DIAS

Institiúid Ard-Léinn
Bhaile Átha Cliath | Dublin Institute for
Advanced Studies

Dublin Institute for Advanced Studies

Annual Report 2020

Institiúid Ard-Léinn
Bhaile Átha Cliath
Tuairisc Bhliantúil 2020

The Dublin Institute for Advanced Studies (DIAS) conducts advanced studies exploring big questions of the 21st century and beyond. Its research gains insights into Celtic society and its legacy; progresses our understanding of our island, our planet and the universe; and deciphers the underpinning mathematical principles of nature.

The Institute leads Ireland's participation in a number of international and global initiatives that focus on big unanswered questions for mankind.

When it was founded in 1940, DIAS was the world's second-only institute for advanced studies – and the first such institute in Europe. For 80 years, it has pushed the boundaries of discovery and, today, it is a globally-embedded institution that attracts high-calibre researchers from all over the world in its core disciplines of Celtic Studies, Theoretical Physics, Astrophysics and Geophysics. DIAS Dunsink Observatory is a designated European site of historical significance for physics.

Currently, there are approximately 100 researchers hailing from 20 different countries based at DIAS.

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Visit our website
to find out more
www.dias.ie

DIAS at a glance

Personnel

115

In 2020, DIAS had 115 team members

97

engaged directly in advanced studies/research and **18** in general administration/support and non-research roles.

Of the **97**;

11

Professors
(Senior Professors and Professors)

21

Other specialist academic and technical staff

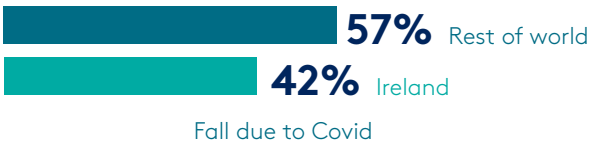
65

Early career researchers
(Fellows, postdocs and scholars).

80%

Of the early stage career researchers, **80%** are funded by external competitively sourced funding.

SCHOLARS



Fall due to Covid

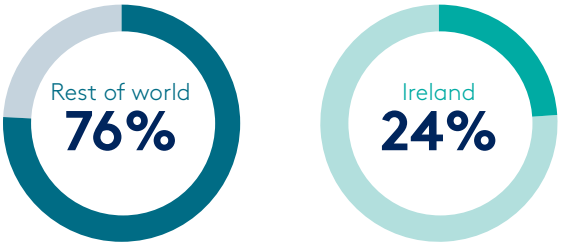
OVERVIEW PROFILE

ORIGIN OF RESEARCHERS

Total number of countries: 22

GENDER

FELLOWS/PROJECT STAFF



Our Financial Resources

FUNDING SOURCES

Funding Expenditure

Oireachtas Grant

€7.210m

Other Sources

€3.3m

Our Partners

ISLAND OF IRELAND COLLABORATIONS

NUIG	TCD
WIT	UCD
AIT	UCC
DCU	Irish Astronomical Society
RIA	NUIM
QUB	Armagh Planetarium
NCI	National Museum of Ireland
TUD	National Monuments Service
IADT	Met Éireann

ADJUNCT APPOINTMENTS

Professors

2

Fellows

8

DIAS at a glance

Our International Research Collaborations*

EUROPEAN AND GLOBAL INFRASTRUCTURE PARTICIPATION

esa H.E.S.S. RadioNet EPOS EUROPEANPLATEOBSERVINGSYSTEM

LOFAR JWST JAXA ESO

Ráiteas an Chathaoirligh

Is cúis mhór áthais dom fáilte a chur romhat chuig Tuarascáil Bhliantúil 2020 Institiúid Ard-Léinn Bhaile Átha Cliath (DIAS), mo thuarascáil deiridh mar Chathaoirleach ar Chomhairle DIAS tar éis deich mbliana sa phost. Ní leor a rá nárbh í 2020 an bhliain a rabhamar ag súil leis, ach lean na hoibreacha agus na dul chun cinn mór ag DIAS.

Cuireadh tús iontach le 2020 leis an bhfógra ar an 3 Eanáir go raibh maoiniú bronnta ar DIAS d'Ollscoil SALI san Fhisic, cuireadh tús le hearcaíocht don phost seo i mí an Mhárta, agus tá súil le ceapachán in 2021.

I mí Eanáir freisin, bhí áthas orm gur seoladh clár DIAS 2020 ag ceiliúradh 80 bliain ar an bhfód ar DIAS. Is beag a bhí ar eolas againn, go mbogfaí go leor de na himeachtaí móra a bhí beartaithe ar líne, nó go gcuirfí siar iad.

I ndeireadh mhí Feabhra tháinig an scéal brónach go bhfuair an tOllamh Denis O'Sullivan, ceannródaí taighde spáis a chuireann go mór le stair DIAS bás ar an 27ú. Chuir Denis, in éineacht leis an Ollamh Alex Thompson, tús le rannpháirtíocht na hÉireann i gcuid de na turgnaimh taighde spáis ardphróifíle, ó mhisin luatha Apollo, go dtí an Stáisiún Spáis Idirnáisiúnta agus threoraigh sé an bealach do thaighdeoirí spáis Éireannacha an lae inniu. Comhbhrón ó chroí lena theaghlach, lena chairde agus lena chomhghleacaithe.

Ní amháin go raibh DIAS 80 in 2020, ach comóradh suntasach a bhí sa bhliain freisin i Scoil an Léinn Cheiltigh, cuimhneachán 21 bliain an Irish Script on Screen (ISOS). Ó 1999 i leith tá 425 de na 5,000 lámhscríbhinn Éireannacha atá ar eolas caomhnaithe go buan agus curtha ar fáil go saor. Faigheann suíomh Gréasáin ISOS na milliúin amas ó níos mó ná 130 tír éagsúil gach bliain.

I lár mhí an Mhárta, d'athraigh gach rud.

Ba chúis áthais dom an méid a rinne DIAS maidir le dul i gcoinne na paindéime COVID-19. Ar fud na scoileanna agus an riaracháin láir, deonaíodh roinnt ball foirne nach raibh in ann obair ón mbaile leis an iarracht náisiúnta. Chuir ár dtaighdeoirí agus ár lucht acadúil mínithe matamaiticiúla ar an gcaoi a scaipeann Covid ar na meáin shóisialta, agus fuair DIAS go leor airde nuair a léirigh sonraí a d'eisigh Líonra Seismeach Náisiúnta na hÉireann a oibríonn DIAS, ní amháin gur thit creathanna talún de dhéantús an duine in Éirinn go dtí timpeall aon trian dá leibhéil réamhdhúnadh i mí Aibreáin, ach léirigh siad freisin nuair a thosaigh gníomhaíocht an duine ag méadú agus ag filleadh ar "gnáth" i gceantar Bhaile Átha Cliath. Cuireadh na sonraí seo ar fáil do NPHET chun cabhrú leo éifeachtacht na srianta sláinte poiblí a mheas.

Rud is suntasaí, b'éigean do roinnt taighdeoirí DIAS dul ar thuras chun sócmhainní/bonneagar náisiúnta a tharrtháil ó bhun an Aigéin Atlantaigh go déanach i mí Aibreáin. Bhí gá le pleanáil agus disciplín an-suntasach i dtéarmaí féin-iargúltacht do thaighdeoirí roimh ré. Bhí mé an-bhródúil as an rath a bhí ar an misean seo, maith sibh do gach duine a bhí bainteach leis. Léiríonn an iarracht seo athléimneacht agus buanseasmhacht fhoireann agus scoláirí DIAS in ainneoin na hagóide.

Bhí mo Deiridh chruinniú Bhord ar siúl ar 19 Meitheamh, an comóradh 80 bliain iarbhír, ar Zoom. Bhí sé seo ag deireadh seachtaine speisialta chun comóradh 80 bliain DIAS a cheiliúradh. Cuireadh tús leis an tseachtain trí bhreathnú ar an bpeirspictíocht stairiúil i seisiún faoi chathaoirleacht David McCullagh https://dias.ie/DIASandDeValera agus chríochnaigh sí le Léacht tionscnaimh Lá DIAS le Buaiteoir Duais Nobel san Ollamh Fisice Gerard d'Hooft. Buíochas le Fisic Theoiriciúil as an léacht seo a eagrú. https://youtu.be/R1cffU108TI

Agus ansin tar éis deich mbliana mar Chathaoirleach na Comhairle bhí sé in am an post faoi phribhléid seo a scor. Is sócmhainn idirnáisiúnta náisiúnta é DIAS, ceannródaí domhanda sna réimsí taighde a bhfreastalaíonn sé orthu. Mar sin féin, tá sé dírithe go príomha ar thaighde bunúsach i gcóras náisiúnta nach gcuireann luach i gcónaí ar ról an taighde bhunúsaigh ná nach maoiníonn na hiarrachtaí seo a mhéid a dhéanann tíortha forbartha eile. Is botún é seo; Ní féidir le hÉirinn a bheith díreach mar fhorbróir iartheachtach smaointe náisiúin eile. Teastaíonn i bhfad níos mó cothromaíochta uainn inár gcláir náisiúnta taighde. Tá luach intreach ollmhór i dtaighde 'gorm spéartha'. Ba chóir go mbeadh spéartha gorma soiléire thar DIAS do na glúine atá le teacht.

Mar sin chun mo théarma a thabhairt i gcrích in amanna nach bhfacthas riamh roimhe, ba mhaith liom buíochas a ghabháil le Eucharia Meehan, ár gCláraitheoir & POF reatha agus Cecil Keaveney, ár gCláraitheoir roimhe seo. Buíochas speisialta leis an bhfoireann sa Riarachán Lárnach as a dtacaíocht - Mary Burke agus Grace Forkin, agus a bhfoirne. Buíochas freisin le baill reatha agus roimhe seo na Comhairle agus an Bhoird Rialaithe, agus le baill foirne agus scoláirí uile DIAS as a gcuid oibre crua agus a dtiomantas d'fhorbairt bhreise DIAS mar ionad barr feabhais idirnáisiúnta do thaighde bunúsach. Guím gach rath ar DIAS sna 80 bliain amach romhainn agus ina dhiaidh sin.

An tOllamh Vincent Cunnane
Cathaoirleach go dtí Meitheamh 2020

Chairmans Statement

It's my great pleasure to welcome you to the 2020 Annual Report of the Dublin Institute for Advanced Studies (DIAS), my final report as Chair of the DIAS Council after ten years in the position. It would be an understatement to say that 2020 was not the year we expected it to be, but the great works and advances at DIAS continued.

2020 got off to a magnificent start with the announcement on 3rd January that DIAS had been awarded funding for a SALI Professorship in Physics, recruitment for this position began in March, with an appointment anticipated in 2021.

Also in January, I was delighted that the DIAS 2020 programme marking DIAS's upcoming 80th anniversary launched. Little did we know, that many of the great events planned would be moved online, or postponed.

Late February brought the sad news that Professor Denis O'Sullivan, a space research pioneer who make a significant contribution to the history of DIAS passed away on the 27th. Denis, along with Professor Alex Thompson, initiated Ireland's participation in some of the most high profile space research experiments, from the early Apollo missions, to the International Space Station and led the way for Irish space researchers of today. Sincerest condolences to his family, friends and colleagues.

Not only was DIAS 80 in 2020, but the year also marked a significant anniversary in the School of Celtic Studies, the 21st anniversary of the Irish Script on Screen (ISOS) project. Since 1999 425 of the 5,000 known Irish manuscripts have been permanently preserved and made freely available. The ISOS website receives millions of hits from more than 130 different countries each year.

In mid-March, everything changed.

I was heartened by the DIAS contribution to countering the COVID-19 pandemic. Across the schools and central administration, a number of staff who couldn't work from home were volunteered to the national effort. Our researchers and academics posted mathematical explanations as to how Covid spreads on social media, and DIAS received a lot of attention when data released by the DIAS-operated Irish National Seismic Network showed that not only had human-made ground vibrations in Ireland dropped to approximately one third of their pre-lockdown levels in April, but also showed when human activity began to increase and return to "normal" in the Dublin area. This data was provided to NPHET to help them assess the effectiveness of public health restrictions.

Most dramatically, a number of DIAS researchers needed to go on an expedition to rescue national assets/infrastructure from the bottom of the Atlantic Ocean in late April. Very significant planning and discipline was required in terms of self-isolation for researchers in advance. I was very proud of the success of this mission, well done to everyone involved. This endeavour is reflective of the resilience and perseverance of DIAS staff and scholars in the face of adversity.

My Final Board meeting took place on June 19th, the actual 80th anniversary, by Zoom. This was at the end of a special week to mark the DIAS 80th anniversary. The week started by looking at the historical perspective in a session chaired by David McCullagh https://dias.ie/DIASandDeValera and ended with the inaugural DIAS Day Lecture by Nobel Prizewinner in Physics Professor Gerard d'Hooft. Thanks to Theoretical Physics for organising this lecture. https://youtu.be/R1cffU108TI

And then after ten years as Chair of the Council it was time to relinquish this privileged position. DIAS is a national international asset, a world leader in the areas of research it serves. However, it is primarily devoted to basic research in a national system which does not always value the role of basic research nor fund these endeavours to the extent other developed countries do. This is a mistake; Ireland cannot just become the downstream developer of other nations' ideas. We need much more balance in our national research programmes. There is huge intrinsic value in 'blue skies' research. There should be clear blue skies over DIAS for generations to come.

So to conclude my term in unprecedented times, I would like to thank Eucharia Meehan, our current Registrar & CEO and Cecil Keaveney, our previous Registrar. Special thanks to the staff in Central Administration for their support – Mary Burke and Grace Forkin, and their teams. Thanks also to current and previous Council and Governing Board members, and all DIAS staff and scholars for their hard work and dedication to the further development of DIAS as a centre of international excellence for fundamental research. I wish DIAS every success for the next 80 years and beyond.

Professor Vincent Cunnane
Chairman to 30 June 2020

Ráiteas an Chathaoirligh

Ba mhór an onóir dom a bheith ceaptha mar Chathaoirleach ar Chomhairle DIAS i bhfómhar na bliana 2020. Is pribhléid é a bheith ag obair le hInstitiúid ar chaighdeán ard. Tá oidhreacht fhada ag DIAS a bheith ina lárionad barr feabhais maidir le fionnachtain eolais agus tá cáil idirnáisiúnta den scoth air - táim ag tnúth le mo pháirt a ghlacadh mar Chathaoirleach sna blianta amach romhainn agus tacú leis an obair seo leis an gComhairle nua, agus le foireann na hInstitiúide.

Ní gnáthbhliain a bhí in 2020 ag DIAS, ná áit ar bith, ach thar na dianghlasáil tá cáilíocht na foirne agus na scoláirí feicthe againn ó thaobh aschur taighde agus diongbháilteacht leanúint lena gcuid oibre. I measc na samplaí bhí:

- Fisiceoirí teoiriciúla ag úsáid cláir dhubha lasmuigh chun fadhbanna a réiteach go comhoibritheach
- Geoifisiceoirí ag seoladh turas farraige rathúil comhlíontach Covid-19
- Ár Réaltfhisiceoirí ag tógáil teileascóip sa chlós cúil
- Obair leanúnach Scoil an Léinn Cheiltigh ar a dtionscadal rish Script on Screen, leis na milliúin amas ar láithreáin ghréasáin, ó níos mó ná 130 tír, in 2020.

Comhghairdeas le gach duine a bhí ag obair ar thionscadail nua ar fud na hinstitiúide i mbliana. Bhí sé iontach an éagsúlacht agus an meascán dámhachtainí agus onóracha a fheiceáil. I measc na samplaí tá:

- Caitriona Jackman, as Ollscoil Southampton, ag teacht le DIAS, nuair a bronnadh Gradam Uachtarán na hÉireann do Cheannairí Taighde sa Todhchaí SFI uirthi ag searmanas speisialta in Áras an Uachtaráin as a tionscadal "Data analytics and machine learning in Space Science."
- Tá taighdeoirí DIAS - an Dr. Brian O'Reilly, an tOllamh Sergei Lebedev, an Dr. Javier Fullea, an Dr. Duygu Kiyan agus an tOllamh Chris Bean - i measc na gcomhoibritheoirí ar thionscadal nua, DIG (Acmhainneacht fuinnimh gheoiteirmeach na hÉireann a Dhíchur) , a fuair maoiniú ó Údarás Fuinnimh Inbhuanaithe na hÉireann (SEAI) agus Suirbhéireacht Gheolaíochta na hÉireann.
- Foilsiú "Clóliosta: Printing in the Irish language, 1571–1871, an attempt at narrative bibliography" leis an Dr. Micheál Hoyne ó Scoil an Léinn Cheiltigh, leis an Ollamh Richard Sharpe, nach maireann, as Coláiste Wadham in Ollscoil Oxford.
- Páipéar nua leis an H.E.S.S. comhoibriú, lena n-áirítear eolaithe DIAS, an tOllamh Felix Aharonian, an tOllamh Emeritus Luke Drury agus an Dr. Jonathan Mackey, in Nature, tar éis luasaire cáithníní ollmhór a bhrath a chuimsíonn na mílte solasbhliain.
- Bhuaigh foireann DIAS an IBM Qiskit Quantum Summer Jam Hackathon. Chuir an fhoireann, Luuk Coopmans, an Dr Ian Jubb, mic léinn samhraidh DIAS Cillian Doherty, Maria Graham, agus Rajarshi Tiwari, i bhfeidhm agus feabhsaíodh iad ar phróiseáil íomhánna núíosacha agus halgartaim comhartha uisce.

Ina theannta sin, ba chúis áthais dom leanúint den dul chun cinn do Phlean Straitéiseach DIAS trí chur i bhfeidhm an chláir Aidiachta nua, agus trí chéad cheapacháin taighdeoirí foirmiúla Aidiachta. Leanfar tuilleadh ceapacháin i 2021.

Níorbh í DIAS80 an bhliain chomórtha a rabhthas ag súil léi nó a bhí beartaithe di, ach is féidir leis an Institiúid a bheith bródúil as na himeachtaí ar líne a tharla chun 80 bliain de DIAS a chomóradh. Is féidir roinnt buaicphointí 80 bliain DIAS a fheiceáil ar https://dias.ie/DIAS2020/video

Mar a bhí riamh, ní bheifí in ann an obair iontach a dhéantar ag DIAS a dhéanamh gan ranníocaíocht ár gcuid Comhairle agus baill an Bhoird Scoile Rialaithe, a thugann leas a gcuid ama, saineolais agus taithí don institiúid. Táimid buíoch go háirithe dóibh as a dtacaíocht.

Níos tábhachtaí fós don bhliain seo de 2020, ba mhaith liom ómós speisialta a thabhairt do, agus mo bhuíochas ó chroí a ghabháil leis an bhfoireann, na scoláirí agus na taighdeoirí uile ag DIAS. Is eol dom go ndeachaigh an paindéim go mór i bhfeidhm ar chuid acu. Tá tú i gcroílár DIAS, agus a thodhchaí, go raibh maith agat as leanúint le d'obair iontach trí amanna dúshlánacha. Ba mhaith liom aitheantas a thabhairt freisin do thiomantas agus gairmiúlacht eiseamláireach ár gCláraitheora agus POF a raibh a dtacaíocht thar a bheith luachmhar dom mar Chathaoirleach.

Faoi dheireadh, bhí bróga móra le líonadh agam nuair a ghlac mé seilbh ar an gCathaoirleach roimhe seo, an tOllamh Vincent Cunnane. Buíochas le Vincent as a thiomantas do DIAS thar a théarma mar Chathaoirleach na Comhairle, agus guím gach rath agus sonas air sa todhchaí.

Dr. Peter Heffernan
Cathaoirleach

Chairmans Statement

It was an honour to be appointed as Chair of the Council of DIAS in the autumn of 2020. It is a privilege to work with an Institute of such a high calibre. DIAS has a long legacy of being a centre of excellence for knowledge discovery and has an excellent international reputation – I look forward to playing my part as Chair in the coming years and supporting this work with the new Council, and staff of the Institute.

2020 has not been a typical year at DIAS, or anywhere, but over the lockdowns we have seen the calibre of the staff and scholars in terms of research output and sheer determination to continue their work. Examples included:

- Theoretical physicists using outdoor blackboards for collaborative problem-solving
- Geophysicists conducting a successful Covid-19 compliant sea expedition
- Our Astrophysicists building telescopes in the back yard
- The continued work of the School of Celtic Studies on their Irish Script on Screen project, with millions of website hits, from over 130 countries, in 2020.

Congratulations to all of those working on new projects across the institute this year. It was great to see the variety and mix of awards and honours. Examples include:

- Dr. Caitriona Jackman, of the University of Southampton, joining DIAS, on being awarded a SFI President of Ireland Future Research Leaders Award at a special ceremony in Áras an Uachtaráin for her project "Data analytics and machine learning in Space Science."
- DIAS researchers – Dr. Brian O'Reilly, Prof. Sergei Lebedev, Dr. Javier Fullea, Dr. Duygu Kiyan and Prof. Chris Bean - are among the collaborators on a new project, DIG (De-risking Ireland's Geothermal energy potential), which received funding from Sustainable Energy Authority of Ireland (SEAI) and Geological Survey Ireland.
- The publication of "Clóliosta: Printing in the Irish language, 1571–1871, an attempt at narrative bibliography" by Dr. Micheál Hoyne of the School of Celtic Studies, with the late Professor Richard Sharpe of Wadham College at the University of Oxford.
- A new paper by the H.E.S.S. collaboration, including DIAS scientists Prof. Felix Aharonian, Prof. Emeritus Luke Drury and Dr. Jonathan Mackey, was published in Nature, having detected a gigantic particle accelerator spanning thousands of light years.
- DIAS' team won the IBM Qiskit Quantum Summer Jam Hackathon. The team, Luuk Coopmans, Dr Ian Jubb, DIAS summer students Cillian Doherty, Maria Graham, and Rajarshi Tiwari, implemented and improved upon novel image processing and watermarking algorithms.

Furthermore, I was delighted to see the continuation of progress for the DIAS Strategic Plan through the implementation of the new Adjunct programme, and the first appointments of formal Adjunct researchers. Further appointments will follow in 2021.

DIAS80 wasn't the anniversary year that was expected or planned for, but the Institute can be proud of the online events that took place to commemorate 80 years of DIAS. Some highlights of the 80 years of DIAS can be seen on https://dias.ie/DIAS2020/video

As ever, the tremendous work carried out at DIAS would not be possible without the contribution of our Council and Governing School Board members, who give the benefit of their time, expertise and experience to the institute. We are particularly grateful to them for their support.

But most importantly for this year of 2020, I would like to pay special tribute to, and offer my sincere thanks to all the staff, scholars and researchers at DIAS. I am aware that some were very impacted by the pandemic. You are at the heart of DIAS, and its future, thank you for continuing your great work through challenging times. I also wish to acknowledge the exemplary dedication and professionalism of our Registrar and CEO whose support have been invaluable to me as Chair.

Finally, I had big shoes to fill when I took over from the previous Chair, Professor Vincent Cunnane. Thanks to Vincent for his dedication to DIAS over his term as Chair of the Council, and I wish him every success and happiness for the future.

Dr. Peter Heffernan
Chairman

Ráiteas an Chláraitheora/POF

Tá áthas orm fáilte a chur romhat chuig Tuarascáil Bhliantúil eile ó Institiúid Ard-Léinn Bhaile Átha Cliath (DIAS). Ba bhliain mhór í 2020 dúinn - ar bhealach a rabhthas ag súil leis, de réir mar a chas DIAS 80 bliain d'aois, agus ar bhealach an-gan choinne de réir mar a d'athraigh Covid 19 an domhan, agus an chaoi a ndéanaimid rudaí. Táim an-bhródúil as an gcaoi ar fhreagair gach duine ag DIAS do na cúinsí athraithe, ar fud ár dtrí scoil agus ár riarachán lárnach. Bhí páirt ag gach duine lena chinntiú go mbeadh 2020 fós ina bliain d'obair agus d'fhionnachtana iontach, agus mar cheiliúradh ar ár gcomóradh 80 bliain suntasach.

Chun tús a chur leis, ba chosúil nach raibh 2020 ach bliain eile le taighde á fhoilsiú in Nature Communications agus Nature Astronomy i mí Eanáir, agus seoladh Solar Orbiter i mí Feabhra i SAM https://www.dias.ie/2020/02/11/dias- an-esa-gréine-orbiter/

De réir mar a d'fhás nuacht faoin Coronavirus a bhí ag teacht chun cinn, ba é an chéad tionchar suntasach do DIAS ná nuair a chuir an tOllamh Pan go déanach i mí Feabhra - ar a dtugtar athair na Ríomhaireachta Candamach - agus atá lonnaithe i Shanghai, a léacht i mBaile Átha Cliath ar ceal, an chéad cheann de roinnt léachtaí pleanáilte i an tsraith DIAS 2020.

Ansin go tobann an 12 Márta, d'athraigh an domhan. Chuaigh DIAS isteach i nglasáil pháirteach agus bhog sé ar dtús chuig samhail iomlán iargúlta oibre.

Chuaigh ar aghaidh le cuid dár léachtaí poiblí ar líne ar Zoom, agus buíochas leis an bhfoireann inmheánach ar fud na hInstitiúide as sraith iontach léachtaí poiblí a raibh an-tóir orthu darb ainm "The Lockdown Lectures" a bhí ar siúl go seachtainiúil sa tréimhse Bealtaine go Meitheamh https://dias.ie/lockdownlectures

Buíochas mór leis na hOifigigh agus Ionadaithe Sláinte agus Sábháilteachta agus leis an bhfoireann riaracháin sna scoileanna, agus leis an bhfoireann i riarachán lárnach agus TF as a gcuid oibre ollmhór chun cianobair a chumasú, i mbeartas S&S a nuashonrú, prótacail nua a fhorbairt, agus na suíomhanna a eagrú do athoscailt iomlán i rith an tsamhraidh. Faraor b'éigean dúinn filleadh ar mhúnla cumaiscthe iargúlta agus ar an láthair san fhómhar mar gheall ar riachtanais um fhadú sóisialta agus treoirlínte sláinte poiblí, ach ba é an dea-scéal gur lean an taighde ar aghaidh, a bhuíochas lenár bhfoireann thiomnaithe agus lenár scoláirí.

Lean seimineáir acadúla ar fud na hInstitiúide freisin agus bhí 39 san iomlán ag Fisic Theoiriciúil, trí Zoom, ó thús mhí Aibreáin go deireadh na bliana. Tá gach ceann díobh ar fáil ar chainéal YouTube DIAS https://www.youtube.com/DIASDublin

In ainneoin frithdhúnadh, ba bhliain mhór í 2020 do DIAS. Buíochas le gach duine a chuaigh i dteagmháil le haghaidh ár gcomóradh 80 bliain, ó ar fud na hÉireann agus níos faide i gcéin.

D'oibríomar le Humans of Dublin sa tréimhse roimh Lá Idirnáisiúnta na mBan i mí an Mhárta chun cuid dár dtaighdeoirí mná cumasacha a thaispeáint anseo ag DIAS. Buíochas lenár nAmbasadóirí: an Dr Duygu Kiyan, an Dr Nike Stam, an Dr Caitriona Jackman agus an Dr Haleh Karbala Ali as a rannpháirtíocht.

Bhíomar thar a bheith sásta lenár gclárú mór d'Fhéile Staire 2020. Thug an tOllamh Dame Jocelyn Bell Burnell léargas iontach ar Réalteolaíocht le 100 bliain anuas agus amach romhainn agus rinne an tOllamh Luke O'Neill an clár faisnéise 'Thinking Outside the Box - Schrödinger in Ireland' a scagadh faoi éachtaí Erwin Schrödinger i mBaile Átha Cliath agus plé painéil ar líne ina dhiaidh sin.

I mbliana freisin bhí ár dtríú féile Samhain agus Eolaíochta thar thréimhse Oíche Shamhna. Cé gur tharla na cainteanna go hiomlán ar líne bhí an clár is mó againn fós agus mheall muid lucht féachana domhanda. https://dias.ie/samhainagusscience2020

Bhí an obair ar siúl i gcónaí ar phríomhbheartais ag DIAS i rith 2020. Is díol suntais ar leith é obair na Foirne Comhionannais agus Cuimsitheachta Inscne, comhaontú ar Straitéis Inscne athbhreithnithe, agus plean gníomhaíochta agus muid ag tosú ar obair i dtreo creidiúnú Juno agus Athena Swan.

In aon bhliain, tá sé tábhachtach go mbraitheann gach duine mar chuid de phobal DIAS. I mbliain phaindéimeach bhí sé níos tábhachtaí fós. Cé go cianda, bhí sé iontach Lá Gach Duine @ DIAS agus ár dTósta Nollag a bheith againn - buíochas leis an Dr Richard Gow, an Dr Nike Stam agus Luuk Coopmans as eagrú. Dhírigh na himeachtaí go háirithe ar fháilte a chur roimh thaighdeoirí agus scoláirí nua DIAS.

Cé nach dtugann tuarascáil na bliana seo an gnáthliosta d'acadóirí agus taighdeoirí ar cuairt ó thar lear, tá bród orm a rá gur leathnaigh sroicheadh DIAS ar fud na hÉireann agus go dtí os cionn 140 tír ar fud na cruinne in 2020. Ó ISOS go léachtaí ar líne, imeachtaí ar líne agus fiú turas ar líne ar Dunsink, tá daoine ag logáil isteach ar ár láithreáin ghréasáin. Tógfaimid air seo nuair a fhillfidh imeachtaí pearsanta, mar a rinneamar i gcónaí, ag cinntiú go bhfuil taifeadtaí ar fáil dóibh siúd atá ag brath ar rochtain ar líne, chomh maith le himeachtaí cumaiscthe a bheith acu.

Registrar/CEO Statement

I am pleased to welcome you to another Annual Report by the Dublin Institute for Advanced Studies (DIAS). 2020 was a big year for us – in an expected way, as DIAS turned 80, and in a very unexpected way as Covid 19 changed the world, and how we do things. I am very proud of how everyone at DIAS reacted to the changed circumstances, across our three schools and central administration. Everybody played their part in ensuring that 2020 would still be a year of great work and discovery, and of celebration for our landmark 80th anniversary.

To begin with, 2020 seemed like just another year with research being published in Nature Communications and Nature Astronomy in January, and the Solar Orbiter launch in February in US https://www.dias.ie/2020/02/11/dias-the-esa-solar-orbiter/

As news grew about the emerging Coronavirus, the first significant impact for DIAS was when in late February Professor Pan – known as the father of Quantum Computing – and based in Shanghai, cancelled his lecture in Dublin, the first of a number of planned lectures in the DIAS 2020 series.

Then suddenly on March 12th, the world changed. DIAS went in to partial lockdown and moved initially to a full remote working model.

Some of our public lectures went ahead on-line by Zoom, and indeed thanks to the internal team across the Institute for a fantastic series of very popular public lectures called "The Lockdown Lectures" which took place weekly in the May to June period https://dias.ie/lockdownlectures

Big thanks to the Health and Safety Officers and Representatives and the administrative staff in the schools, and to the staff in central administration and IT for their massive work in enabling remote working, in updating H&S policy, developing new protocols, and organising the sites for full re-opening over the summer. Sadly we had to revert to a blended remote and onsite model in the autumn due to social distancing requirements and public health guidelines, but the good news was that the research continued, thanks to our dedicated staff and scholars.

Academic seminars also continued across the Institute with Theoretical Physics holding 39 in total, via Zoom, from early April to year end. There are all available on the DIAS YouTube Channel https://www.youtube.com/DIASDublin

Despite lockdowns, 2020 was a big year for DIAS. Thanks to all those who got in touch for our 80th anniversary, from around Ireland and further afield.

We collaborated with Humans of Dublin in the run up to International Women's Day in March to showcase some of our talented female researchers here at DIAS. Thanks our Ambassadors: Dr Duygu Kiyan, Dr Nike Stam, Dr Caitriona Jackman and Dr Haleh Karbala Ali for their participation.

We were delighted with our prestigious line-up for the 2020 Festival of History. Professor Dame Jocelyn Bell Burnell gave a fascinating insight into Astronomy over the past and next 100 years and Professor Luke O'Neill screened the documentary 'Thinking Outside the Box – Schrödinger in Ireland' about Erwin Schrödinger's achievements in Dublin followed by an online panel discussion.

This year also saw our third Samhain agus Science festival over the Halloween period. Although the talks took place entirely online we had our biggest programme yet and attracted a global audience. https://dias.ie/samhainagusscience2020

Work has continued on key policies at DIAS throughout 2020. Of particular note, was the work of the Gender Equality and Inclusion Team, agreeing a revised Gender Strategy, and plan of action as we begin work towards Juno and Athena Swan accreditation.

In any year, it's important that everyone feels part of the community that is DIAS. In a pandemic year it was even more important. Albeit remotely, it was great to have Everyone@DIAS Day and our Christmas Toast – thanks to Dr Richard Gow, Dr Nike Stam and Luuk Coopmans for organising. The events focused in particular on welcoming new DIAS researchers and scholars.

While this year's report does not bring the usual list of visiting academics and researchers from overseas, I am proud to say that DIAS' reach extended all across Ireland and to over 140 countries across the globe in 2020. From ISOS to online lectures, online events and even an online tour of Dunsink, people have been logging on to our websites. We will build on this when in person events return by, as we have always done, ensuring that recordings are available for those who rely on online access, in addition to having blended events.

Ráiteas an Chláraitheora & POF (ar lean)

Gabhaim buíochas le baill ár gComhairle, Boird Rialaithe, ár gcomhoibrithe, soláthraithe agus gach duine a chabhraigh leis an eagraíocht a choinneáil ag feidhmiú in am an-dúshlánach. Buíochas freisin le baill an Choiste Iniúchta agus Riosca as an ról ríthábhachtach atá acu i dtéarmaí riosca, rialaithe, rialachais agus dearbhuithe gaolmhara na hInstitiúide. Agus ar deireadh, buíochas leis an Roinn Breisoideachais agus Ardoideachais, Taighde, Nuálaíochta agus Eolaíochta as tacaíochtaí tábhachtacha Covid.

Tá súil againn go dtabharfaidh ár gcéad tuarascáil eile nuacht faoi fhilleadh ar rud éigin atá beagnach gnáth i dtéarmaí gníomhaíochtaí pearsanta de réir mar a athosclaíonn an tír go mall. Anseo i DIAS leanfaimid orainn ag obair i dtreo na spriocanna a leagadh síos inár straitéis 2018-2022 a bhaint amach, "Embedded Globally, Strength Locally" https://dias.ie/strategy2018_2022, agus fionnachtana nua a threorú i dtaighde teorann. Táimid ag tnúth le 2021 dearfach, agus le dul i dteagmháil leat i rith na bliana seo chugainn.

Dr Eucharia Meehan MRIA
Registrar & CEO

Registrar/CEO Statement (continued)

My sincere thanks to the members of our Council, Governing Boards, our collaborators, suppliers and all those who helped keep the organisation functioning in a very challenging time. Thanks also to the members of the Audit and Risk Committee for the vital role they play in terms of risk, control, governance and associated assurances of the Institute. And finally, thanks to the Department of Further and Higher Education, Research, Innovation and Science for important Covid supports.

Our next report will hopefully bring news of a return to something close to normal in terms of in person activities as the country slowly reopens. Here in DIAS we will continue to work towards reaching the targets set in our 2018-2022 strategy, "Embedded Globally, Strength Locally" https://dias.ie/strategy2018_2022, and lead new discoveries in frontier research. We look forward to a positive 2021, and to engaging with you over the next year.

Dr Eucharia Meehan MRIA
Registrar & CEO

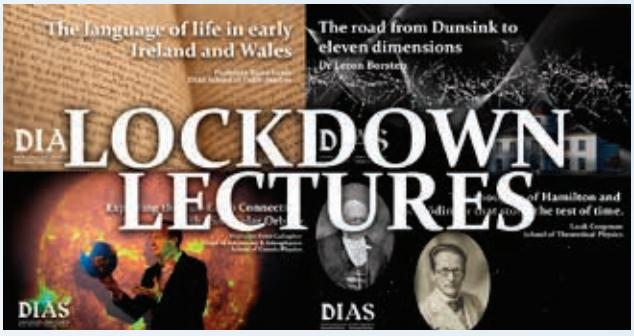
Ag an seoladh le comóradh 80 bliain DIAS, an tOllamh Peter Gallagher, Dr Eucharia Meehan CEO & Registrar, Professor Ruairí Ó'Huiginn and Professor Chris Bean.

Launching the programme for DIAS 80's anniversary Professor Peter Gallagher, Dr Eucharia Meehan CEO & Registrar, Professor Ruairí Ó'Huiginn and Professor Chris Bean.

2020 in Pictures/ 2020 i bPictúirí

Feabhra: An tOllamh Heino Falke(Ollscoil Radboud, an Ísiltír agus an tOllamh Tom Ray ag Léacht Reachtúil a tionóladh i gColáiste na hOllscoile, Baile Átha Cliath.

February: Professor Heino Falke (Radboud University, the Netherlands and Professor Tom Ray at the Statutory Lecture which was held at University College Dublin.



Bealtaine/Meitheamh: Thóg gach scoil agus rannóg í bpáirt na léachtaí rathúla ar line "Lockdown Lectures".

May/June All schools and sections took part in our very successful "Lockdown Lectures" series of online lectures.

Márta: Chun Lá Idirnáisiúnta na mBan a cheiliúradh chomhoibrigh DIAS le "Humans of Dublin", chun an obair do na taighdóiri baineann a thaispeant.

March: To mark International Women's Day, DIAS collaborated with "Humans of Dublin" to showcase some of our female researchers.

SOCIAL MEDIA

Followers: 31 December 2019	619	176	1,136	1,667	n/a
Followers: 31 December 2020*	830	362	1,292	2,217	250
Percentage increase	+34%	+101%	14%	+33%	n/a

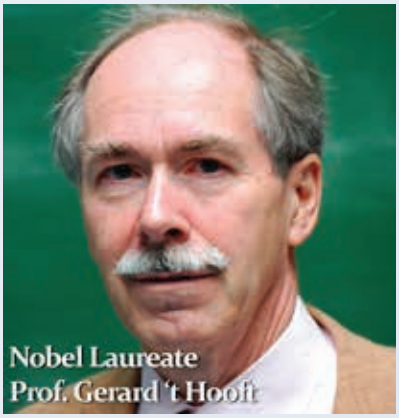
* figures are estimates based on annualised follower counts.

Bealtaine: An tOllamh Sergei Lebedev ar mbord an RV Celtic Explorer mar chuid de mhisean aisghabhála Covid-safe chun sisiméadaiméadar farraigre tábhachtach a aisghabháil.

May: Professor Sergei Lebedev on board the RV Celtic Explorer as part of a Covid-safe retrieval mission to recover important ocean bottom seismometers.

Meitheamh: Príomhoifigeach Leighis an Dr Tony Holohan luann sonraí Dias Geophysics/INSN ag plé gluaiseach danra faoi shrian Covid.

June: Chief medical officer Dr Tony Holohan cites Dias Geophysics/ INSN data when discussing population movement under coronavirus restrictions.



Meitheamh: Seachadta an Labhras Nobel an tOllamh Gerhardt d'Hooft and chéad bhliantúil leach ar Lá DIAS.

June: Nobel Laureate Professor Gerhard d'Hooft delivered our first Annual DIAS Day lecture.

An Dr. Micheál Hoyne agus "Clóliosta" as an Scoil Cheilteach agus cóip nuafhoilsithe de "Clóliosta" a chur se in ann leis an tOllamh Richard Sharpe.

Dr. Micheál Hoyne from the School of Celtic Studies with a copy of the newly published "Clóliosta" which he co-wrote with the late Professor Richard Sharpe.

Nollag: Sheol DIAS an chéad comórtas réaltfhótagrafaoíocht le Alice PR agus The Irish Times.

December: DIAS launched our inaugural astrophotography competition in conjunction with Alice PR and the Irish Times.

SECTION 1

School of Celtic Studies

Scoil an Léinn Cheiltigh

Scoil an Léinn Cheiltigh

COMHTHÉACS

Fearacht go leor réimsí eile den saol, níor bheag an cur isteach a rinne paindéim Covid 19 ar obair na Scoile. B'éigean na seimineáir againn a chur ar ceal i ngeall ar an gcéad dianghlasáil, ach faoin bhfómhar bhí ár gcumas iad a chur ar bun arís ar líne. Ar an gcuma chéanna, ba ghá roinnt ócáidí a bhí eagraithe le ceiliúradh a dhéanamh ar chothrom 80 bliain ó bunaíodh an Institiúid a chur siar. Ina measc siúd bhí sraith léachtanna ar shean-dlíthe na hÉireann a bhí le bheith ar bun san earrach agus comhdháil ar an ilteangachas sna meánaoiseanna a bhí le bheith i Mí na Bealtaine. Bhí orainn an Tionól bliantúil agus an léacht reachtúil a chur siar, ach beidh siad seo ar siúl arís ach a mbeidh an uain ann. Cuireadh siar nó cuireadh ar ceal comhdhálacha agus ócáidí acadúla eile a raibh cuireadh faighte ag baill den Scoil a bheith páirteach iontu. Agus chuir na bacanna a d'eascair as Covid i gcaitheamh na bliana moill ar obair a bhí réitithe ag baill na Scoile le foilsiú.

Mar sin féin, socraíodh ar réimeas gníomhaíochta a chuir ar chumas daoine obair ón mbaile agus bhí cead ag an bhfoireann leas a bhaint as na hoifigí agus as an leabharlann lá amháin in aghaidh na seachtaine, rud a lig don obair thaighde agus clár foilseacháin na Scoile dul ar aghaidh.

TAIGHDE

Lean Liam Breatnach lena chuid oibre ar eagrán de dhán de chuid na naoú haoise, *A mmo Choimmdiu cid do-gén fri Firu Arda, ar Bretha Nemed Toísech,* ar Ghraiméar Meán-Ghaeilge agus réitigh sé roinnt páipéar le haghaidh a bhfoilsithe.

Bhí Ruairí Ó hUiginn ag obair ar eagrán den téacs *Oileamhain Chon Culainn agus Oidheadh Chonnlaoich mheic Con Culainn*, ar cháipéisí a bhaineann le Somhairle Mac Domhnaill agus réitigh sé imeachtaí comhdhála agus roinnt alt le haghaidh a bhfoilsithe.

Chríochnaigh Barry Lewis a eagrán de *Bonedd y Saint,* ginealaigh na naomh Breatnach, agus chuir sé faoi bhráid Choiste na bhFoilseachán é.

Choinnigh Aoibheann Nic Dhonnchadha uirthi lena cuid taighde ar théacsanna leighis de chuid na Nua-Ghaeilge Moiche agus réitigh páipéar comhdhála le haghaidh a fhoilsithe.

Chríochnaigh Michelle O Riordan a leabhar *Poetics and Polemics* agus chuir faoi bhráid Cork University Press lena fhoilsiú faoi dheireadh na bliana. Tá sí ag leanacht lena cuid taighde ar réimsí eile.

Lean Brian Ó Curnáin lena chuid oibre ar ghnéithe éagsúla de shochtheangeolaíocht na Nua-Ghaeilge agus Gaeilge na hAlban agus ar an gcanúineolaíocht mar a raibh sé ag obair ar mhonagraf ar Ghaeilge Oirthear na Gaillimhe. Thaifead sé ábhar agus rinne tras-scríobh ar roinnt foinsí lámhscríofa, clóite agus taifeadta i nGaeilge na hÉireann agus i nGaeilge na hAlban agus réitigh saothair eile le haghaidh a bhfoilsithe.

Lean Mícheál Hoyne lena chuid oibre ar eagrán nua de *Irish Grammatical Tracts* III–IV agus réitigh roinnt alt le haghaidh a bhfoilsithe.

Lean Chantal Kobel ag obair ar chóidéacseolaíocht lámhscríbhinní Gaeilge dlí de chuid na meánaoiseanna, chuir sí eagar ar gluais dlí nár foilsíodh roimhe seo agus thosaigh ar staidéar cóidéacseolaíochta a dhéanamh ar lámhscríbhinní Thaidhg Uí Ríghbhardáin. Réitigh sí roinnt alt le haghaidh a bhfoilsithe.

Choinnigh Nike Stam léi ag obair ar a tras-scríbhinn agus a heagrán de bhlúirí filíochta atá bainteach leis an Tráchtaireacht ar *Félire Óengusso,* atá i ndá lámhscríbhinn i Leabharlann Ríoga na Bruiséile. Is féidir iad seo a fheiceáil ar shuíomh idirlín Mheamram Páipéar Ríomhaire (ISOS). Tá socruithe déanta aici leis an ábhar seo a chur i gcló.

Thosaigh sí ag déanamh imscrúdú le córas Python ar na comhaid XML d'fhonn códmhalartú a aimsiú sna leaganacha lámhscríofa uile agus tá sí ag cur na leaganacha éagsúla sin i gcomparáid lena chéile. Tá sí le torthaí an imscrúdaithe seo a chur i láthair na comhdhála ar Lámhscríbhinní Ilteangacha a d'eagraigh sí le Scoil an Léinn Cheiltigh agus atá le bheith ar bun i Mí na Bealtaine 2021. Foilseofar imeachtaí na comhdhála sin. Tá obair déanta aici freisin ar dhá alt ina gcuirfidh sí eagrán criticiúil de bhlúire filíochta ar fáil agus roinnt gluaiseanna ar Naomh Céile Críst.

Lean Andrea Palandrí lena chuid oibre ar eagrán, aistriúchán agus anailís ar an leagan Gaeilge de scéal Marco Polo a scríobhadh i dtréimhse na Nua-Ghaeilge Moiche. Tá sé i gceist aige an t-eagrán seo a chur faoi bhráid Choiste na bhFoilseachán le go bhfoilseofaí i Sraith na Nua-Ghaeilge Moiche é. Ina cheann sin, thosaigh sé ag obair ar aircív fhuaime na Scoile, bailiúchán GLÓR, agus tá sé á réiteach le cur ar líne. Baineann an-chuid obair dhigitithe agus tras-scríobh leis an tionscadal. Mar chuid de seo, rinne sé maoirseacht ar an obair a rinne roinnt de na hintéirnigh shamhraidh a d'fhostaigh an Scoil.

Bhí Christina Cleary ag obair ar a tionscadal 'A Diachronic Study of the Commentary to the *Amrae Coluimb Chille*'. Go nuige seo, tá tras-scríobh déanta aici ar iomlán na tráchtaireachta i gceithre cinn de na cúig lámhscríbhínn a bhfuil sí le fáil iontu agus a bhfuil fúithi iad a chur in eagar. Faoi láthair is ag obair ar an gcúigiú lámhscríbhinn, ARÉ LS C iii 2 atá sí. Ina cheann sin, bhí sí ag obair ar dhá pháipéar le haghaidh a bhfoilsithe. Is éard atá sa chéad cheann acu seo, leagan den chaint a thug sí ag an gcomhdháil 'Intentional obscuritas in Irish and Welsh literature (650–1650)', a bhí ar bun sa Scoil i 2019; eagrán maille le haistriúchán ar an dán Meán-Ghaeilge atá sa tráchtaireacht ar ACC *Aed mac Ainmirech na n-all* atá san alt eile.

School of Celtic Studies

CONTEXT

The Covid 19 pandemic proved to be as disruptive to the work of the School of Celtic Studies as it was elsewhere. Our seminars had to be cancelled due to the first lockdown but were resumed online by the autumn. Several events planned to celebrate DIAS 80 had to be postponed. These included a series of lectures on Early Irish law that was scheduled for the spring and a conference on medieval multilingualism that was to take place in May. Our annual Tionól and Statutory Lecture likewise had to be postponed. These will take place again once circumstances allow. Several conferences and other academic gatherings in which members of the School had been invited to participate were also cancelled or postponed. The restrictions imposed by Covid during the year furthermore resulted in work submitted by members of the School for publication being delayed.

However, a regime of working remotely was established with access to offices and the Library one day each week being facilitated. This enabled both our research and work on the School's publications programme to continue.

RESEARCH

Liam Breatnach continued work on preparing an edition of the mid-ninth-century poem *A mmo Choimmdiu cid do-gén fri Firu Arda,* as well as work on *Bretha Nemed Toísech,* a Grammar of Middle Irish, and on preparing a number of papers for publication.

Ruairí Ó hUiginn worked on an edition of the text *Oileamhain Chon Culainn agus Oidheadh Chonnlaoich mheic Con Culainn,* on documents relating to Somhairle Mac Domhnaill, on a book of conference proceedings and prepared a number of conference papers for publication.

Barry Lewis completed his edition of *Bonedd y Saint,* the Welsh saints' genealogies, and submitted it to the Publications Committee.

Aoibheann Nic Dhonnchadha continued her research work on Early Modern Irish medical texts and prepared a conference paper for publication.

Michelle O'Riordan completed her book *Poetics and Polemics* for publication at the end of 2020 by Cork University Press. Her work is on-going in other research areas.

Brian Ó Curnáin continued work on various aspects of the sociolinguistics of Modern Irish and Scottish Gaelic, on dialect studies, including the preparation of a monograph on East Galway Irish, recording material, transcription and research on some manuscript, printed and recorded sources in Irish and in Scottish Gaelic and on the preparation of other work for publication.

Mícheál Hoyne continued his work on a new edition of *Irish Grammatical Tracts* III–IV and prepared some articles for publication.

Chantal Kobel continued research on the codicology of medieval Irish legal manuscripts, editing a previously unpublished medieval Irish glossary, commenced a palaeographical and codicological study of Tadhg Ua Ríghbhardáin's manuscripts and worked on a number of articles for publication.

Nike Stam continued to work on her transcription and edition of the poetic fragments that are related to the Commentary on the *Félire Óengusso,* contained in two manuscripts kept at the Royal Library in Brussels, that now can be viewed online on the Irish Script on Screen (ISOS) website. Arrangements have been made for publication of this material.

With the XML files, she has started carrying out python queries on the material to extract code-switches in all manuscript versions and has started to compare the different manuscripts. The results of this analysis are to be presented at the Conference on Multilingual Manuscripts, which she has organized with the School of Celtic Studies for May 2021 which also will result in published proceedings. She has also worked on two articles that are to present a critical edition of a poetic fragment, and of a set of glosses on the Saint Céile Críst.

Andrea Palandri has continued with his edition, translation and analysis of the Early Modern Irish text of the Travels of Marco Polo with a view to submitting it to the School's Early Modern Irish Texts Series. He has also begun working on the sound archive of the institute, the GLÓR collection, and is preparing it for online release. This work includes extensive digitising work and transcription. As part of this, he helped to oversee some of the work carried out by the summer interns engaged by the School.

Christina Cleary worked on her project 'A Diachronic Study of the Commentary to the *Amrae Coluimb Chille*'. To date she has transcribed the entirety of the commentary from four of the five manuscripts she has planned to edit and is currently working on the transcription of the fifth copy in RIA MS C iii 2. She also worked on two papers for publication: the first is a contribution to the proceedings of the conference 'Intentional *obscuritas* in Irish and Welsh literature (650–1650)', hosted by DIAS in 2019; and the second is an edition and translation of the Middle Irish poem *Aed mac Ainmirech na n-all* from the commentary to ACC.

Prior to his departure in August to take up a fellowship at the University of Aarhus in Denmark, Daniel Watson continued with his study of the influence of nature and natural law on medieval Irish writing and completed a review for submission.

Scoil an Léinn Cheiltigh (ar lean)

Lean Daniel Watson leis an staidéar a bhí ar bun aige faoin tionchar a bhí ag an nádúr agus an dlí nádúrtha ar scríbhinní Éireannacha ó na meánaoiseanna, sular fhág sé an Scoil le dul i mbun comhaltachta in Ollscoil Aarhus na Danmhairge i Mí Lúnasa. Chríochnaigh sé léirmheas freisin.

INTÉIRNIGH SHAMHRAIDH

Cuireadh ar chumas na Scoile roinnt mac léinn a fhostú mar intéirnigh shamhraidh faoi scéim na n-intéirneach a cuireadh ar bun i 2020. Bhí siad ag obair i gcomhpháirt le baill de chuid na Scoile ar thionscadal GLÓR agus leasaigh siad roinnt iontrálacha catalóige le haghaidh ISOS.

MEAMRAM PÁIPÉAR RÍOMHAIRE/IRISH SCRIPT ON SCREEN (ISOS)

Lean forbairt thionscadal ISOS faoi stiúir Anne Marie O'Brien leis an gclár digitithe lámhscríbhinní. Chuir cuairt ar leabharlann Acadamh Ríoga na hÉireann, mar ar éirigh linn dhá lámhscríbhinn, 23 O 19 agus 24 P 23, a dhigitiú, tús maith leis an mbliain. Lámhscríbhinní de chuid na seachtú haoise déag iad araon ina bhfuil cóipeanna de *Foras Feasa ar Eírinn* le Céitinn.

Sular cuireadh an dianghlasáil a d'eascair as Covid i bhfeidhm, bhí tús curtha san earrach le clár digitithe i gColáiste na Tríonóide, Baile Átha Cliath, mar ar éirigh linn digitiú a dhéanamh ar LS 1316, lámhscríbhinn mheamraim leighis de chuid na cúigiú haoise déag; LS 1317, lámhscríbhínn ilchodach de chuid na seachtú haoise déag ina bhfuil tráchtais dlí, gluaiseanna agus leagan de *Dinnsheanchas Érenn;* LS 1387, ina bhfuil tráchtais dlí; codanna de LS 1433, Leabhar Aicill, ina bhfuil blúirí de dhlíthe na mBreithiún maille le gluaiseanna agus tráchtaireacht. Ar an drochuair, tháinig an phaindéim anuas orainn agus sinn i gceartlár na hoibre, rud a d'fhág gurbh éigean stad a chur leis an obair sheachtrach ag an bpointe sin.

Lean ISOS leis an digitiú ar láthair na Scoile nuair ab fhéidir sin. Gabhadh 1,100 íomhá d'imleabhar mór, LS 19 de chuid Óstaí an Rí. Lámhscríbhinn de chuid na hochtú haoise déag ina bhfuil beathaí naomh í seo. Tá clúdach cartchláir agus leathair de dhéantús baile uirthi ina bhfuil an fhuáil le feiceáil.

D'fhág an tOllamh Edgar Slotkin ó Ollscoil Cincinnati, nach maireann, dhá lámhscríbhinn le huacht ag Scoil an Léinn Cheiltigh. Is iad seo LSS Dunnington 1 & 2 ar de bhunadh Phort Láirge iad agus a scríobhadh sa naoú haois déag. Amhráin, filíocht agus scéalta atá iontu. Is ón té a raibh siad ina sheilbh aige a ainmníodh iad. Trí sheans a tháinig seisean orthu a fhad is a bhí sé i Louisville i stát Kentucky. Ba ghnáth le Dunnington leabhair agus earraí cuimhneacháin a bhain le Cogadh Cathartha Mheiriceá a bhailiú. Chuala sé go raibh leabharlann Chliarscoil Ord na Croise Naofa le díol agus is nuair a bhí sé i láthair ag an gceant a thug sé na lámhscríbhinní seo chun suntais, cé gur mar lámhscríbhinní i nGréigis nó i Laidin a bhí siad liostaithe ag an gceantálaí. As fiosracht agus mórtas cine a cheannaigh sé iad. Ba as Éirinn a shinsir agus d'aithin sé gur lámhscríbhinní Gaelacha a bhí iontu ón uair go raibh cuairt tugtha aige ar Éirinn agus go raibh eolas aige ar shainfhoirm na lámhscríbhneoireachta Gaelaí. Cé nach raibh an Ghaeilge aige, cheannaigh sé na lámhscríbhinní agus chuaigh chuig an Ollamh Slotkin a iarraidh comhairle air. Is féidir teacht ar an gcuntas aige maille le catalóg iomlán na lámhscríbhinní ar shuíomh ISOS.

Ceann de mhórbhuanna an tionscadail seo is ea go gcuireann sé ar ár gcumas teacht ar bhailiúcháin a bhí folaithe orainn go nuige seo agus iarracht a dhéanamh iad a thabhairt le chéile le hábhair ghaolmhara. Ar an mbealach seo is féidir naisc a aithint nár léir i gcónaí roimhe seo. Tharla a leithéid i mbliana le bailiúchán de théacsanna dlí i lámhscríbhinn a bhreac Domhnall Ó Dubhdábhoireann i seascaidí na séú haoise déag. Scaradh codanna den lámhscríbhinn seo óna chéile agus cuireadh i dtaisce iad i dtrí institiúid éagsúla. Is é Séamas Ó hArgadáin a fuair a chuid ba mhó di agus sa bhliain 1832 dhíol sé le Museum na Breataine í. Is i Leabharlann na Breataine, mar a bhfuil sí cláraithe mar LS Egerton 88, atá sí anois. Fuair Acadamh Ríoga na hÉireann blúire ní ba lú ná sin am éigin roimh 1844. Ceanglaíodh sin le blúirí as lámhscríbhinní eile faoin gcód seilf 23 Q 6. Tá blúire eile fós a bhain le 23 Q 6 tráth sa Leabharlann Ríoga i gCóbanhávan na Danmhairge mar ar sheol an Coirnéal Charles Vallancey chuig duine dá locht aitheantais ansin agus súil aige leis gur chabhair a bheadh ann dó le lámhscríbhinní Gaeilge eile a aithint dá nochtfadh a leithéid sa Danmhairg.

Tugadh péire de na lámhscríbhinní seo le chéile agus cuireadh ar taispeáint iad i 2020 i nGaillimh le linn a tréimhse mar Phríomhchathair Chultúir na hEorpa. Dá thoradh seo, fuarthas cóip dhigitithe de Egerton 88 ó Leabharlann na Breataine agus cóip den bhlúire atá sa Leabharlann Ríoga i gCóbanhávan. Agus de bhrí go raibh 23 Q 6 digitithe cheana, bhíothas in ann gach a bhfuil fágtha againn den lámhscríbhinn thábhachtach seo a thabhairt le chéile ar an aon suíomh amháin, rud a thugann deis ar leith do dhaoine scrúdú a dhéanamh ar fhoinse shuntasach do sheandlíthe na hÉireann. Tá teacht ar an ábhar seo faoin teideal 'The Book of O'Davoren' ar shuíomh ISOS.

BIBLEAGRAFAÍOCHT

Choinnigh Alexandre Guilarte air ag aimsiú agus ag iontráil ábhar nua don *Bibliography of Irish Linguistics and Literature* (/BILL) agus scríobh iontrálacha do iml. 52 den *International Medieval Bibliography* a chuireann the Institute for Medieval Studies in Ollscoil Leeds ar fáil agus a fhoilsíonn muintir Brepols.

School of Celtic Studies (continued)

SUMMER INTERNS

Under the summer internship scheme instituted in 2020 at DIAS, the School of Celtic Studies was able to engage a number of students as summer interns. They worked in association with members of the School on parts of the GLÓR project and on revised manuscript catalogue entries for ISOS.

IRISH SCRIPT ON SCREEN (ISOS)

The Irish Script on Screen project (ISOS) continued to progress with its manuscript digitisation programme under the direction of Anne Marie O'Brien. The year started out well with an annual visit to the Royal Irish Academy, where two manuscripts MS 23 O 19 and MS 24 P 23 were digitized. Both are of the seventeenth century and contain copies of *Keating's Foras Feasa ar Éirinn*.

Prior to the lockdown resulting from Covid, a digitization programme began in the spring at Trinity College Dublin, where we successfully digitized MS 1316, a fifteenth-century vellum medical manuscript. MS 1317 a seventeenth-century composite manuscript that includes legal tracts, glossaries and a copy of the *Dinnshenchas Érenn*. MS 1387 contains early Irish law tracts. Parts of MS 1433, The Book of Aicill, containing fragments of the Brehon Laws, with gloss and comment. Unfortunately, while we were in the middle of our residency, the pandemic hit Ireland and at that point our off-site digitization activity had to cease.

ISOS continued a digitization program on site at DIAS when possible. A large volume of some 1,100 images was captured in King's Inns manuscript, MS 19. This eighteenth-century paper manuscript contains the lives of saints, bound in a home-made cover of cardboard and leather with visible stitching.

The School of Celtic Studies was very generously donated two manuscripts, Dunnington MSS 1&2, by the late Prof Edgar Slotkin, from the University of Cincinnati. These two manuscripts originally from Waterford are both of the nineteenth century and contain songs, poetry and stories. The Dunnington manuscripts are named after their proprietor, a Mr Dunnington, who by chance came across them while in Louisville, Kentucky. Mr. Dunnington, a collector of Civil War books and memorabilia, heard of the sale of the library of the Holy Cross Fathers Seminary. While attending the event he recognized the Irish manuscripts even though they were listed for sale by the auctioneer as 'in Greek or Latin'. Out of curiosity and ethnic pride, he purchased them. Being of Irish ancestry, he recognized the two manuscripts were written in Irish since he had been to Ireland and knew the characteristic form of the script. Although he did not know Irish, he purchased the manuscripts and sought out Prof Slotkin for his advice. You can now read his accounts and extensive catalogues of the Dunnington MSS 1&2 on ISOS.

One of the greatest achievements of the ISOS project is allowing access to collections that have been previously hidden and strive to unite them virtually with related materials at other institutions, making connections that may have previously gone unrecognised. We were able to do one such project this year with a collection of Brehon Law tracts from a manuscript written in the 1560s by Donal O'Davoren and his students. This manuscript was subsequently broken up and deposited at three different institutions. The main part of the O'Davoren manuscript was acquired by James Hardiman and was sold to The British Library in 1832, catalogued as Egerton 88. A smaller fragment was acquired by the Royal Irish Academy sometime before 1844. It came as part of 'a collection of disjointed fragments', now with the shelf-mark 23 Q 6 and another small fragment of the same O'Davoren manuscript is now in the Royal Library in Copenhagen, sent by Charles Vallancey to an academic friend as a sample of an Irish manuscript, in the hope that other Irish manuscripts might be recognised if they came to light in Denmark.

Two of these manuscripts were reunited and displayed in Galway for the 2020 European Capital of Culture. Resulting from this, a digitized copy of Egerton 88 was acquired from the British Library as were digitized copies of the section of the manuscript at the Royal Library in Copenhagen. As the Royal Irish Academy MS 23 Q 6 had been previously digitized by ISOS, this allowed all surviving sections of this important manuscript to be reunited virtually on the one site. Providing a unique opportunity for the study of the ancient laws of Ireland, they can all be found under 'The Book of O'Davoren' on ISOS.

BIBLIOGRAPHY

Alexandre Guilarte continued finding and entering new material for the *Bibliography of Irish Linguistics and Literature* (/BILL), and also contributed entries to vol. 52 of the *International Medieval Bibliography* edited by the Institute for Medieval Studies, University of Leeds, and published by Brepols.

MANUSCRIPT STUDIES

Professor Liam Breatnach continued direction of a diplomatic edition of the early fifteenth-century manuscript *Leabhar Breac,* and a project involving staff and scholars of the School to produce a new catalogue on the contents of the Yellow Book of Lecan.

SCHOOL OF CELTIC STUDIES LIBRARY & ARCHIVE

The library of the School of Celtic Studies aims to provide the best facilities and materials for the purpose of advanced research in the area of Celtic Studies.

Scoil an Léinn Cheiltigh (ar lean)

LÉANN NA LÁMHSCRÍBHINNÍ

Lean Liam Breatnach leis ag stiúradh na hoibre ar eagrán diomplómaitiúil den Leabhar Breac, lámhscríbhinn de chuid thús na séú haoise déag. Ina cheann sin, tá sé ag stiúradh tionscadail eile a bhfuil sé mar aidhm leis clár nua a chur ar fáil dá bhfuil i Leabhar Buí Leacáin.

LEABHARLANN AGUS AIRCÍV SCOIL AN LÉINN CHEILTIGH

Tá sé mar aidhm ag leabharlann Scoil an Léinn Cheiltigh na háiseanna agus na foinsí is fearr a chur ar fáil le taighde ar ardleibhéal a dhéanamh i réimse an Léinn Cheiltigh. Is ar líne den chuid ba mhó a bhí rochtain ar acmhainní na leabharlainne i 2020. B'éigean athsmaoineamh a dhéanamh ar an mbealach ab fhearr leis an leabharlann a úsáid le linn dhianghlasáil Covid 19. Tá athsmaoineamh den chineál seo faoi na bealaí is fearr le húsáid a bhaint as an leabharlann ar bun le tamall de bhlianta. Is féidir leabhair as na bailiúcháin atá sa phríomhleabharlann a thabhairt ar iasacht go sábhálta agus go cruinn tríd an gcóras bainistíochta atá againn sa leabharlann. Rinneadh mionathruithe ar an gcóras seo le go bhféadfaimis leabhair a thabhairt ar iasacht mar ba ghá.

De réir na comhairle a fuaireamar faoi shláinte agus sábháltacht, b'éigean freisin smaoineamh ar leabhair a chur ar coraintín nuair a d'fhágtaí ar ais sa leabharlann iad. De bhrí gur leabharlann í seo a thugann tús áite d'ábhar clóite, b'éigean dúinn athruithe a dhéanamh go sciobtha ar an mbealach a gcuirimid ár gcuid acmhainní ar fáil agus an méid tacaíochta ab fhéidir a thabhairt do thaighdeoirí go cianda.

For-rochtain na Leabharlainne

Podchraoladh taighde Scoil an Léinn Cheiltigh: Ní hansae

'Ní deacair (a réiteach)' an bhrí atá le *ní hansae* na Sean-Ghaeilge agus sin é go díreach an smaoineamh a rithfeas leat tar éis duit éisteacht le taighdeoirí ag tabhairt míniú ina bhfocail féin ar a gcuid taighde ar an bpodchraoladh seo. I ngach eagrán, cuireann Nike Stam ceisteanna sa tSean-Ghaeilge ar scoláirí Ceiltise, ach ná bíodh buairt ort ós i mBéarla atá a gcuid freagraí!

Foireann léirithe: Christina Cleary, Margaret Irons, Nike Stam.

Tacaíocht theicniúil: Andrew McCarthy.

Ár mbuíochas do Stiúrthóir Scoil an Léinn Cheiltigh as a thacaíocht agus dóibh siúd a ghlac páirt sa tsraith.

Is féidir teacht ar an bpodchraoladh, a sheol Scoil an Léinn Cheiltigh i Mí Dheireadh Fómhair 2020 anseo: https://www.dias.ie/podcast/

Rare Books Group of the Library Association of Ireland

Is ball coiste í Margaret Irons den Rare Books Group of the Library Association of Ireland.

Bhí seimineár bliantúil an chumainn ar bun 20 Samhain 2020. Thug Chantal Kobel caint ann ar son na Scoile dar theideal: A researcher's perspective on closed libraries during lockdown: Challenges, changes and collaboration'. Is féidir éisteacht leis an gcaint ar an nasc seo: https://rarebooksgroup.wordpress.com/2020/12/02/rare-beyond-words-special-collections-and-access-in-2020/

Polasaí Rochtana Oscailte ar Thaighde ag IALBÁC.

Bhí Margaret Irons ag obair i bpáirt leis an Ollamh Luke Drury and an Dr Eucharia Meehan le polasaí rochtana oscailte ar thaighde do IALBÁC a dhréachtadh. Tá mar aidhm aige seo polasaithe institiúideacha IALBÁC a thabhairt chun réitigh le Moladh Choimisiún na hEorpa faoi rochtain ar thaighde agus caomhnú taighde, agus leis an nuashonrú a rinneadh air sin i 2018, mar atá Treoirlínte Horizon 2020 faoi na rialacha a bhaineann le rochtain oscailte ar fhoilseacháin eolaíochta agus ar shonraí taighde. Cuireann sé san áireamh forbairtí tábhachtacha ag leibhéal an Aontais Eorpaigh a bhaineann le hEolaíocht Oscailte/Rochtain Oscailte ar nós chinntí Chomhairle na hEorpa sa bhliain 2016 faoin aistriú go córas Eolaíochta Oscailte, 'Plan S' agus 'cOAlition S', na forbairtí atá tagtha ar an European Open Science Cloud (EOSC) agus gníomhú an European Open Science Policy Platform. Ní beag atá sé i dtuilleamaí: treoirlínte Rochtana Oscailte UNESCO maidir le forbairt polasaí, treoirlínte MedOANet maidir le Rochtain Oscailte, PASTEUR4OA Toolkit agus na Treoirlínte Polasaí, moltaí RECODE faoi pholasaí tionscadal maidir le polasaithe rochtana oscailte ar shonraí taighde, polasaí thionscadal LEARN maidir le múnla bainistiú sonraí taighde, grúpa oibre polasaí de chuid thionscadal EOSCpilot agus tuairisc SPARC Europe ar Shonraí Oscailte agus Eolaíocht Oscailte san Eoraip.

D'fhaomhaigh Coiste Riarachaín agus Airgeadais Chomhairle IALBÁC an polasaí seo ar 31/08/2020 agus is féidir teacht air anseo ar DAIR https://dair.dias.ie/policy.html.

TIONÓL 2020

Níorbh fhéidir Tionól na bliana seo a eagrú i ngeall ar an dianghlasáil a lean Covid. B'éigean an Léacht Reachtúil a chur siar ar an ábhar céanna. Táimid ag súil leis go mbeifear in ann an Tionól a chur ar bun arís i 2021 agus go mbeidh an Léacht Reachtúil againn, fiú más ar líne a bheas sé.

School of Celtic Studies (continued)

2020 was a year of providing primarily online resources to our users. We had to rethink how the library collections could be utilised during Covid-19 lockdown.

Over the years we had been working towards this in many ways. All of our collections in the main library can be borrowed safely and accurately through our library management system. With some system reconfigurations we were able to offer access to borrowing as required.

We also then had to consider quarantining items after use and return, in line with public health advice. As a primarily print based library we quickly had to change our service provision model and provide as much research support as possible remotely.

Library Outreach

SCS Research Podcast: Ní hansae

Ní hansae is Old Irish for 'not difficult', which is precisely what you will think after listening to the researchers explaining their research in their own words on this podcast. In each episode, O'Donovan Scholar Nike Stam throws questions in Old Irish at Celtic Studies scholars, but not to worry, they answer in English!

Production team: Christina Cleary, Margaret Irons, Nike Stam.

Technical support: Andrew McCarthy.

With thanks the Director of the School of Celtic Studies for his support and to all the interviewees for taking part.

The podcast which was launched by the School of Celtic Studies in October 2020 can be found here https://www.dias.ie/podcast/

Rare Books Group of the Library Association of Ireland

Margaret Irons is a committee member of the Rare Books Group of the Library Association of Ireland.

The RBG annual seminar was held on 20 November 2020.

Chantal Kobel presented a paper on behalf of the School of Celtic Studies the title of which was 'A researcher's perspective on closed libraries during lockdown: Challenges, changes and collaboration'.

A recording of this paper can be found online here https://rarebooksgroup.wordpress.com/2020/12/02/rare-beyond-words-special-collections-and-access-in-2020/

Open Access to Research Policy at DIAS

Margaret Irons worked in conjunction with Prof. Luke Drury and Dr Eucharia Meehan to compile an Open Access Policy to Research for DIAS.

This policy aims at aligning the institutional policies of DIAS with the 2012 Recommendation of the European Commission on access to and preservation of scientific information and its 2018 update, the Horizon 2020 Guidelines on the rules of open access to scientific publications and research data, and takes into consideration important developments at EU-level related to Open Science/Open Access such as the 2016 European Council Conclusions on the transition towards an Open Science system, the "Plan S" and "cOAlition S", the developments of the European Open Science Cloud (EOSC) and the action lines of the European Open Science Policy Platform. It draws heavily on the UNESCO Open Access policy development guidelines, the MedOANet guidelines for Open Access, PASTEUR4OA Toolkit and Policy Guidelines, the RECODE project policy recommendations for Open Access policies to research data, the LEARN project Model Research Data Management Policy, the policy working group of the EOSC Pilot project, and the SPARC Europe report on Open Data and Open Science policies in Europe.

The policy was approved by the Administration and Finance Committee of the Council of DIAS on 31/08/2020 and can be found on DAIR here https://dair.dias.ie/policy.html

TIONÓL 2020

Due to the ongoing Covid lockdown it was not possible to organize the Tionól this year. The Statutory Lecture had also to be postponed for the same reason. It is hoped that the Tionól can resume in 2021 and arrangements will be made to hold the Statutory Lecture in 2021, possibly online.

CONFERENCES

A conference on medieval multilingualism organized by Nike Stam was planned for May but had to be postponed due to Covid restrictions. It has been rescheduled as an online conference for May, 2021 and it is hoped that proceedings will be published in due course.

Christina Cleary co-organised the online Máirtín Ó Cadhain Conference 2020 (Comhdháil Uí Chadhain 2020), Trinity College Dublin, 20 November, 2020.

Scoil an Léinn Cheiltigh (ar lean)

COMHDHÁLACHA

D'eagraigh Nike Stam comhdháil ar an ilteangachas a bhí le bheith ar siúl i Mí na Bealtaine ach arbh éigean í a chur siar i ngeall ar na srianta a lean Covid. Tá an chomhdháil seo le cur ar bun ar líne i Mí na Bealtaine 2021 agus táthar ag súil leis go bhfoilseofar na himeachtaí in am agus i dtráth.

Ba chomheagraí í Christina Cleary ar an gcomhdháil ar líne faoi Mháirtín Ó Cadhain a bhí ar bun i gColáiste na Tríonóide, Baile Átha Cliath, ar 20 Samhain 2020.

SEIMINEÁIR

Bhí seimineár seachtainiúil ag **Ruairí Ó hUiginn** ar an téacs *Oileamhain Chon Culainn agus Oidheadh Chonnlaoich mheic Con Culainn* ó Eanáir go Bealtaine.

Bhí seimineár seachtainiúil ag **Liam Breatnach** ar ghluaiseanna na Sean-Ghaeilge ó Dheireadh Fómhair go Bealtaine.

Bhí seimineár seachtainiúil ag **Barry Lewis** ar thráchtaisí gramadaí na Breatnaise ó Dheireadh Fómhair to Nollaig.

Bhí seimineár seachtainiúil ag **Mícheál Hoyne** faoi *Irish Grammatical Tracts* III–IV ó Dheireadh Fómhair go Bealtaine.

LÉACHTAÍ SEACHTRACHA

Thug Liam Breatnach an 'Introductory talk' mar aon le léacht dar theideal 'Miscellanies, Digests and Glossaries. The Law Texts in the Book of Domhnall Ó Dubhdábhoireann', ag an gcomhdháil *A Brehon Lawyer's School,* a bhí ar bun in Ollscoil na hÉireann, Gaillimh, 25 Eanáir, 2020.

Thug sé Léacht Chuimhneacháin Carl Marstrander in Det Norske Videnskaps-Akademi/Acadamh na hIorua don Eolaíocht agus don Litríocht, Oslo ar 28 Feabhra, 2020. 'Issues in Early Medieval Irish Poetry and Metrics' ba theideal don léacht.

Thug Ruairí Ó hUiginn léacht 'Reuniting O'Davoren's Book and the work of Irish Script on Screen', ag an gcomhdháil A Brehon Lawyer's School, Ollscoil na hÉireann, Gaillimh, 25 Eanáir, 2020.

Thug Barry Lewis léacht dar theideal 'What is Life? One question, many answers': IALBÁC ar líne, 12 Bealtaine 2020.

Thug sé an Séú Léacht Chuimhneacháin ar an Ollamh Pól Breatnach, Ollscoil Mhá Nuad, 12 Samhain 2020, ar líne. 'Nature and art in early Welsh verse' ba theideal dó.

Thug Chantal Kobel caint ar líne: 'A researcher's perspective on closed libraries during lockdown: challenges, changes and collaboration', ag an gcruinniú *Rare beyond words – Special Collections and Access in 2020,* 20 Samhain 2020

Thug Daniel Watson seimineár ar cuireadh: 'Metempsychosis in Pythagorean Tradition and Early Irish Literature: The Case of Mongán mac Fiachnai', don Traditional Cosmology Society, in Ollscoil Dhún Éidean, 28 Feabhra.

Thug sé dhá sheimineár eile ar cuireadh in Ollscoil Cambridge 'The Conciliation of Natural Language and Natural Law in Early Irish Literature', don Cambridge Centre for the Study of Platonism, ar 28 Eanáir agus 'The Six Ages of the World and Nostalgia for the Pagan Past in Early Irish Literature', don Department of Anglo-Saxon, Norse and Celtic ar 24 Eanáir.

CÚRSAÍ OLLSCOILE A THUG BAILL NA SCOILE

Barry Lewis:

Middle Welsh reading, Ollscoil Mhá Nuad (seimeastar 2)

Middle Welsh for beginners, Ollscoil Mhá Nuad (seimeastar 1)

Mícheál Hoyne:

'Ceart agus Labhairt na Teanga' do mhic léinn sa Chéad Bhliain i Roinn na Gaeilge agus na dTeangacha Ceilteacha, Coláiste na Tríonóide, BÁC.

'An Dán Díreach' do mhic léinn fochéime sa Tríú agus sa Cheathrú Bliain i Roinn na Gaeilge agus na dTeangacha Ceilteacha, Coláiste na Tríonóide, BÁC.

Chantal Kobel:

An Introduction to Palaeography (SG618), Roinn na Sean-Ghaeilge, Ollscoil Mhá Nuad

Christina Cleary:

Introduction to Old Irish I, i Roinn na Gaeilge agus na dTeangacha Ceilteacha, Coláiste na Tríonóide, BÁC.

Introduction to Old Irish II, i Roinn na Gaeilge agus na dTeangacha Ceilteacha, Coláiste na Tríonóide, BÁC.

Early Irish Prose, i Roinn na Gaeilge agus na dTeangacha Ceilteacha, Coláiste na Tríonóide, BÁC.

EAGARTHÓIREACHT

Ba chomheagarthóir **Liam Breatnach** ar *Ériu* 69 le Damian Mc Manus.

Ba chomheagarthóir **Ruairí Ó hUiginn** ar *Celtica* 32 le Barry Lewis.

Ba chomheagarthóir **Barry Lewis** ar *Celtica* 32 le Ruairí Ó hUiginn.

Ba chomheagarthóir í **Aoibheann Nic Dhonnchadha** ar *An Linn Bhuí: iris Ghaeltacht na nDéise,* 24 le Pádraig Ó Macháin.

School of Celtic Studies (continued)

SEMINARS

Ruairí Ó hUiginn held a weekly seminar on the text *Oileamhain Chon Culainn agus Oidheadh Chonnlaoich mheic Con Culainn* from January to May.

Barry Lewis held a weekly a seminar on 'Texts on the poet in late-medieval Wales' from October to December.

Mícheál Hoyne held a weekly seminar on *Irish Grammatical Tracts* III–IV from October to May.

Liam Breatnach gave a weekly seminar on Old Irish glosses and verse from October to May.

EXTERNAL LECTURES AND PRESENTATIONS

Liam Breatnach gave the 'Introductory Talk', as well as a lecture entitled 'Miscellanies, Digests and Glossaries. The Law Texts in the Book of Domhnall Ó Dubhdábhoireann', at the conference *A Brehon Lawyer's School,* held at NUI Galway on 25 January, 2020.

He delivered the Carl Marstrander Memorial Lecture at Det Norske Videnskaps-Akademi/The Norwegian Academy of Science and Letters in Oslo on 28 February, 2020, on the subject of 'Issues in Early Medieval Irish Poetry and Metrics'.

Ruairí Ó hUiginn:

'Reuniting O'Davoren's Book and the work of Irish Script on Screen', at the conference A Brehon Lawyer's School, NUI Galway, 25 January, 2020.

Barry Lewis:

'What is Life? One question, many answers': DIAS, Dublin, online, 12 May 2020.

'Nature and art in early Welsh verse': Sixth Paul Walsh Memorial Lecture, Maynooth University, 12 November 2020, online.

Chantal Kobel:

'A researcher's perspective on closed libraries during lockdown: challenges, changes and collaboration', Rare beyond words – Special Collections and Access in 2020, (took place on Zoom), 20 November 2020

Daniel Watson:

'Metempsychosis in Pythagorean Tradition and Early Irish Literature: The Case of Mongán mac Fiachnai', an invited seminar for The Traditional Cosmology Society, at the University of Edinburgh, 28 February.

'The Conciliation of Natural Language and Natural Law in Early Irish Literature', an invited seminar for the Cambridge Centre for the Study of Platonism, at the University of Cambridge, 28 January.

'The Six Ages of the World and Nostalgia for the Pagan Past in Early Irish Literature', an invited seminar for the Department of Anglo-Saxon, Norse and Celtic, at the University of Cambridge, 24 January.

COURSES TAUGHT

Barry Lewis:

Middle Welsh reading, Maynooth University (semester 2)

Middle Welsh for beginners, Maynooth University (semester 1).

Mícheál Hoyne:

'Ceart agus Labhairt na Teanga' First Year students of Modern Irish in the Department of Irish and Celtic Languages (TCD).

'An Dán Díreach' (Classical Irish Poetry) to Third and Fourth Year undergraduate students in the Department of Irish and Celtic Languages (TCD).

Chantal Kobel:

An Introduction to Palaeography (SG618), Department of Early Irish, Maynooth University.

Christina Cleary:

Introduction to Old Irish I, Trinity College Dublin

Introduction to Old Irish II, Trinity College Dublin

Early Irish Prose, Trinity College Dublin.

EDITING

Liam Breatnach was co-editor with Damian Mc Manus of *Ériu 69*.

Ruairí Ó hUiginn was was co-editor with Barry Lewis of *Celtica 32*.

Barry Lewis was co-editor with Ruairí Ó hUiginn of *Celtica 32*.

Aoibheann Nic Dhonnchadha was co-editor (with Pádraig Ó Macháin) of *An Linn Bhuí: iris Ghaeltacht na nDéise,* volume 24.

Chantal Kobel with Christina Cleary and Mícheál Hoyne, continued editing the proceedings from the Inaugural Eleanor Knott Conference held in TCD (2016).

She also began editing the proceedings of the 'Obscuritas in Medieval Irish and Welsh Literature' conference held in 2019 in the School of Celtic Studies.

Mícheál Hoyne assisted Prof. Damian McManus in the editing of the journal *Ériu* and was appointed co-editor at the end of 2020; with Dr Síle Ní Mhurchú (UCC) he finalised a volume of conference proceedings, *Seal re Saobhnós: essays on Irish courtly love poetry,* for submission to the Institute in early 2021;

Scoil an Léinn Cheiltigh (ar lean)

Bhí Chantal Kobel ag obair i bpáirt le Christina Cleary agus Mícheál Hoyne, ar imeachtaí na Chéad Chomhdhála faoi Eleanor Knott a cuireadh ar bun i gColáiste na Tríonóide, BÁC, i 2016. Chuaigh sí i mbun eagarthóireachta ar imeachtaí na comhdhála 'Obscuritas in Medieval Irish and Welsh Literature' a bhí ar bun i Scoil an Léinn Cheiltigh i 2019 freisin.

Thug **Mícheál Hoyne cúnamh do Damian McManus** in eagarthóireacht *Ériu* and ceapadh ina chomheagarthóir é ag deireadh 2020. Chuir sé bailchríoch ar imeachtaí comhdhála *Seal re Saobhnós: essays on Irish courtly love poetry,* le Síle Ní Mhurchú agus tá sé i gceist go gcuirfear an leabhar faoi bhráid Choiste na bhFoilseachán in 2021. Bhí sé ag obair i dteannta Chantal Kobel agus Christina Cleary ar imeachtaí na Chéad Chomhdhála faoi Eleanor Knott a cuireadh ar bun i gColáiste na Tríonóide, BÁC, i 2016.

Chuir **Christina Cleary** imleabhar 6 de *Ceræ: An Australasian Journal of Medieval and Early Modern Studies* in eagar agus is comheagarthóir í le Chantal Kobel agus Mícheál Hoyne ar imeachtaí na Chéad Chomhdhála faoi Eleanor Knott a cuireadh ar bun i gColáiste na Tríonóide, BÁC, i 2016.

Ba eagarthóirí cúnta iad **Christina Cleary, Andrea Palandri, Nike Stam agus Daniel Watson** ar Celtica 32.

SCRÚDAITHEOIREACHT SHEACHTRACH AGUS BALLRAÍOCHT AR CHOISTÍ

Ba é Ruairí Ó hUiginn an Scrúdaitheoir Seachtrach sa Cheiltis in Ollscoil Obar Dheathain. Is ball é de Choiste Leabharlainne Acadamh Ríoga na hÉireann. Tá sé ina Chathaoirleach ar Iontaobhas Uí Chadhain agus ina Rúnaí ar an Bureau for the International Congress of Celtic Studies. Tá sé ar choistí comhairleacha: *Ainm: a journal of onomastics, Léann, Zeitschrift für celtische Philologie* agus *ComharTaighde*.

Ba é **Barry Lewis** an Scrúdaitheoir Seachtrach sa Bhreatnais i Scoil na Gaeilge, OÉG.

Ba bhall de Bhord Eagarthóireachta CELT í **Aoibheann Nic Dhonnchadha** agus ba bhall í den Fhochoiste Leabharlainne, Leabharlann de Hindeberg, Coláiste na Rinne.

Ba bhall í **Michelle O Riordan** de Choiste Náisiúnta Léann na Gaeilge, Litríocht na Gaeilge agus na gCultúr Ceilteach (Acadamh Ríoga na hÉireann), agus ba bhall de Chomhchoiste Foilseachán Ábhar Spioradálta agus An Timire í freisin.

Ba phiarmheasúnóir é **Brian Ó Curnáin** ar pháipéir a cuireadh faoi bhráid an *Journal of the International Phonetics Association* agus *Roczniki Humanistyczne*.

Bhí **Mícheál Hoyne** ar Bhord Comhairleach thionscadal MACMORRIS, tionscadal sna daonachtaí digiteacha atá lonnaithe in Ollscoil Mhá Nuad.

Ba phiarmheasúnóir í **Christina Cleary** d'ábhar a cuireadh faoi bhráid *Ériu*.

FOILSEACHÁIN

Foilsíodh leabhar Fergus Kelly *The MacEgan Legal Treatise* i Mí na Márta. Tá an t-eagrán seo de thráchtas dlí sa Nua-Ghaeilge Mhoch a chuir Giolla na Naomh Mac Aodhagáin (†1309) i dtoll a chéile ar an ochtú himleabhar sa tsraith Early Irish Law.

Foilsíodh Clóliosta: *printing in the Irish language,* 1571–1871 – *an attempt at narrative bibliography* xxxviii + 1253 lch le Richard Sharpe (†) agus Mícheál Hoyne i Mí na Nollag agus tá sé le seoladh an bhliain seo chugainn. Tá léargas le fáil sa mhórshaothar seo ar gach ar foilsíodh i gcló sa Ghaeilge in imeacht trí chéad bliain.

Is i Mí na Nollag freisin a foilsíodh *Celtica* 32.

Cuireadh roinnt saothar nua faoi bhráid Choiste na bhFoilseachán le linn na bliana agus tá cuid eile ag léitheoirí seachtracha nó á réiteach don chló. Tá súil againn go bhfoilseofar i 2021 iad.

FOILSEACHÁIN LE BAILL NA SCOILE

Liam Breatnach:

'The demonstrative pronouns in Old and Middle Irish', in Elliott Lash, Fangzhe Qiu and David Stifter (eag.) *Morphosyntactic Variation in Medieval Celtic Languages. Corpus-Based Approaches,* Trends in Linguistics. Studies and Monographs 346 (Berlin 2020) 115–41.

'Ríagail na Manach Líath "The Rule of the Grey Monks": A late mediaeval fabrication', Celtica 32 (2020) 77–100.

Barry Lewis:

'Bonedd y Saint, Brenhinedd y Saesson, and historical scholarship at Valle Crucis abbey', in Ben Guy, Georgia Henley, Owain Wyn Jones and Rebecca Thomas (eag), *The Chronicles of Medieval Wales and the March: New Contexts, Studies and Texts* (Turnhout, 2020), 139–54.

'Religion and the church in Geoffrey of Monmouth', in Georgia Henley and Joshua Byron Smith (eag.), *A Companion to Geoffrey of Monmouth* (Leiden and Boston, 2020), 397–424.

Brian Ó Curnáin:

The Gaelic Crisis in the Vernacular Community (le C. Ó Giollagáin, G. Camshron, P. Moireach, I. Caimbeul, B. MacDonald, T. Péterváry (IGRP), Aberdeen University Press.

Mícheál Hoyne:

(le Richard Sharpe†) *Clóliosta: printing in the Irish language,* 1571–1871 – *an attempt at narrative bibliography* (Dublin, 2020) [xxxviii + 1253 pp].

'IGT/BST citations and duplicate entries: the ascriptions in the H 2.17 copy of *IGT* III–IV', *Ériu* 69 (2019 [2020]), 41–54.

'Unaccusativity and the subject pronoun in Middle and Early Modern Irish', *Celtica* 32 (2020), 145–85.

with Chantal Kobel and Christina Cleary, he continued editing the proceedings from the Inaugural Eleanor Knott Conference held in TCD (2016).

Christina Cleary edited Volume 6 of Cerœ: An *Australasian Journal of Medieval and Early Modern Studies* and is co-editor of the proceedings from the Inaugural Eleanor Knott Conference held in TCD (2016).

Christina Cleary, Andrea Palandri, Nike Stam and Daniel Watson were assistant editors of *Celtica 32*.

EXTERNAL EXAMINING AND MEMBERSHIP OF COMMITTEES

Ruairí Ó hUiginn was External Examiner in Celtic at the University of Aberdeen. He is a member of the Royal Irish Academy's Library Committee. He is Cathaoirleach of Iontaobhas Uí Chadhain and Secretary of the Bureau for the International Congress of Celtic Studies. He is on the Advisory Boards of *Ainm: a journal of onomastics, Léann, Zeitschrift für celtische Philologie and ComharTaighde*.

Barry Lewis was external examiner for Welsh, Scoil na Gaeilge, NUIG.

Aoibheann Nic Dhonnchadha was a member of the Editorial Board of CELT, and of An Fochoiste Leabharlainne, Leabharlann de Hindeberg, Coláiste na Rinne.

Michelle O Riordan was a member of Coiste Náisiúnta Léann na Gaeilge, Litríocht na Gaeilge agus na gCultúr Ceilteach (Royal Irish Academy), and a member of the joint committee of Foilseachán Ábhar Spioradálta and *An Timire*.

Brian Ó Curnáin acted as peer reviewer for papers submitted to the *Journal of the International Phonetics Association and to Roczniki Humanistyczne*.

Mícheál Hoyne served on the advisory board of the MACMORRIS project, a digital humanities project based in Maynooth University.

Christina Cleary acted as a peer-reviewer for *Ériu*

PUBLICATIONS

Fergus Kelly's *The MacEgan Legal Treatise* was published in March. This edition of an Early Modern Irish tract compiled by Giolla na Naomh Mac Aodhagáin (†1309) is the eighth volume in the School's Early Irish Law series.

Clóliosta: printing in the Irish language, 1571–1871 – *an attempt at narrative bibliography* xxxviii + 1253 pp by Richard Sharpe (†) and Mícheál Hoyne appeared in December and will be launched in the coming year.

This extensive work offers a detailed survey of all printed material in Irish over the course of three centuries.

Celtica 32 was also published in December.

In the course of the year some new works were submitted for the consideration of the Publications Committee, and others that have been proceeding through the external peer-review and publications process are scheduled to appear in 2021.

PUBLICATIONS BY MEMBERS OF THE SCHOOL

Liam Breatnach:

'The demonstrative pronouns in Old and Middle Irish', in Elliott Lash, Fangzhe Qiu and David Stifter (eds) *Morphosyntactic Variation in Medieval Celtic Languages. Corpus-Based Approaches,* Trends in Linguistics. Studies and Monographs 346 (Berlin 2020) 115–41.

'Ríagail na Manach Líath "The Rule of the Grey Monks": A late mediaeval fabrication', Celtica 32 (2020) 77–100.

Barry Lewis:

'Bonedd y Saint, Brenhinedd y Saesson, and historical scholarship at Valle Crucis abbey', in Ben Guy, Georgia Henley, Owain Wyn Jones and Rebecca Thomas (eds), *The Chronicles of Medieval Wales and the March: New Contexts, Studies and Texts* (Turnhout, 2020), 139–54.

'Religion and the church in Geoffrey of Monmouth', in Georgia Henley and Joshua Byron Smith (eds), *A Companion to Geoffrey of Monmouth* (Leiden and Boston, 2020), 397–424.

Brian Ó Curnáin:

The Gaelic Crisis in the Vernacular Community (With C. Ó Giollagáin, G. Camshron, P. Moireach, I. Caimbeul, B. MacDonald, T. Péterváry (IGRP), Aberdeen University Press.

Mícheál Hoyne:

(with Prof. Richard Sharpe†) *Clóliosta: printing in the Irish language,* 1571–1871 – *an attempt at narrative bibliography* (Dublin, 2020) [xxxviii + 1253 pp].

'IGT/BST citations and duplicate entries: the ascriptions in the H 2.17 copy of IGT III–IV', *Ériu* 69 (2019 [2020]), 41–54.

'Unaccusativity and the subject pronoun in Middle and Early Modern Irish', *Celtica* 32 (2020), 145–85.

'The assassination of Mág Raghnaill and the capture of his ship in 1502', *Studia Hibernica* 46 (2020), 53–66.

Scoil an Léinn Cheiltigh (ar lean)

'The assassination of Mág Raghnaill and the capture of his ship in 1502', *Studia Hibernica* 46 (2020), 53–66.

Léirmheas (i nGearmáinis) ar P. Riggs (eag.), *Tadhg Dall Ó hUiginn: his historical and literary context* (Cork, 2010) in *Zeitschrift für celtische Philologie* 67 (2020), 282–6.

Léirmheas ar N. Mac Cathmhaoil, M. Nic Cathmhaoil and C. Mac Seáin (eag.), *Súgán an Dúchais: aistí ar ghnéithe de thraidisiún liteartha Chúige Uladh i gcuimhne ar Dhiarmaid Ó Doibhlin* (Derry, 2019) in Celtica 32 (2020), 293–7.

Léirmheas ar C. Breatnach, M. Ní Úrdail agus G. Ó Riain (eag.), *Lorg na Leabhar: a Festschrift for Pádraig A. Breatnach* (Dublin, 2019) in Celtica 32 (2020), 298–300.

Chantal Kobel:

'A descriptive catalogue of TCD MS H 3.18 (1337), vols 2–4, pp. 1–87: "Máel Íosa's book"', *Celtica* 32 (2020), 187–215.

Nike Stam:

'"Hij Die Niet Leest Is Een Dweil": Nieuw Licht Op de Commentaartraditie van de *Félire Óengusso*.' *Kelten*, iml. 81, Márta 2020.

Review of Willem Gerritsen, *Verhalen van de Drakendochter: Leven en werk van Maartje Draak (1907-1995)*. *Kelten*, Márta 2020.

Daniel Watson:

Alt léirmheasa: 'Ali Bonner, *The Myth of Pelagianism*, A British Academy Monograph (Oxford 2018)', *Irish Theological Quarterly* 85.4 (2020), 421–34.

Christina Cleary:

'Critical notes and signs in the Book of Leinster *Táin Bó Cúailnge*', in J. Carey (eag.), *Táin Bó Cúailnge from the Book of Leinster: Reassessments*, Irish Texts Society Subsidiary Series 32 (2020), 90–121.

Léirmheas ar W. Meid, *Der Rinderraub. Táin Bó Cúailnge in Auszügen. Restaurierter altirischer Text, mit Einleitung, Übersetzung, Kommentar und Glossar*, Innsbruck (2018), *Cambrian Medieval Celtic Studies*. 00–00.

IMEACHTAÍ EILE

Cuireadh agallamh ar Ruairí Ó hUiginn don chlár teilifíse *DNA Caillte* a craoladh ar TG4 16 Meán Fómhair.

Ba chainteoir ar phainéal í Chantal Kobel ag 'The Evolution of Halloween: Transatlantic Influences & Shaping Traditions' a d'eagraigh Consalacht Ghinearálta na hÉireann i Nua Eabhrac i gcomhpháirt le hAmbasáid na hÉireann i gCeanada, 27 Deireadh Fómhair 2020.

Cuireadh agallamh ar Bhrian Ó Curnáin i Mí Iúil 2020 ar *Seacht Lá* (TG4) tar éis fhoilsiú an leabhair *The Gaelic Crisis in the Vernacular Community*. Cuireadh agallamh air i Mí na Samhna ar Nuacht a hAon (Raidió na Gaeltachta) faoi lonnú agus tithíocht sa Ghaeltacht.

Tá Christina Cleary ag dearadh cúrsa ar líne paileagrafaíochta le haghaidh shuíomh gréasáin Léámh.org i dteannta an Dr Breandan Kane, Ollscoil Connecticut. Thug sí agallamh podchraolta le Nike Stam: Eagrán 1 de *Ní hAnsae, SCS Research Podcast*, atá ar shuíomh gréasáin na Scoile. Rinne sí taifeadtaí sat Sean-, Meán- agus Nua-Ghaeilge don tsraith raidió 'Wives, workers and warmongers: women in medieval Ireland', a scríobh Brigit McCone agus a chraol Dublin City FM.

SCÉALTA BÁIS

B'údar bróin do mhuintir na Scoile nuair a tháinig scéal chugainn i Mí Eanáir faoi bhás Iarchathaoirleach Bhord Stiúrtha na Scoile, an tOllamh Breandán Ó Madagáin. Bhí an tOllamh Ó Madagáin ina Chathaoirleach ar an mBord idir na blianta 1995 agus 2005 agus ba é Ollamh na Nua-Ghaeilge i gColáiste na hOllscoile, Gaillimh é ó 1975 nó go ndeachaigh sé ar scor sa bhliain 1996.

I Mí na Márta chualamar gur cailleadh gan choinne an tOllamh Richard Sharpe ó Ollscoil Oxford. Ba staraí agus Ceiltíoch cumasach an tOllamh Sharpe agus le blianta beaga anuas ba ghnáth leis tréimhsí fada a chaitheamh i Scoil an Léinn Cheiltigh nuair a bhí sé ag iarraidh críoch a chur le *Clóliosta*, an mórstaidéar ar ábhar clóite sa Ghaeilge 1571–1871 a chuir sé i dtoll a chéile leis an Dr Mícheál Hoyne agus a foilsíodh i mbliana.

School of Celtic Studies (continued)

Review (in German) of P. Riggs (ed.), *Tadhg Dall Ó hUiginn: his historical and literary context* (Cork, 2010) in *Zeitschrift für celtische Philologie* 67 (2020), 282–6.

Review of N. Mac Cathmhaoil, M. Nic Cathmhaoil and C. Mac Seáin (eds), *Súgán an Dúchais: aistí ar ghnéithe de thraidisiún litearthа Chúige Uladh i gcuimhne ar Dhiarmaid Ó Doibhlin* (Derry, 2019) in *Celtica* 32 (2020), 293–7.

Review of C. Breatnach, M. Ní Úrdail and G. Ó Riain (eds), *Lorg na Leabhar: a Festschrift for Pádraig A. Breatnach* (Dublin, 2019) in *Celtica* 32 (2020), 298–300.

Chantal Kobel:

'A descriptive catalogue of TCD MS H 3. 18 (1337), vols 2–4, pp. 1–87: "Máel Íosa's book"', *Celtica* 32 (2020), 187–215.

Nike Stam:

'"Hij Die Niet Leest Is Een Dweil": Nieuw Licht Op de Commentaartraditie van de *Félire Óengusso.' Kelten,* vol. 81, March 2020.

Review of Willem Gerritsen, *Verhalen van de Drakendochter: Leven en werk van Maartje Draak* (1907-1995). *Kelten,* March 2020.

Daniel Watson:

Review Article: 'Ali Bonner, *The Myth of Pelagianism,* A British Academy Monograph (Oxford 2018)', *Irish Theological Quarterly* 85.4 (2020), 421–34.

Christina Cleary:

'Critical notes and signs in the Book of Leinster *Táin Bó Cúailnge',* in J. Carey (ed.), *Táin Bó Cúailnge from the Book of Leinster: Reassessments,* Irish Texts Society Subsidiary Series 32 (2020), 90–121.

Review of W. Meid, *Der Rinderraub. Táin Bó Cúailnge in Auszügen. Restaurierter altirischer Text, mit Einleitung, Übersetzung, Kommentar und Glossar,* Innsbruck (2018), Cambrian Medieval Celtic Studies pp.00–00.

OTHER ACTIVITIES AND EVENTS

Ruairí Ó hUiginn was interviewed for the programme *DNA Caillte* which was shown on TG4 16 September.

Chantal Kobel was a panel speaker at 'The Evolution of Halloween: Transatlantic Influences & Shaping Traditions' organised by Consulate General of Ireland, New York partnered with the Embassy of Ireland in Canada, 27 October 2020.

Brian Ó Curnáin was interviewed in July 2020 on *Seacht Lá* (TG4) after the publication of the book *The Gaelic Crisis in the Vernacular Community* and was interviewed in November on *Nuacht a hAon* (Raidió na Gaeltachta) in relation to settlement and housing in the Gaeltacht.

Christina Cleary is currently constructing an online course in palaeography for Léamh.org project site with Dr Brendan Kane, University of Connecticut. Together with Nike Stam she gave a podcast interview: Episode 1 of *Ní hAnsae, SCS Research Podcast,* hosted by DIAS. She provided voice recordings in Old, Middle and Modern Irish and Latin for the radio series 'Wives, workers and warmongers: women in medieval Ireland', written by Brigit McCone and broadcasted by Dublin City FM.

DEATHS

It was with great regret that we learned in January of the death of Professor Breandán Ó Madagáin, former Chair of the Governing Board of the School of Celtic Studies (1995–2005). Breandán Ó Madagáin had been Professor of Modern Irish at University College Galway (later NUI Galway) from 1975 until his retirement in 1996.

March brought news of the untimely death of Professor Richard Sharpe of Oxford University. Professor Sharpe was an accomplished historian and Celticist and in recent years had spent extended periods at the School of Celtic Studies as he worked to complete *Clóliosta,* the major study of printed material in Irish 1571–1871, which he compiled with Dr Mícheál Hoyne.

SECTION 2

School of Cosmic Physics

Scoil na Fisice Cosmaí

Scoil na Fisice Cosmaí

Tuarascáil Bhliantúil Réalteolaíochta & Réaltfhisice DIAS 2020

Príomhfhorbairtí 2020: Le tuairisciú de réir na gceithre Sprioc Straitéiseach uileghabhálach sa Straitéis nua.

Ba bhliain dhúshlánach í 2020 don Rannóg Réalteolaíochta & Réaltfhisice, mar a bhí do chodanna eile de DIAS, lenár bhfoireann agus ár mic léinn ag obair go cianda mar gheall ar shrianta COVID. Ina ainneoin sin, leanamar le cruinnithe grúpa a reáchtáil, seimineáir a eagrú, freastal ar chomhdhálacha idirnáisiúnta fíorúla agus páipéir a fhoilsiú in irisleabhair idirnáisiúnta a bhfuil cáil mhór orthu.

Leanamar orainn ag cur le tionscadail náisiúnta agus idirnáisiúnta, amhail Réadlann Deiscirt na hEorpa (ESO), an Eagar Minicíochta Íseal (LOFAR), an Córas Speictreascópach Ardfhuinnimh (H.E.S.S.), an Réadlann Aircheathanna Ard-Airde (LHAASO) agus go leor misin atá ann cheana agus atá beartaithe ag Gníomhaireacht Spáis na hEorpa (ESA) agus NASA, mar shampla Fithiseoir Gréine, Teileascóp Spáis James Webb, ARIEL, Iúnó agus an teileascóp X-gha Chandra atá ag gluaiseacht ar fithis timpeall an Domhain agus an teileascóp XMM. Ina theannta sin, leanamar ag mealladh maoinithe agus taighdeoirí chuig an Rannóg agus ag cur oiliúna ar mhic léinn iarchéime ardcháilíochta atá cláraithe go príomha i gColáiste na Tríonóide, Baile Átha Cliath agus i gColáiste na hOllscoile, Baile Átha Cliath.

Chuaigh an tOifigeach Teicniúil Anne Grace ar scor in 2020 tar éis beagnach ceithre scór bliain de sheirbhís don Rannóg Réalteolaíochta & Réaltfhisice. Cuireadh tús le hobair Anne leis an anailís ar rianta gatha cosmaí ó Shaoráid Nochtadh Faid Fhada (LDEF) de chuid NASA mar iarracht tuiscint a fháil ar raidhse núiclídí troma (líon ard adamhach). Le blianta beaga anuas chabhraigh sí le raon éagsúil tascanna i riarachán ginearálta agus tacaíocht do ghníomhaíochtaí sa Rannóg. Guímid gach rath uirthi agus í ag dul ar scor.

Sprioc 1: Eolas agus léargas nua a fhionnadh trí ardtaighde agus scoláireacht bhunúsach, lena gcuirtear ar chumas DIAS leanúint dá oidhreacht agus cáil na hÉireann mar oileán caipitil intleachtúil a fheabhsú

Foirmiú Réalta agus Pláinéid

Rinne an ionstraim GRAVITY ar Thrasnamhéadair Teileascóip An-Mhór ESO (VLTI) an chéad bhreathnóireacht dhíreach ar eiseapláinéid ag baint úsáide as trasnaiméadracht optúil (Comhoibriú GRAVITY, 2020). Leis an modh seo nochtadh atmaisféar casta eiseapláinéid le scamaill iarainn agus sileacáití ag luascadh i stoirm ar fud an phláinéid. Leis an teicníc cuirtear féidearthachtaí uathúla ar fáil chun saintréithe a thabhairt do go leor de na heiseapláinéid atá ar eolas inniu. Bhí an Dr Rebeca Garcia Lopez, Comhalta Taighde ag DIAS, mar chuid den fhoireann taighde a bhí ag obair ar an bhfionnachtain. Fógraíodh an toradh seo i mí an Mhárta 2020 i litir san iris Astronomy & Astrophysics leis an gComhoibriú GRAVITY, ina gcuireann siad breathnuithe ar an eisphlainéad HR8799e i láthair ag baint úsáide as trasnaiméadracht optúil. Thángthas ar an eisphlainéad in 2010 nuair a bhíothas ag gluaiseacht ar fithis na réalta óga príomhsheichimh HR8799, atá suite timpeall 129 solasbhliain ón Domhan sa réaltbhuíon Pegasus.

Thug foireann idirnáisiúnta lena mbaineann an tOllamh Tom Ray, an Dr Rebeca García López (ó Choláiste na hOllscoile, Baile Átha Cliath agus DIAS) agus an Dr Alessio Caratti o Garatti faoi deara go díreach den chéad uair an chaoi a bhforbraíonn réaltaí óga a mais. Foilsíodh a gcuid torthaí in Nature i mí Lúnasa 2020. Bhraith an fhoireann an chaoi a dtéann colúin ábhair báistí ar réalta nuabheirthe óna diosca mórthimpeall. Ní amháin a thugann dioscaí den sórt sin, ar a dtugtar dioscaí prótapláinéid, saol do réaltaí ach tugann siad saol freisin do chórais phláinéid cosúil lenár gceann féin. Chun an fhionnachtain a dhéanamh, bhain an fhoireann úsáid as an 'sár-theileascóp' GRAVITY ardbheachtais de chuid ESO. Leis an ionstraim an-úr seo comhcheanglaítear an solas den ceithre teileascóip is mó ar domhan chun ceann amháin a dhéanamh. Roimhe seo bhí amhras ann gur rugadh réaltaí agus pláinéid nua ó ábhar a bhaineann le réaltaí atá ann cheana trí phróiseas ar a dtugtar fuilleamh maighnéadaisféarach. Níor dearbhaíodh é seo, áfach, go dtí go ndearna an fhoireann ár staidéar ceannródaíoch agus go bhfaca siad an próiseas i ngníomh. Trí úsáid a bhaint as an ionstraim sofaisticiúil GRAVITY, bhí an fhoireann in ann réaltaí a anailísiú le leibhéal mionsonraithe gan fasach. Chun críocha an staidéir, bhreathnaigh an fhoireann ar an réalta TW Hydra, arb í an réalta óg is gaire don Domhan. Bhí siad in ann breathnú ar an gacoi a ndéantar ábhar óna dhiosca máguaird a threorú ar an réalta, rud a chuireann ar a chumas meáchan a fhorbairt. Fágann sé sin gurb iad an fhoireann na chéad taighdeoirí a dheimhníonn an próiseas trína saolaítear réaltaí nua - agus, i ndeireadh na dála, pláinéid. Thacaigh an Chomhairle Eorpach um Thaighde agus Fondúireacht Eolaíochta Éireann go páirteach leis an obair seo.

School Of Cosmic Physics

Astronomy & Astrophysics

Key Developments 2020: To be reported in line with the four overarching Strategic Goals in the new Strategy.

2020 has been a challenging year for the Astronomy & Astrophysics Section, as in other parts of DIAS, with our staff and students working remotely due to COVID restrictions. Despite this, we have continued to hold group meetings, organise seminars, attend virtual international conferences and to publish papers in leading international journals.

We have also continued to contribute to national and international projects, such as the European Southern Observatory (ESO), the Low Frequency Array (LOFAR), the High Energy Spectroscopic System (H.E.S.S.), the Large High Altitude Air Shower Observatory (LHAASO) and numerous existing, and planned, European Space Agency (ESA) and NASA missions, such as Solar Orbiter, the James Webb Space Telescope, ARIEL, Juno and the Earth-orbiting Chandra and XMM X-ray telescopes. Furthermore, we continued to attract funding and researchers to the Section and to train high calibre post-graduate students registered mainly at Trinity College Dublin and University College Dublin.

Technical Officer Anne Grace retired in 2020 following almost four decades of service to the Astronomy & Astrophysics Section. Anne's work began with the analysis of cosmic ray tracks from NASA's Long Duration Exposure Facility (LDEF) in an effort to understand the abundance of heavy (high atomic number) nuclides. In more recent years she has assisted with a diverse range of tasks in general administration and support of activities in the Section. We wish her well in her retirement.

Goal 1: Discovery of new knowledge and insights through advanced fundamental research and scholarship, enabling DIAS continue it's legacy and enhance Ireland's reputation as an island of intellectual capital

Star and Planet Formation

The GRAVITY instrument on ESO's Very Large Telescope Interferometer (VLTI) made the first direct observation of an exoplanet using optical interferometry (GRAVITY Collaboration, 2020). This method revealed a complex exoplanetary atmosphere with clouds of iron and silicates swirling in a planet-wide storm. The technique presents unique possibilities for characterising many of the exoplanets known today. Dr Rebeca Garcia Lopez, a Research Fellow at DIAS, was part of the research team that has been working on the discovery. This result was announced in March 2020 in a letter in the journal Astronomy & Astrophysics by the GRAVITY Collaboration, in which they present observations of the exoplanet HR8799e using optical interferometry. The exoplanet was discovered in 2010 orbiting the young main-sequence star HR8799, which lies around 129 light-years from Earth in the constellation of Pegasus.

An Trasnamhéadar Teileascóip An-Mhór ESO (VLTI) agus Réadlann Deiscirt na hEorpa (ESO) a úsáideann taighdeoirí Réalteolaíocht & Réaltfhisic DIAS chun fionnachtana a dhéanamh faoi fhoirmiú réalta agus phláinéid. Creidiúintí: ESO.

The Very Large Telescope Interferometer (VLTI) a the European Southern Observatory (ESO) used by DIAS Astronomy & Astrophysics researchers to make discoveries about star and planet formation. Credit: ESO.

An international team involving Professor Tom Ray, Dr Rebeca García López (of University College Dublin and DIAS) and Dr Alessio Caratti o Garatti has directly observed for the first time how young stars acquire their mass. Their findings were published in Nature in August 2020. The team detected how columns of matter rain onto a new-born star from its surrounding disc. Such discs, known as protoplanetary discs, not only give birth to stars but also planetary systems like our own. To make the discovery, the team used the high-precision GRAVITY 'super-telescope' at ESO. This very novel instrument combines the light of four of the largest telescopes in the World into one. Previously it was suspected that new stars and planets were born from matter surrounding existing stars through a process called magnetospheric accretion. However, this was not confirmed until the team carried out our ground-breaking study and saw first-hand the process in action. By using the sophisticated GRAVITY instrument, the team was able to analyse stars with an unprecedented level of detail. For the purposes of the study, the team observed the star TW Hydra, which is the closest young star to Earth. They were able to see

Scoil na Fisice Cosmaí (ar lean)

Léaráid ealaíontóra ar an eisphlainéad a bhrath GRAVITY ar Thrasnamhéadar Teileascóip An-Mhór (VLTI) de chuid ESO. Creidiúintí: ESO.

Artist's impression of the exoplanet detected by GRAVITY on ESO's Very Large Telescope Interferometer (VLTI). Credit: ESO.

Réaltfhisic Ardfhuinnimh

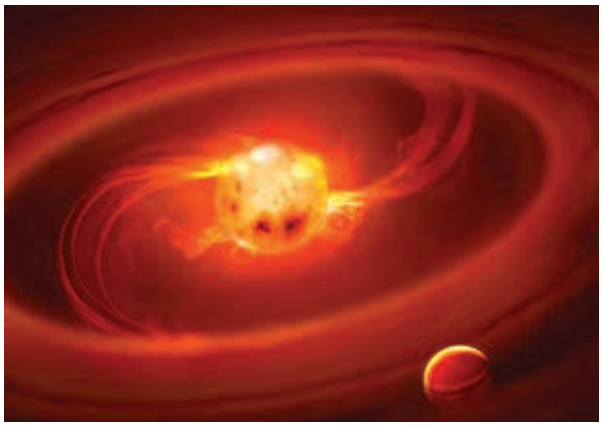
Leanann Réaltfhisiceoirí DIAS orthu ag imirt róil cheannródaíocha i gcomhoibriú HESS; Is é an tOllamh Aharonian ceannaire Ghrúpa Oibre HESS ar Réada Eachtar-Réaltrach Leathnaithe agus tá beirt Chomhalta Taighde Iardhochtúireachta anois ag an Dr Jonathan Mackey arna mhaoiniú ag Dámhachtain Laureate Tosaigh IRC atá ag obair in H.E.S.S. Tá an bheirt acu ag cur le H.E.S.S. le linn a oibríochta arna fhadú go mí Dheireadh Fómhair 2022 agus mar thoradh air sin beidh baint níos mó ag Eagar Teileascóip Cherenkov (CTA) i lár na 2020idí. Tá an Dr Davit Zargaryan ag déanamh na príomh-anailíse sonraí faoi láthair do thionscadal ardtosaíochta laistigh den chomhoibriú. Tá HESS ag iarraidh síneadh breise a chur le hoibríochtaí suas go dtí mí Dheireadh Fómhair 2025 i bhfianaise moilleanna breise maidir le comhpháirt Leathsféar an Deiscirt den CTA a mhaoiniú. Fanfaidh H.E.S.S. mar an t-aon réadlann TeV Leathsféar an Deiscirt go ceann i bhfad, atá tábhacht ag baint leis maidir le breathnóidearacht a dhéanamh ar an bPlána Réaltrach, Scamaill Magellan, agus chun clúdach iomlán a fháil ar an spéir d'fhoinsí neamhbhuana ar nós Roiseanna Gháma-Ghathach.

Buaicphointe eolaíoch ó H.E.S.S. in 2020 ba ea an páipéar a foilsíodh in Nature a d'aimsigh astaíochtaí TeV a leathnaíodh go spásúil ó feadh scaird an Núicléas Réaltrach Gníomhach "Centaurus A". Thaispeáin sé seo den chéad uair nach bhfuil suíomh luasghéarú na gcáithníní teoranta do réigiún gar don pholl dubh ollmhór, ach go leathnaíonn sé cileaparsoiceanna feadh an scaird choibhneasta (Abdalla et al., 2020). Ba é an dara buaicphointe ná an córas dénártha Eta Carinae a bhrath ag fuinneamh gáma-gathacha TeV. Níl anseo ach an dara córas dénártha réalta ollmhór a braitheadh ag a leithéid d'ardfhuinneamh nach réalta neodrón nó poll dubh ceachtar den dá chomhpháirt. Taispeánann sé seo gur saotharlanna úsáideacha iad córais den sórt sin chun luasghéarú cáithníní a imscrúdú toisc go bhfuil córais dhénártha gan réad dlúth sách simplí a shamhaltú agus a thuiscint, agus gan iad a bheith comhdhéanta ach de dhá shreabhadh imbhuailte osnádúrtha amháin.

Ag baint úsáide as sonraí ó mhisean NASA Fermi, braitheadh gathanna gáma ardfhuinnimh ó 0.1 go 100 GeV ón iarsma W44 atá thart ar 10,000 bliain d'aois agus ón gcoimpléasc gáis mhóilíneach ollmhór máguaird (Peron et al., 2020). Fuarthas dhá struchtúr gáma-gha leathnaithe atá suite ag dhá imill urchomhaireacha den iarsma feadh a ais mhóir (féach an figiúr). Léirigh comparáid idir an léarscáil gáma-gha leis na léarscáileanna CO gurb é an dlús ga-ghathaithe feabhsaithe seachas grádán an dáilte gáis is cúis le foinsí fada gáma-gha. Mínítear go bhfuil na "scamaill" gatha chosmaí seo ann de réir carachtar anisotrópach éalú prótón luathaithe ón mblaosc feadh réimse maighnéadach an iarsma.

Bunaithe freisin ar shonraí Fermi-LAT, braitheadh gáma-ghathanna ardfhuinnimh ó naoi gcinn déag de Scamaill Mhóilíneacha Giant atá suite ar fud Bhealach na Bó Finne. Nochtann an dáileadh gathacha réaltach- lárnaíoch de dhlús na gatha cosmaí a dhíorthaítear ó bhreathnuithe gáma-gha agus CO ar na rudaí seo, chomh maith le roinnt scamaill in aice láimhe a bhaineann le coimpléasc Gould Belt, "muir" aonchineálach de ghathanna cosmacha le dlús seasmhach agus cruth speictrim gar do fhlosc gathanna cosmacha a thomhaistear go díreach (go háitiúil) (Aharonian et al., 2020).

how matter from its surrounding disc is channelled onto the star, enabling it to gain weight. This makes the team the first researchers to confirm the process by which new stars – and, ultimately, planets – are born. This work was in part supported by the European Research Council and Science Foundation Ireland.



Léaráid ealaíontóra ar an bhfionnachtain réalta nua-bheirthe ag an ionstraim GRAVITY ag ESO.

Artist's impression of the newly born star discovery by the GRAVITY instrument at ESO.

High Energy Astrophysics

DIAS Astrophysicists continue to play leading roles in the H.E.S.S. collaboration; Professor Aharonian is the leader of the H.E.S.S Working Group on Extended Extragalactic Objects and Dr Jonathan Mackey now has two Postdoctoral Research Fellows funded by an IRC Starting Laureate Award working in H.E.S.S. Both are contributing to H.E.S.S. during its extended operation to October 2022 and leading to greater involvement with the Cherenkov Telescope Array (CTA) into the mid-2020s. Dr Davit Zargaryan is currently doing the main data analysis for a high-priority project within the collaboration. HESS is looking towards a further extension of operations to October 2025 in light of further delays in funding the Southern Hemisphere component of the CTA. H.E.S.S. will remain the only Southern Hemisphere TeV observatory for the foreseeable future, important for observing the Galactic Plane, Magellanic Clouds, and to get full coverage of the sky for transient sources like Gamma-Ray Bursts.

An teileascóp H.E.S.S. sa Namaib (barr). I bpáipéar Nature lena n-áirítear taighdeoirí DIAS, tuairiscíodh síneadh spásúil astaíochtaí gáma-ghathach TeV ón réaltra gníomhach ollmhór, Centaurus A.

The H.E.S.S. telescope in Namibia (top). A Nature paper including DIAS researchers reported the spatial extension of the TeV gamma-ray emission from the giant active galaxy, Centaurus A.

A scientific highlight from H.E.S.S. in 2020 was the paper published in Nature that detected spatially extended TeV emission from along the jet of the Active Galactic Nucleus "Centaurus A". This showed for the first time that the site of particle acceleration is not limited to a region near the supermassive black hole, but extends for kiloparsecs along the relativistic jet (Abdalla et al., 2020). A second highlight was the detection of the binary system Eta Carinae at TeV gamma-ray energies. This is only the second massive star binary system detected at such high energy where

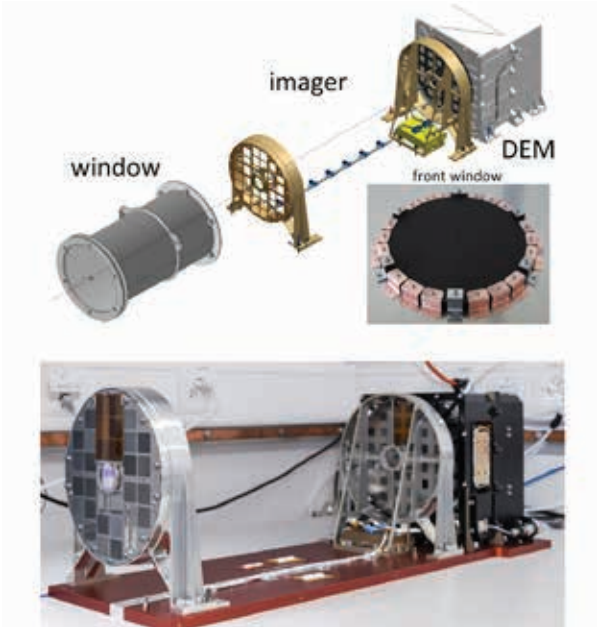
Scoil na Fisice Cosmaí (ar lean)

Fisic Gréine agus Aimsir Spáis

D'fhreastail Taighdeoirí DIAS ar sheoladh spásárthaí Fhithiseoir Gréine ESA ó Ionad Spáis Kennedy NASA ag Cape Canaveral in Florida ar an Luan 10 Feabhra, 2020. Tabharfaidh an Fithiseoir Gréine aghaidh ar chuid de na fadhbanna is dúshlánaí san eolaíocht spáis agus cuideoidh sé linn tuiscint a fháil ar an gcaoi a bhfeidhmíonn an ghrian agus an tionchar a imríonn sí ar an Domhan agus ar an nGrianchóras iomlán. Seoladh é ó Cape Canaveral ag 4:03 am Éireannach agus caithfidh sé 7 mbliana ar a mhisean, ag seoladh íomhánna ar ais go dtí an Domhan. Tá naisc láidre Éireannacha leis an bhFithiseoir Gréine: Bhí baint ag taighdeoirí ó DIAS agus ó Choláiste na Tríonóide, Baile Átha Cliath, le forbairt bogearraí don satailíte, agus d'fhorbair cuideachta Éireannach ENBIO an sciath teasa chosanta a chuirfidh ar chumas an Fithiseoir staidéar a dhéanamh ar an ngrian ar leibhéal gar, ar leibhéal nach ndéantar riamh. Is Comh-Imscrúdaitheoir é an tOllamh Peter Gallagher don ionstraim X-Ghathanna Íomháú Teileascóp Gréine (STIX) ar an bhFithiseoir Gréine. Tá an Dr Shane Maloney ina bhall sinsearach d'fhoireann ionstraimí STIX agus rinneadh Comh-Imscrúdaitheoir don ionstraim é in 2020. Maoinítear rannpháirtíocht na hÉireann san Fhithiseoir Gréine/STIX trí ESA PRODEX agus riarann Fiontraíocht Éireann é.

Seoladh misean Fithiseoir Gréine ESA ó Stáisiún Aerfhórsa Cape Canaveral in Florida (9 Feabhra, 2020). Creidiúintí: NASA/Kim Shiflett.

Launch of ESA's Solar Orbiter mission from Cape Canaveral Air Force Station in Florida (February 9, 2020). Credit: NASA/Kim Shiflett.



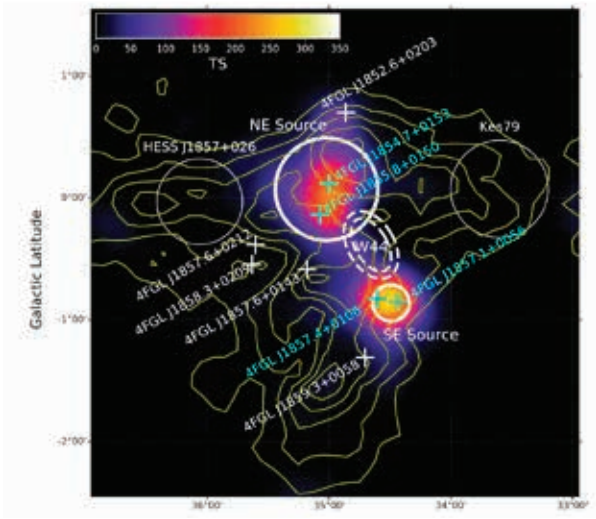
Tá an ionstraim Gréine/Teileascóip le haghaidh Íomháú X-ghathanna (STIX) ar an bhFithiseoir Gréine ESA deartha chun staidéar a dhéanamh ar bhladhma gréine X-gha le fuinneamh sa raon de 4-150 keV.

The Solar/Telescope for Imaging X-rays (STIX) instrument on ESA Solar Orbiter is designed to study solar X-ray flares with energies in the range 4-150 keV.

neither component is a neutron star or black hole. This shows that such systems are useful laboratories for investigating particle acceleration because binary systems without a compact object are relatively simple to model and understand, being composed of only two supersonic colliding flows.

Using data from the NASA Fermi mission, high energy gamma rays from 0.1 to 100 GeV were detected from the approximately 10,000 year old supernova remnant W44 and the surrounding massive molecular gas complex (Peron et al., 2020). Two extended gamma-ray structures located at two opposite edges of the remnant along its major axis have been found (see figure). The comparison of the gamma-ray map with the CO maps revealed that extended gamma-ray sources are caused by the enhanced cosmic-ray density rather than the gradient of the gas distribution. The existence of these cosmic-ray "clouds" is explained by the anisotropic character of the escape of accelerated protons from the shell along the magnetic field of the remnant.

Also based on Fermi-LAT data, high energy gamma-rays have been detected from 19 Giant Molecular Clouds located throughout the Milky Way. The galactocentric radial distribution of the cosmic ray density derived from the gamma-ray and CO observations of these objects, as well as from some nearby clouds that belong to the Gould Belt complex, unveil a homogeneous "sea" of cosmic rays with a constant density and spectral shape close to the flux of directly (locally) measured cosmic rays (Aharonian et al., 2020).



An léarscáil gáma-gha de dhá fhoinse leathnaithe a braitheadh lasmuigh de W44. Léiríonn na comhrianta bána suíomhanna na "scamaill" gáma-gha i gcoibhneas leis an íomhá gáma-gha den iarsma de W44. Tá na comhrianta CO breactha i mbuí (Aharonian et al., 2020).

The gamma-ray map of two extended sources detected outside W44. The white contours indicate the locations of gamma-ray "clouds" relative to the gamma-ray image of the remnant of W44. The CO contours are plotted in yellow (Aharonian et al., 2020).

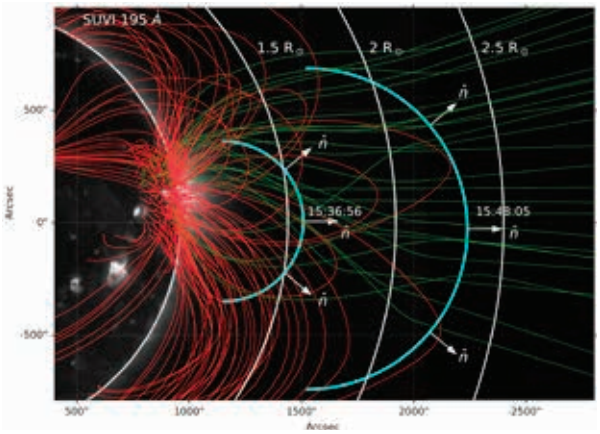
Solar Physics and Space Weather

DIAS Researchers attended the launch of ESA's Solar Orbiter spacecraft from NASA's Kennedy Space Centre at Cape Canaveral in Florida on Monday February 10, 2020. Solar Orbiter will address some of the most challenging problems in space science and help us understand how the sun operates and impacts the Earth and the entire Solar System. It was launched from Cape Canaveral at 4:03pm Irish and will spend seven years on its mission, sending images back to the Earth. There are strong Irish connections to Solar Orbiter: Researchers from DIAS and Trinity College Dublin were involved in the development of software for the satellite, while an Irish company ENBIO developed the protective heat shield that will enable the Orbiter to study the sun at an unprecedented level of proximity. Professor Peter Gallagher is a Co-Investigator for the Solar Telescope Imaging X-rays (STIX) instrument on Solar Orbiter. Dr Shane Maloney is a senior member of the STIX instrument team and was made a Co-Investigator for the instrument in 2020. Irish participation in Solar Orbiter/STIX is funded via ESA PRODEX and administered by Enterprise Ireland.

Scoil na Fisice Cosmaí (ar lean)

Cé go raibh gníomhaíocht na gréine íseal in 2020, bhí an t-ádh ar fhoireann STIX bladhma gréine a fheiceáil an 7 Meitheamh 2020. Cé go raibh sí lag, bhí an bladhma sách mór chun beagnach gach gné de STIX a thástáil. Léirítear sna sonraí a thaispeántar anseo speictream na X-ghathanna a braitheadh ón mbladhma, agus an bealach ar athraigh siad le ham. Tagann an comhartha dearg ó 'lúbanna bladhma' téite, ar áirsí maighnéadacha iad sa chorónach gréine a líontar le gás agus a théitear go dtí timpeall 11 milliún céim Celsius leis an bhfuinneamh a scaoiltear le linn na bladhma. Leis an gcomhartha gorm léirítear leictreoin a luathaíodh le linn na bladhma. Leis na leictreoin ardfhuinnimh seo, déantar na sraitheanna íochtaracha den choróin gréine a téamh, trína soláthraítear an t-ábhar a líonann na lúba bladhma. Mar sin méadaíonn an cuar dearg nuair a bhíonn an cuar gorm ard. Tar éis don luasghéarú stopadh, tosaíonn na lúba bladhma ag fuarú agus laghdaíonn an astaíocht X-gha dá réir.

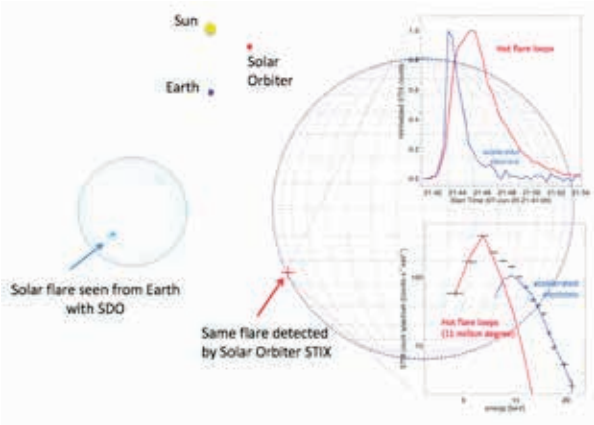
Lean taighdeoirí DIAS le ról ceannasach a bheith acu i gcónaí maidir le hoibriú agus anailísiú sonraí ón Eagar Minicíochta Íseal (LOFAR). D'úsáid Ciara Maguire Mac Léinn PhD DIAS agus TCD sonraí LOFAR mar aon le híomhánna ó mhisin NOAA, NASA agus ESA chun staidéar a dhéanamh ar mhaisithe mais chorónach gréine (CMEanna) agus na tonnta turrainge a ghabhann leo. D'fhéadfadh suaití den sórt sin bheith mar chúis l e luasghéarú leictreoin agus astaíochtaí raidió ina dhiaidh sin i bhfoirm pléascthaí raidió gréine. Mar sin féin, tá éabhlóid luathchéime airíonna turrainge agus a gaol le héabhlóid pléasctha gréine "cineál II" fós faoi réir imscrúdaithe. I bpáipéar in Réalteolaíocht & Réaltfhisic (Maguire et al., 2020), rinne siad comparáid idir trí mhodh a úsáidtear go coitianta chun uimhir Alfvén Mach a ríomh, ag díriú ar an tonn turrainge a chonaic an Íomháóir ultraivialait Gréine ar bord GOES-16, in solas bán ag an gCoronagraf Uillinn Móra agus Speictriméadrach ar bord SOHO, agus an pléasctha raidió de chineál II a bhreathnaigh I-lOFAR. Tugann a dtorthaí le fios gur féidir an astaíocht raidió a mhíniú leis an easpa geoiméadracht turrainge gar-ingearach, rud a chuireann cosc ar luasghéarú leictreoin éifeachtach agus astaíochtaí raidió ina dhiaidh sin.



Tonn turrainge ag iomadú trí réimse maighnéadach istigh an choróin gréine. Tá an éifeacht is mó ag turraingí agus luasghéarú cáithníní i gcás nach bhfuil an gnáth-turrainge dea-ailínithe leis an réimse maighnéadach (Maguire et al., 2020).

A shock wave propagating through the inner magnetic field of the solar corona. Shocks and particle acceleration are most efficient where the shock normal is not well aligned with the magnetic field (Maguire et al., 2020).

School Of Cosmic Physics (continued)



An chéad bhreathnadóireacht ar bhladhma gréine X-aicme ag an bhFithiseoir Gréine/STIX ESA. Thug Réadlann Gréine Dynamics (SDO) NASA gar don bhladhma gar don Domhan agus don Fhithiseoir Gréine.

First observation of a solar X-class flare by ESA Solar Orbiter/STIX. The flare was observed by NASA's Solar Dynamics Observatory (SDO) near Earth and Solar Orbiter.

Even though solar activity was low in 2020, the STIX team was lucky enough to observe a solar flare on 7 June 2020. Although weak, the flare was still large enough to test almost all the aspects of STIX. The data shown here represents the spectrum of the X-rays detected from the flare, and the way they changed with time. The red signal comes from heated 'flare loops', which are magnetic arches in the solar coronal that are filled with gas and heated to around 11 million degrees Celsius by the energy released during the flare. The blue signal represents electrons that were accelerated during the flare. These high-energy electrons heat the lower layers of the solar corona, which provides the material that fills the flare loops. Hence the red curve increases during when the blue curve is high. After the acceleration stops, the flare loops start to cool and the X-ray emission decreases accordingly.

Teileascóp raidió LOFAR na hÉireann ag Caisleán Bhiorra, Co. Uíbh Fhailí, Éire. Creidiúintí: Alison Delaney, Diméin Chaisleán Bhiorra.

The Irish LOFAR radio telescope at Birr Castle, Co. Offaly, Ireland. Credit: Alison Delaney, Birr Castle Demesne.

DIAS researchers continued to play a leading role in the operation and analysis of data from the Low Frequency Array (LOFAR). DIAS and TCD PhD Student Ciara Maguire used LOFAR data together with images from NOAA, NASA and ESA missions to study solar coronal mass ejections (CMEs) and their associated shock waves. Such shocks can result in electron acceleration and subsequent radio emission in the form of solar radio bursts. However, the early-phase evolution of shock properties and its relationship to solar "type II" burst evolution is still subject to investigation. In a paper in Astronomy & Astrophysics (Maguire et al., 2020), they compared three commonly used methods of calculating the Alfvén Mach number, focusing on the shock wave observed in extreme ultraviolet by the Solar Ultraviolet Imager on board GOES-16, in white-light by the Large Angle and Spectrometric Coronagraph on board SOHO, and the type II radio burst observed by I-LOFAR. Their results suggest that the radio emission can be explained by the lack of quasi-perpendicular shock geometry, which inhibits efficient electron acceleration and subsequent radio emission.

Scoil na Fisice Cosmaí (ar lean)

Teicneolaíocht Brathadóra Réalteolaíoch na chéad ghlúine eile

Teicneolaíocht brathadóra sár-iompair nua is ea Brathadóirí Ionduchtaithe Cinéiteach Micreathonn (MKIDanna) a bhfuil cumais uathúla acu don réalteolaíocht. In ainneoin na ndúshlán mór a bhí ann de bharr an dianghlasála, d'éirigh linn dul chun cinn suntasach a bhaint amach in 2020 lenár dtionscadal chun MKIDanna a bharrfheabhsú chun fótóin optúla go fótóin beagnach-IR a bhrath.

Le linn 2020, bhunaíomar comhoibriú torthúil le hInstitiúid Náisiúnta Tyndall, Corcaigh chun brabús a bhaint as an taithí ollmhór atá acu ar thaisceadh spriúchta scannáin tanaí, liteagrafaíocht ardtaifigh agus eitseáil thirim feabhsaithe ag plasma. I gcomhar le Tyndall táimid ag baint úsáide as an 'éifeacht cóngarachta' mar a thugtar air chun teocht trasdula sraitheanna de scannáin Tíotáiniam (Ti) agus Nítríd Tíotáiniam (TiN) cruachta a ionramháil le tiús sa raon nanaiméadair. Bhaineamar amach rialú beacht agus inatáirgthe ar na hilsraitheanna Ti/TiN agus chun athshondóirí sár-iompair a dhéanamh le tosca ardchaighdeáin an-arda. Mar chruthúnas ar phrionsabal d'úsáidamar na chéad eagair fréamhshamhlacha seo chun gathanna cosmacha a bhrath. Tá iarrachtaí breise ar bun chun tosca cáilíochta inmheánacha ár mbrathadóra a mhéadú, chun ár dtomhais bíge a leathnú chuig fótóin optúla agus chun réiteach fuinnimh ár mbrathadóra a thréithriú agus a bharrfheabhsú.

In 2020, rinneamar dul chun cinn maith freisin lenár bhforbairt ar leictreonaic agus dochtearraí inléite na chéad ghlúine eile do MKIDanna agus brathadóirí teocht íseal ilphléacsáilte minicíochta-fearainn eile ag baint úsáide as an mbord nua Córas Minicíochta Raidió Xilinx ZCU111 ar Chip (RFSoC). Agus é críochnaithe, ligfidh ár dochtearraí dúinn bord aonair a úsáid chun suas le 8,000 picteilín MKID a léamh ag an am céanna agus an costas inléite in aghaidh an picteilín a laghdú faoi fhachtóir 3-4 ar a laghad níos fearr ná na luachanna reatha agus le fachtóir 10 b'fhéidir.

Tá an tionscadal arna maoiniú ag Fondúireacht Eolaíochta Éireann agus i measc na foirne ag DIAS faoi stiúir an Ollaimh Tom Ray bhí an Dr Gerhard Ulbricht, agus na mic léinn PhD Mario de Lucia agus Eoin Baldwin. Meastar go dtiocfaidh baill foirne breise isteach ar an bhfoireann in 2021.

Eolaíocht Phláinéadach

Tá an Grúpa Maighnéadaisféir Phláinéadaigh faoi stiúir Ceannaire Taighde Todhchaí Uachtarán na hÉireann SFI, an Dr Caitriona Jackman, ag déanamh staidéir ar thimpeallachtaí maighnéadacha na pláinéid Mearcair, an Domhan, lúpatar agus Satarn ag úsáid breathnuithe in situ ó spásárthaí fithise, breathnuithe cianda ó theileascóip spásbhunaithe agus talamh-bhunaithe, agus ardteicnící foghlama meaisín á n-úsáid. Faomhadh síneadh a chur le misean lúnó NASA chuig lúpatar go 2025 agus tá an Dr Caitriona Jackman i gceannas ar Chlár Mór Réadlann X-gha Chandra chun lúpatar a fheiceáil i dtonnta X-gha sa samhradh 2021. Is é seo an clár Chandra aonair is mó riamh ina ndéantar breathnadóireacht ar lúpatar agus bainfidh sé leas as fithisí nua lúnó chun comparáid a dhéanamh idir na breathnuithe cianda X-gha le tomhais in situ ar mhaighnéadasféar lúpatar ar an taobh dorcha den phláinéid. Tá sé seo tábhachtach chun clúdach cothrom a fháil ar chodanna éagsúla den mhaighnéadasféar ina bhfuil próisis fhisiciúla éagsúla i bhfeidhm, ag tiomáint an ghealáin chumhachtaigh agus mhistéirigh. Táimid ag obair i gcomhar le saineolaithe i dtonnta raidió (Dr Corentin Louis, DIAS), chomh maith le ultraivialait (breathnóirí Teileascóip Spáis Hubble) chun peirspictíocht il-tonnfhaid a fháil ar lúpatar.

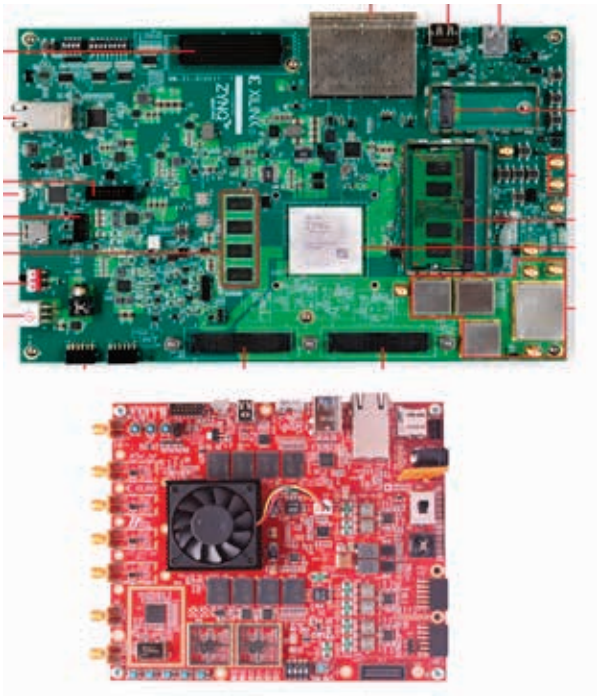
Next-generation Astronomical Detector Technology

Microwave Kinetic Inductance Detectors (MKIDs) are a novel superconducting detector technology with unique capabilities for astronomy. In spite of severe challenges caused by lockdown we still managed to achieve significant progress in 2020 with our project to optimize MKIDs for the detection of optical to near-IR photons.

During 2020, we established a fruitful collaboration with the Tyndall National Institute, Cork to profit from their vast experience in thin film sputter deposition, high-resolution lithography and plasma-enhanced dry etching. In collaboration with Tyndall we are utilizing the so-called superconducting 'proximity effect' to manipulate the transition temperature of layers of stacked Titanium (Ti) and Titanium Nitride (TiN) films with thicknesses in the nanometer range. We achieved precise and reproducible control of the Ti/TiN multilayers and to fabricate superconducting resonators with very high quality factors. As a proof of principle we used these first prototype arrays to detect cosmic rays. Further efforts to increase our detector's internal quality factors, to extend our pulse measurements to optical photons and to characterize and ultimately optimize our detector's energy resolution are underway.

In 2020 we also achieved good progress with our development of the next generation readout electronics and firmware for MKIDs and other frequency-domain multiplexed low temperature detectors using the new Xilinx ZCU111 Radio Frequency System on Chip (RFSoC) board. In its finished state our firmware will allow us to utilize a single board to read up to 8,000 MKID pixels simultaneously and reduce the per-pixel readout cost by at least a factor of 3-4 better than current values and potentially by a factor of 10.

The project is funded by Science Foundation Ireland and the team at DIAS led by Prof Tom Ray included Dr Gerhard Ulbricht, and PhD students Mario de Lucia and Eoin Baldwin. Additional staff are expected to join the team in 2021.



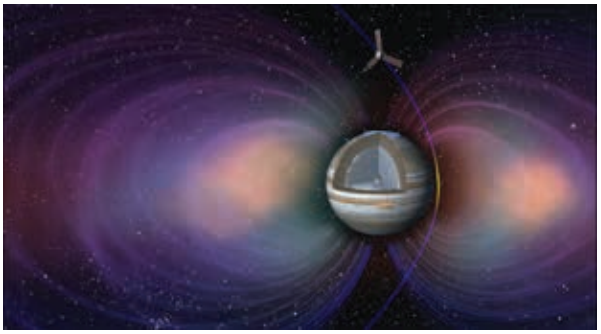
Barr: Bord inléite Xilinx RFSoC ZCU111: trí úsáid a bhaint as ár dochtearraí, ligeann an córas seo dúinn costais inléite MKID a laghdú go suntasach. Bun: Trealamh forbróra Xilinx RFSoC 2x2. I gcomhcheangal leis an bhfirmware atá á fhorbairt againn, agus i gcomhar le hOllscoil Durham, táimid ag forbairt eagair Megapixel MKID.

Top: The Xilinx RFSoC ZCU111 readout board: using our firmware this system allows us to significantly reduce MKID readout costs. Bottom: The Xilinx RFSoC 2x2 developer kit. In combination with the firmware we are developing, and in collaboration with the University of Durham, we are developing Megapixel MKID arrays.

Planetary Science

The Planetary Magnetospheres Group led by SFI President of Ireland Future Research Leader Dr Caitriona Jackman have been studying the magnetic environments of the planets Mercury, Earth, Jupiter and Saturn using in situ observations from orbital spacecraft, remote observations from space-based and ground-based telescopes, and utilising advanced machine learning techniques. NASA's Juno mission to Jupiter has been approved for extension to 2025 and Dr Caitriona Jackman is leading a Chandra X-ray Observatory Large Program to observe Jupiter in X-ray wavelengths in summer 2021. This is the largest ever single Chandra programme to observe Jupiter and will take advantage of the new orbits of Juno to compare the remote X-ray observations with in situ measurements of Jupiter's magnetosphere on the dusk side of the planet. This is important to obtain balanced coverage of different parts of the magnetosphere where diverse physical processes are in operation,

Scoil na Fisice Cosmaí (ar lean)



An cineál fithisí atá á ndéanamh ag an spásárthach NASA lúnó ar lúpatar, gar do bharr na scamall in aice leis an meánchiorcal, agus ard os cionn na bpol, ag trasnú línte an réimse mhaighnéadaigh atá nasctha le próisis ghealáin. Tugann an misean, i dteannta le breathnuithe cianda gealáin (m.sh. ó Chandra agus Hubble) deis gan fasach rúin mhaighnéadais pholacha lúpatar a nochtadh.

The type of orbits which the NASA Juno spacecraft is making at Jupiter, close over the cloud tops near the equator, and high over the poles, traversing the magnetic field lines which are linked to auroral processes. The mission, in concert with remote auroral observations (e.g. from Chandra and Hubble) provides an unprecedented opportunity to unlock the secrets of Jupiter's polar magnetosphere.

I mí na Samhna 2020, tharla ailíniú pláinéadach, rud a tharlaíonn uair amháin i 19 mbliana, rud a chuir an phláinéid Satarn "taobh thiar" den phláinéid lúpatar agus sa chaoi sin, chaith sé am tumtha i maighnéadatail ollmhór lúpatar in ionad Satarn a bheith tumtha i sreabhadh gaoithe na gréine. Tharla an t-ailíniú seo nuair a thug an spásárthach Voyager cuairt ar Satarn go luath sna 1908idí, agus sna sonraí, nochtadh éifeachtaí an spáis pharaiméadair neamhchoitianta seo - lena n-áirítear imeacht as amharc beagnach iomlán d'astaíochtaí raidió Satarn. Ba é an t-ailíniú seo i mí na Samhna 2020 an chéad uair riamh go raibh muid in ann tomhais ghealáin a dhéanamh ar Satarn agus é tumtha i dtimpeallacht plasma lóbhach. Threoraigh an mac léinn PhD Dale Weigt (ar thaobhú fadtéarmach ó Ollscoil Southampton a bheith ag obair ag DIAS leis an maoirseoir an Dr Caitriona Jackman) feachtas teileascóp X-gha Chandra chun breathnú ar Satarn le linn an ailínithe uathúil seo, ag comhlánú feachtais mhór Teileascóp Spáis Hubble ag an an am céanna. Trí bhreathnóireachtaí cianda a fháil ar na pláinéid ollmhóra gáis le linn ailínithe pláinéadacha neamhchoitianta agus le linn uaireanta nuair a bhíonn spásárthaí in situ againn (ar nós lúnó) agus trí iniúchadh a dhéanamh ar na domhain seo, is féidir linn na meicníochtaí fisiciúla a tháirgeann cuid de na hastaíochtaí gealáin is iontaí inár gcóras gréine a iniúchadh.

Go déanach in 2020 rinneadh roinnt breathnuithe ar lúpatar leis an teileascóp raidió I-LOFAR, rud a thug deis do chomhoibriú méadaithe idir na grúpaí Fisic Gréine/ Aimsir Spáis agus Maighnéadaisféir Phláinéadaigh. Faoi láthair tá a chomhghleacaí iardhochtúireachta DIAS, an Dr Corentin Louis, i gceannas ar fheachtas breathnóireachta lóbhach a chomhcheanglaíonn I-LOFAR, teileascóip raidió Nenufar agus LOFAR sa Fhrainc, agus an stáisiún LOFAR sa Ghearmáin. Tá an feachtas seo, ina bhfuil roinnt breathnuithe i rith samhradh 2021, i gcomhpháirt le misean lúnó NASA in situ ag lúpatar, ag caitheamh solais nua ar an phláinéid lúpatar, an t-astaire pláinéadach is cumhachtaí de thonnta raidió inár gcóras gréine. Thug eagarthóir an fhoilseacháin EOS de chuid Aontas Geoifisiceach Mheiriceá aird ar alt ar astaíochtaí raidió ó lúpatar le Louis et al. (2020).

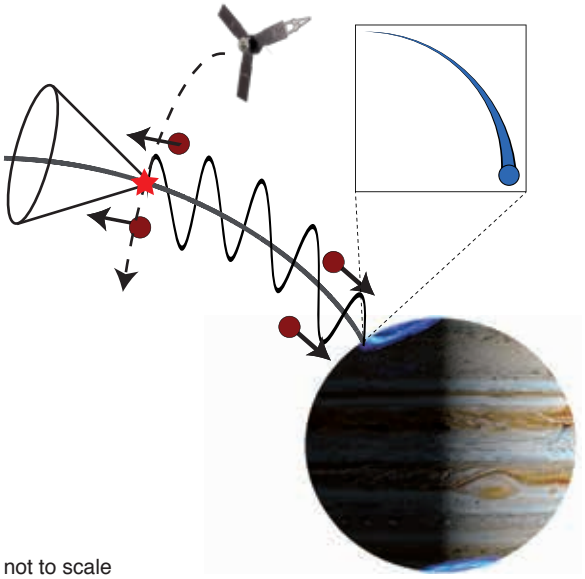
Tá roinnt ball den ghrúpa taighde maighnéadaisféir phláinéadaigh ag Southampton ag díriú a n-aird ar staidéar ar astaíochtaí raidió ón Domhan, leis an ainm Radaíocht Chiliméadrach Gealáin (AKR). Is féidir an astaíocht raidió seo a urramú ó spásárthaí fithise ar nós Wind. D'oibrigh an Mac Léinn PhD James Waters (cuairteoir ó Ollscoil Southampton) agus an taighdeoir iardhochtúireachta an Dr Alexandra Fogg (Comhalta Taighde DIAS) ar phíblíne chun na sonraí AKR a roghnú as ionstraim WAVES na spásárthaí gaoithe. Is éard atá i gceist leis an tasc teicniúil an-chasta seo gach foinse eile astaíochtaí raidió a bhaint go huathoibríoch, lena n-áirítear roiseanna gréine de Chineál III. Go deimhin, tá sochar breise ag baint le próiseáil na sonraí seo ionas gur féidir na roiseanna gréine a bhaintear (d'fhonn díriú ar AKR) a chur i gcatalóg ar leithligh le húsáid ag comhghleacaithe ón ngrúpa Fhisic Gréine. Is sampla eile é seo den obair idirdhisciplíneach atá ag dul i méid i réaltfhisic DIAS agus trasnú idir grúpaí taighde aonair sa chuid seo. Is é fócas deiridh na staidéar AKR roiseanna AKR a úsáid mar seachfhreastalaí ar dhinimic mhaighnéadaisféarach ar an Domhan, ag cainníochtú nuair a chuireann an Aimsir Spáis isteach ar an gcóras trastíre agus ag táirgeadh "innéacs raidió" a fhéadfaidh an pobal fisice spáis níos leithne a úsáid.

School Of Cosmic Physics (continued)

driving the powerful and mysterious aurora. We are working together with experts in radio wavelengths (Dr Corentin Louis, DIAS), as well as ultraviolet (Hubble Space Telescope observers) to gain a multi-wavelength perspective on Jupiter.

In November 2020, there was a once-in-19-years planetary alignment which placed the planet Saturn "behind" the planet Jupiter such that instead of Saturn being immersed in the solar wind flow, it spent time immersed in the giant magnetotail of Jupiter. This alignment occurred when the Voyager spacecraft visited Saturn in the early 1908s, and the data revealed the effects of this rare parameter space - including an almost total disappearance of Saturn's radio emissions. This alignment in November 2020 represented the first time ever that we were able to take auroral measurements of Saturn while it was bathed in the jovian plasma environment. PhD student Dale Weigt (on long-term attachment from the University of Southampton to work at DIAS with supervisor Dr Caitriona Jackman) led a Chandra X-ray telescope campaign to observe Saturn during this unique alignment, complementing a large Hubble Space Telescope campaign at the same time. Securing remote observations of the gas giant planets during rare planetary alignments and during times when we have in situ spacecraft (such as Juno) exploring these worlds allows us to probe the physical mechanisms which produce some of the most intriguing auroral emissions in our solar system.

In late 2020 there were several observations made of Jupiter with the I-LOFAR radio telescope, affording an opportunity for increased collaboration between the Solar Physics/Space Weather and Planetary Magnetospheres groups. DIAS postdoctoral fellow Dr Corentin Louis is currently leading a jovian observation campaign combining I-LOFAR, the Nenufar and LOFAR radio telescopes in France, and the LOFAR station in Germany. This campaign, comprising several observations during summer 2021, in concert with NASA's Juno mission in situ at Jupiter, is shedding new light on the planet Jupiter, the most powerful planetary emitter of radio waves in our solar system. An article on radio emission from Jupiter by Louis et al. (2020) was highlighted by the editor of the American Geophysical Union's EOS publication.



Líne réimse maighnéadach (i liath) ag nascadh lúpatar lena ló gealaí. Ag an iorg, táirgtear astaíocht UV trí imbhualadh leictreon anuas (poncanna dearga) leis an atmaisféar uachtarach lóbach. Ag airde níos airde, déantar astaíochtaí raidió (réalta dhearg) a tháirgeadh feadh cóin thoill trí leictreoin aníos. Íomhá curtha in oiriúint ó Szalay et al. (2020).

Magnetic field line (in grey) connecting Jupiter to its moon Io. At the footprint, UV emission is produced by the collision of downward electrons (red dots) with the jovian upper atmosphere. At higher altitude, radio emission is produced (red star) along a hollow cone, by upward electrons. Image adapted from Szalay et al. (2020).

Several members of the planetary magnetospheres research group at Southampton are focusing their attention on the study of radio emission from the Earth, with the name Auroral Kilometric Radiation (AKR). This radio emission can be observed from orbiting spacecraft such as Wind. PhD Student James Waters (visitor from the University of Southampton) and postdoctoral researcher Dr Alexandra Fogg (DIAS Research Fellow) have worked on a pipeline to select just the AKR data from the Wind spacecraft's WAVES instrument. This very complex technical task involves the automatic removal of all other sources of radio emission, including Type III solar bursts. Indeed, the processing of this data has an added benefit that the solar bursts which are removed (in order to focus on AKR) can then be placed into a separate catalogue for use by colleagues from the Solar Physics group. This is yet another example of the increasing inter-disciplinary work in DIAS astrophysics and crossover between individual research groups in the section. The ultimate focus of the AKR studies is to use the bursts of AKR as a proxy for magnetospheric dynamics at Earth, quantifying when the terrestrial system is disturbed by Space Weather and producing a "radio index" which can be used by the broader space physics community.

Scoil na Fisice Cosmaí (ar lean)

Dámhachtainí Maoinithe Taighde in 2020

Lean an Rannán ag cur isteach ar mhaoiniú agus ag fáil maoinithe ó chomhlachtaí maoinithe náisiúnta agus idirnáisiúnta, lena n-áirítear Comhairle Taighde na hÉireann, Fondúireacht Eolaíochta Éireann, an Cumann Ríoga agus Horizon Europe.

Fuaireamar maoiniú don chlár "Leathnaithe" de chuid Horizon Europe dar teideal "Sármhaitheas Eolaíoch agus Teicneolaíoch trí Ghnóthú Dul Chun Cinn LOFAR i Réalteolaíocht Raidió (STELLAR)" arna maoiniú ag an gCoimisiún Eorpach. Cuimsíonn an tionscadal Réadlann Náisiúnta na Bulgáire, Ollscoil Theicniúil Sóifia, Ionad Réalteolaíochta Raidió na hOllainne (ASTRON) agus Réalteolaíocht & Réaltfhisic DIAS (Iomlán €899,000; €205,000 do DIAS). Ag DIAS, tá an tOllamh Peter Gallagher, an Dr Eoin Carley, an Dr Shane Maloney agus an Dr Sophie Murray ag obair ar an tionscadal.

Bronnadh Scoláireacht Comhpháirtíochta Fiontraíochta Chomhairle Taighde na hÉireann (€96,000) ar Scoláire DIAS John Malone-Leigh chun oibriú ar stoirmeacha geomaighnéadacha in Éirinn le Suirbhéireacht Gheolaíochta na hÉireann. Beidh an tUasal Malone-Leigh cláraithe i gColáiste na Tríonóide, Baile Átha Cliath agus faoi mhaoirsiú an Ollaimh Gallagher.

Bronnadh dhá dheontas orainn ón gclár ESA PRODEX arna riar ag Fiontraíocht Éireann. Thacaigh dámhachtain amháin a bhí ag an Ollamh Tom Ray le dearadh agus déantúsaíocht scoilteoirí bhíoma fréamhshamhla do mhisean ARIEL (€75,000) agus bronnadh maoiniú ar an Ollamh Gallagher agus an Dr Shane Maloney chun tacú lena gcuid oibre ar an bhFithiseoir Gréine/STIX.

D'earcaigh an Dr Jonathan Mackey Comhalta Taighde Iardhochtúireachta, an Dr Robert Brose, arna maoiniú ag dámhachtain Laureate Tosaigh IRC, a thosaigh i mí Lúnasa 2020.

Fuair an Dr Mackey Deontas Rannpháirtíochta Poiblí an Chumainn Ríoga freisin chun líonra ceamaraí dreige uile-Éireann a fhorbairt don oideachas agus d'eolaíocht na saoránach (2020-2022, €11,000, trealamh agus mac léinn) agus glacadh lena togra don chlár chuig Ionad Inniúlachta EuroHPC "Suaitheantas Acadúil" ag Ionad na hÉireann um Ríomhaireacht Ard-Dheiridh (ICHEC), mar cheann de phríomhúsáideoirí acadúla acmhainní HPC na hÉireann (PI, 750,000 uair LAP móide am foirne ICHEC d'fhorbairt cóid, 2020-2022).

Bronnadh £4,300 ar an Dr Sophie Murray agus an Scoláire PhD John Malone-Leigh ó Scéim Deontas Beag um Oideachas & For-Rochtain an Chumainn Réalteolaíoch Ríoga chun líonra maighnéadiméadar scoile a thógáil ar fud na hÉireann. Tógfaidh sé seo ar an obair atá ar siúl cheana ag Réaltfhisic agus Geoifisic DIAS don líonra MagIE.ie.

D'earcaigh an Dr. Caitriona Jackman comhaltaí iardhochtúireachta an Dr. Alexandra Fogg (Deireadh Fómhair 2020, ó Ollscoil Leicester), agus an Dr. Corentin Louis (Samhain 2020, ó IRAP Toulouse), arna maoiniú óna dámhachtain Ceannairí Taighde Todhchaí Uachtarán na hÉireann SFI.

Bhronn an Dr. Caitriona Jackman Clár Mór (504 ks) mar PI chun breathnadóireacht a dhéanamh ar lúpatar le teileascóp X-gha Chandra i gcomhthráth le fithisí 2021 de mhisean NASA lúnó. Bhronn Dale Weigt (mac léinn PhD atá Ionnaithe i Southampton, an Dr. Jackman) DDT ar Chandra chun breathnú ar Shatarn i mí na Samhna 2020 agus an pláinéad tumtha i maighnéadotail lúpatair.

Cur i láthair

Thug an tOllamh Aharonian óráid ag Colóiciam Roinn Réaltfhisice Ollscoil Nanjing "Iniúchadh a dhéanamh ar an Cruinne Neamhtheirmeach le Teileascóip Cherenkov Atmaisféaracha" an 13 Eanáir, 2020 in Nanjing, sa tSín

Thug an tOllamh Gallagher óráid phoiblí i mBiorra ar réalteolaíocht raidió gréine an 15 Eanáir, 2020.

Thug an Dr Sophie Murray seimineár cuireadh ar "Réamhaisnéis Brúchtadh Gréine" in Ollscoil Southampton i mí Eanáir 2020.

Thug an tOllamh Aharonian óráid ag Colóiciam COC, Ollscoil Barcelona ar "Luasaitheoirí Cáithníní Foircneacha an Dúlra" an 20 Feabhra, 2020 in Barcelona, sa Spáinn.

Bhí an Dr Sophie Murray ar cheann de phríomh-eagraithe an Chruinnithe tionscnaimh Foirne Aimsire Spáis Idirnáisiúnta COSPAR in Florida, SAM, i mí Feabhra 2020. D'fhreastail an tOllamh Gallagher agus an Dr Shane Maloney air.

Thug an tOllamh Ray óráid ag na Réimsí Maighnéadacha i gCruinniú na Cruinne ar "Réimsí Maighnéadacha a Thomhas in Eis-sreabhadh ó Réaltaí Óga" an 19 Feabhra, 2020 in Quy Nhon, Vítneam.

Thug an Dr Simon Purser seimineár ar shuirbhé LOFAR ar scamaill mhóilíneacha Perseus agus Taurus (trí Zoom) ag Ceardlann LOFAR 2020 i mBiorra an 3 Márta 2020.

Thug Maria Moutzouri caint ar Réalteolaíocht Raidió (trí Zoom) an 16 Márta do dhaltaí Mheánscoil Santa Sabina.

Thug an Dr Sophie Murray seimineár cuiridh ar Réamhaisnéis Bhrúchtadh Gréine in Ollscoil na Banríona, Béal Feirste i mí an Mhárta 2020.

Cainteanna na hIdirbhliana: Thug an Dr Jonathan Mackey, an Dr David Malone (Ollscoil Mhaigh Nuad), Sam Green, agus Maria Moutzouri cainteanna ag Meánscoil Santa Sabina i Sutton, Co. Bhaile Átha Cliath i mí Aibreáin 2020.

School Of Cosmic Physics (continued)

Research Funding Awards in 2020

The Section has continued to apply for and secure funding from both national and international funding bodies, including the Irish Research Council, Science Foundation Ireland, the Royal Society and Horizon Europe.

We received funding for the Horizon Europe "Widening" programme entitled "Scientific and Technological Excellence by Leveraging LOFAR Advancements in Radio Astronomy (STELLAR)" was funded by the European Commission. The project involves the Bulgarian National Observatory, Technical University of Sofia, the Dutch Centre for Radio Astronomy (ASTRON) and DIAS Astronomy & Astrophysics (Total €899,000; €205,000 for DIAS). At DIAS, the project involves Professor Peter Gallagher, Dr Eoin Carley, Dr Shane Maloney and Dr Sophie Murray.

DIAS Scholar John Malone-Leigh was awarded an Irish Research Council Enterprise Partnership Studentship (€96,000) to work on geomagnetic storms in Ireland with the Geological Survey of Ireland. Mr Malone-Leigh will be registered at Trinity College Dublin and supervised by Professor Gallagher.

We have been awarded two grants from the ESA PRODEX programme administered by Enterprise Ireland. One award held by Professor Tom Ray supported the design and the manufacturing of prototype beam splitters for the ARIEL mission (€75,000) while Professor Gallagher and Dr Shane Maloney were awarded funding to support their work on Solar Orbiter/STIX.

Dr Jonathan Mackey recruited a Postdoctoral Research Fellow, Dr Robert Brose, funded from an IRC Starting Laureate award, who started in August 2020.

Dr Mackey also Received the Royal Society Public Engagement Grant to develop an all-Ireland network of meteor cameras for education and citizen science (2020-2022, €11,000, equipment and student) and had a proposal accepted to the EuroHPC Competence Centre "Academic Flagship" program at the Irish Centre for High-End Computing (ICHEC), as one of the leading academic users of Irish HPC resources (PI, 750,000 CPU-hours plus ICHEC staff time for code development, 2020-2022).

Dr Sophie Murray and PhD Scholar John Malone-Leigh were awarded £4,300 from the Royal Astronomical Society Education & Outreach Small Grants Scheme to build a school magnetometer network across Ireland. This will build upon the work already ongoing by DIAS Astrophysics and Geophysics for the MagIE.ie network.

Dr. Caitriona Jackman recruited postdoctoral fellows Dr. Alexandra Fogg (October 2020, from University of Leicester), and Dr. Corentin Louis (November 2020, from IRAP Toulouse), funded from her SFI President of Ireland Future Research Leaders award.

Dr. Caitriona Jackman awarded a Large Program (504 ks) as PI to observe Jupiter with the Chandra X-ray telescope to coincide with the 2021 orbits of the NASA Juno mission. Dale Weigt (Dr. Jackman's Southampton-based PhD student) awarded DDT on Chandra to observe Saturn in November 2020 while the planet is immersed in Jupiter's magnetotail.

Presentations

Prof. Aharonian gave a talk at the Colloquium of the Astrophysics Department of the Nanjing University "Exploring the Non-Thermal Universe with the Atmospheric Cherenkov Telescopes" on Jan 13, 2020 in Nanjing, China

Prof. Gallagher gave a public talk in Birr on solar radio astronomy on January 15, 2020.

Dr Sophie Murray gave an invited seminar on "Solar Eruption Forecasting" at the University of Southampton in January 2020.

Prof. Aharonian gave a talk at the UCC Colloquium, University Barcelona on "Nature's Extreme Particle Accelerators" on Feb 20, 2020 in Barcelona, Spain.

Dr Sophie Murray was one of the main organisers of the inaugural COSPAR International Space Weather Actions Teams Meeting in Florida, USA, in February 2020. Attended by Professor Gallagher and Dr Shane Maloney.

Professor Ray gave a talk at the Magnetic Fields in the Universe Meeting on "Measuring Magnetic Fields in Outflows from Young Stars" on Feb 19, 2020 in Quy Nhon, Vietnam.

Dr Simon Purser delivered a seminar on a LOFAR survey of the Perseus and Taurus molecular clouds (via Zoom) at the LOFAR 2020 Workshop in Birr on March 3, 2020.

Maria Moutzouri gave a talk on Radio Astronomy (via Zoom) on March 16 to the students of Santa Sabina Secondary School.

Dr Sophie Murray gave an invited seminar on Solar Eruption Forecasting at Queen's University Belfast in March 2020.

Transition Year Talks: Dr Jonathan Mackey, Dr David Malone (Maynooth University), Sam Green, and Maria Moutzouri gave talks at the Santa Sabina Secondary School in Sutton, Co. Dublin in April 2020.

Scoil na Fisice Cosmaí (ar lean)

Chomheagraigh an Dr Sophie Murray an cruinniú "Píotón i Réalteolaíocht" in Aibreán 2020, a bhí beartaithe ar dtús a óstáil ag DIAS i mBaile Átha Cliath ach a chuaigh ar aghaidh ar líne ina ionad mar gheall ar shrianta COVID.

Thug an tOllamh Gallagher "Léacht Dianghlasála" DIAS dar teideal "Iniúchadh ar an Nasc Gréine-Domhain le Fithiseoir Gréine ESA" an 29 Bealtaine.

Thug an tOllamh Gallagher turas fíorúil poiblí agus labhair sé faoi stair Dunsink agus na naisc le James Joyce an 16 Meitheamh mar chuid d'Fhéile Bloomsday 2020.

Thug an tOllamh Gallagher óráid ar tugadh cuireadh ar "Tionchair Aimsire Spáis ar an tSochaí" ag Cruinniú Cinn Bhliana Chumann Réalteolaíoch na hEorpa an 30 Meitheamh.

D'eagraigh an tOllamh Aharonian an cheardlann ar líne "Réaltfhisic ardfhuinnimh Ilteachtaire i ré LHAASO", 27-29 Iúil 2020. Bhí an cruinniú seo dírithe ar ghnéithe éagsúla den eolaíocht le LHAASO agus a thorthaí luatha, agus a thionchar ar réimsí taighde éagsúla na fisice réaltcháithníní, go háirithe ar Bhunús na nGathanna Cosmaí Réaltracha.

Thug an Dr Eoin Carley cur i láthair ag Cruinniú Réalteolaíochta Náisiúnta na hÉireann an 4 Lúnasa 2020 ar bhreathnadóireacht ghréine LOFAR i gcomhordú le misean Parker Solar Probe NASA.

Labhair an Dr Sophie Murray ag Campa Spáis Fíorúil AstroLands I-LOFAR do dhaltaí meánscoile agus Campa Spáis Teaghlaigh Irish Times do dhaltaí bunscoile i mí Lúnasa 2020.

Thug an Dr Sophie Murray óráid ar tugadh cuireadh dóibh dar teideal "Predicting Solar Eruptions: cad a rinne foghlaim meaisín dúinn?" ag an gCeardlann Timpeallachta um Shamhaltú Fíorúil Geospáis i mí Lúnasa 2020.

Thug an Dr Caitriona Jackman roinnt cainteanna agus seimineáir acadúla ar tugadh cuireadh dóibh: Idirghníomhaíocht Heliospáis Iomlán agus Collóiciam Pláinéadach WHPI (Lúnasa 2020), seimineár MIST na RA (Meán Fómhair 2020), INAM (Meán Fómhair 2020).

Thug an Dr Jonathan Mackey caint ar realtfhisic riomhaireachtuil agus realtnealta timpeall realtai ollmhora mar chuid den trathnona fioruil Oiche Chultuir ag Readlann DIAS Dhun Sinche an 18 Meán Fómhair.

Thug an tOllamh Gallagher óráid phoiblí ar stair Réadlann DIAS Dhún Sinche d'Oíche Cultúir 2020 an 17 Meán Fómhair.

Thug an Dr Eoin Carley óráid phoiblí ar líne faoi réalteolaíocht raidió I-LOFAR d'Oíche Cultúir 2020, 18 Meán Fómhair. Lean C&A fíorúil leis an bpobal, arna óstáil ag Ionad Oideachais I-LOFAR.

Thug an tOllamh Gallagher léacht phoiblí do Chumann Réalteolaíoch na hÉireann i mBéal Feirste ar "Breathnú ar an gCruinne Raidió le I-LOFAR" an 23 Meán Fómhair, 2020.

Thug an tOllamh Gallagher óráid phoiblí do Chumann Réalteolaíoch na hÉireann (Béal Feirste) ar I-LOFAR an 23 Meán Fómhair.

Thug an Dr Caitriona Jackman roinnt léachtanna acadúla ar tugadh cuireadh dóibh: Scoil Samhraidh STFC na RA ar Cheangal Gréine-Stellar (Warwick, Meán Fómhair 2020), modúl Teicneolaíochta Spásárthaí Ollscoil Michigan (Michigan, Deireadh Fómhair 2020), Eolaíocht Spáis OCBÁC MSc (Baile Átha Cliath, Samhain 2020).

Thug an Dr Caitriona Jackman léacht ar tugadh cuireadh di, agus in éineacht lena iardochtúireacht, threoraigh an Dr. Tadhg Garton ceardlann tráthnóna ar "Foghlaim Mheaisín d'Fhisic Spáis" ag an gcampa aclaíochta "Fondúireachtaí in Ionad Eolaíochta Sonraí d'Oiliúint Thaighde", arna mhaoiniú ag SFI, faoi stiúir Ollscoil Luimnigh, Maigh Nuad agus OCBÁC (Meán Fómhair 2020).

Bhunaigh agus comhordaíonn an Dr Caitriona Jackman sraith seimineár idirnáisiúnta ar líne nua ar "Foghlaim Mheaisín d'Fhisic Spáis Phláinéadaigh", a óstáiltear go míosúil ar líne (Meán Fómhair 2020 ar aghaidh) agus le 200+ ball ar an liosta postála ó gach cearn den saol acadúil agus eolaíocht sonraí.

Thug an Dr Sophie Murray óráid ar tugadh cuireadh di ag an gCeardlann Fíorúil ar Fhoghlaim Meaisín, Mianadóireacht Sonraí, agus Comhshamhlú Sonraí i Geospás i mí Mheán Fómhair 2020.

School Of Cosmic Physics (continued)

Dr Sophie Murray co-organised the "Python in Astronomy" meeting in April 2020, which was originally planned to be hosted by DIAS in Dublin but went ahead online instead due to COVID restrictions.

Professor Gallagher gave a DIAS "Lockdown Lecture" entitled "Exploring the Sun-Earth Connection with ESA's Solar Orbiter" on May 29.

Professor Gallagher gave a public virtual tour and talk about the history of Dunsink and the links to James Joyce on June 16 as part of the Bloomsday Festival 2020.

Professor Gallagher gave an invited talk on "Space Weather Impacts on Society" at the European Astronomical Society Annual Meeting on June 30.

Prof Aharonian organised the online workshop "Multimessenger high energy astrophysics in the era of LHAASO", 27-29 July 2020. This meeting was devoted to various aspects of the science with LHAASO and its early results, and its impact on the various research areas of astroparticle physics, in particular on the Origin of the Galactic Cosmic Rays.

Dr Eoin Carley gave a presentation at the Irish National Astronomy Meeting on 4th August 2020 on LOFAR solar observations in coordination with NASA's Parker Solar Probe mission.

Dr Sophie Murray spoke at the I-LOFAR AstroLands Virtual Space Camp for secondary school students and Irish Times Family Space Camp for primary school students in August 2020.

Dr Sophie Murray gave an invited talk entitled "Predicting Solar Eruptions: what has machine learning done for us?" at the Virtual Geospace Modeling Environment Workshop in August 2020.

Dr Caitriona Jackman gave several invited academic talks and seminars: Whole Heliosphere and Planetary Interactions WHPI Colloquium (August 2020), UK MIST seminar (September 2020), INAM (September 2020).

Dr Jonathan Mackey gave a talk on computational astrophysics and nebulae around passive stars as past of the virtual Culture night evening at DIAS Dunsink observatory on September 18.

Professor Gallagher gave a public talk on the history of DIAS Dunsink Observatory for Culture Night 2020 on September 17.

Dr Eoin Carley gave an online public talk about I-LOFAR radio astronomy for Culture Night 2020, September 18. The talk was followed by a virtual Q&A with the public, hosted by the I-LOFAR Education Centre.

Professor Gallagher gave a public lecture to the Irish Astronomical Society in Belfast on "Observing the Radio Universe with I-LOFAR" on September 23, 2020.

Professor Gallagher gave a public talk to the Irish Astronomical Association (Belfast) on I-LOFAR on September 23.

Dr Caitriona Jackman gave several invited academic lectures: UK STFC Summer School on Solar-Stellar Connection (Warwick, September 2020), University of Michigan Spacecraft Technology module (Michigan, October 2020), UCD MSc Space Science (Dublin, November 2020).

Dr Caitriona Jackman gave an invited lecture, and together with her postdoc Dr. Tadhg Garton led an afternoon workshop on "Machine learning for Space Physics" at the SFI-funded "Foundations in Data Science Centre for Research Training" bootcamp, led by University of Limerick, Maynooth and UCD (September 2020).

Dr Caitriona Jackman founded and co-leads a new international online seminar series on "Machine learning for Planetary Space Physics", hosted monthly online (September 2020 onwards) and with 200+ mailing list members from across academia and data science.

Dr Sophie Murray gave an invited talk at the Virtual Workshop on Machine Learning, Data Mining, and Data Assimilation in Geospace in September 2020.

Scoil na Fisice Cosmaí (ar lean)

Thug an Dr Pauline McGinnis cur i láthair ag Cruinniú Réalteolaíochta Náisiúnta na hÉireann an 3 Meán Fómhair 2020 ar na sceabhacht mhaighnéadach a bhaineann le réaltaí T Tauri a fhuilleamh.

Thug an tOllamh Gallagher seimineár ag an Centro de Rádio Astronomia e Astrofísica Mackenzie, an Bhrasaíl an 6 Deireadh Fómhair dar teideal "Tuning into the Radio Universe from Ireland".

Thug an Dr Alessio Caratti o Garatti óráid ar tugadh cuireadh di ar líne ag Institiúid Náisiúnta Réaltfhisice na hlodáile ar bhreathnóireachta idirfhéirmhéadracha gar-IR ar nithe réaltacha óga le GRAVITY (Deireadh Fómhair 2020).

Thug an Dr Alessio Caratti o Garatti óráid ar líne ar tugadh cuireadh di ag na bladhmanna Fuillimh agus lonrachais ar fud an speictrim maise réaltach'', CEARDLANN AR LÍNE dar teideal "Athbhreithniú a dhéanamh ar bhreathnóireachta le déanaí ar bhladhmanna fabhraithe in HMYSOnna" (Nollaig 2020)

Thug an tOllamh Ray seimineár ar líne d'Ollscoil Grenoble (IPAG) ar "Breathnóireachtaí Raidió Minicíocht Íseal ar Réada Óga Réaltacha" (Deireadh Fómhair 2020).

Thug an tOllamh Gallagher óráid ar tugadh cuireadh di ag Ceardlann Sheirbhís Aimsire Spáis an ESA i mí Dheireadh Fómhair 2020 an 14 Deireadh Fómhair dar teideal "LOFAR agus Aimsir Spáis".

Thug an tOllamh Gallagher óráid phoiblí d'Oíche Thaighdeoirí an AE dar teideal "An Cruinne Minicíocht Íseal" an 27 Deireadh Fómhair.

Thug an Dr Caitriona Jackman caint ar líne faoin nGrianchóras do 20 rang bunscoile agus meánscoile do Chlár Seachtain Eolaíochta I-LOFAR (Samhain 2020).

Thug an tOllamh Ray léacht phoiblí do Chumann Réalteolaíoch Luimnigh ar "An Teileascóp is Mó ar Domhan a Thógáil" (Samhain 2020).

D'eagraigh an Dr Jonathan Mackey tráthnóna fíorúil "Evening of Meteors, Massive Stars and Citizen Science" mar chuid d'Fhéile Eolaíochta DIAS Samhain agus Science 2020, le cainteanna ó JM, scoláire DIAS Sam Green, comhpháirtithe réalteolaíochta amaitéaracha agus lucht tacaíochta Eolaíochta Saoránaigh Dhún Sinche (Samhain 2020).

Thug an Dr Jonathan Mackey agus Scoláire DIAS Hamilton Sam Green cainteanna fíorúla do mhic léinn Idirthréimhse ó Choláiste Pobail Chaisleán Cnucha (CCC), in éineacht le CCC agus Sarah Joyce alumnus Sheachtain TY Dhún Sinche i mí na Samhna.

Thug an Dr Sophie Murray óráid ar tugadh cuireadh di dar teideal "Taighde ar riachtanais oibríochta: peirspictíocht lárionaid réamhaisnéise" ag Cruinniú Aontas Titim Geoifisiceach Mheiriceá (Nollaig 2020).

Thug an Dr Corentin Louis seimineár ar tugadh cuireadh dó ag an "Seimineár Gréasáin LESIA", Observatoire de Paris, an Fhrainc (Meitheamh 2020), dar teideal "Latitudinal beaming of Jupiter's radio emissions from Juno/Waves calibrated flux density measurements" ("Bealadh fadaimseartha astaíochtaí raidió lúpatar ó thomhais dlús flosc calabraithe lúnó/Tonnta").

Thug an Dr Corentin Louis seimineár ar tugadh cuireadh dó ag an "Seimineár Gréasáin Comhpháirteach ISPAT (Ollscoil Peking, an tSín) - IRAP (Toulouse, an Fhrainc)" (Meitheamh 2020), dar teideal "Jovian Auroral Radio Emissions in the Juno Era: simulations, remote observations and in-situ measurements" ("Astaíochtaí Raidió Ghealáin Lóbach i Ré lúnó: insamhaltaí, breathnuithe cianda agus tomhais in-situ").

Thug an Dr Corentin Louis cur i láthair ó bhéal ag Comhdháil Eolaíochta Europlanet (Lúnasa 2020), dar teideal "Ganymede-induced decametric radio emission: in-situ measurements by Juno" ("Astaíocht raidió decametrach spreagtha ag Ganymede: tomhais in-situ le lúnó").

Thug an Dr Corentin Louis cur i láthair ó bhéal ag an gceardlann "idirghníomhaíocht Moon-Magnetosphere Outer Planet" (fíorúil), ESA/ESTEC, Noordwijk, an Ísiltír (Samhain 2020), dar teideal "Astaíocht raidió gealáin spreagtha ag an ngealach sa ghrianchóras seachtrach: ó Voyager go lúno, agus go dtí na Fathaigh Oighir".

Thug an Dr Corentin Louis cur i láthair ó bhéal ag Comhdháil Aontas Geoifisiceach Mheiriceá (fíorúil), San Francisco, SAM (Nollaig 2020), dar teideal "Astaíocht raidió a spreagann an ghealach sa chóras Lóbach: tomhais in-situ le lúnó".

Sprioc 2: Idirnáisiúnú dár dtaighde agus ár gcomhoibrithe trína ndéantar taighde domhanda a fheabhsú ag an am céanna agus taighde agus scoláireacht na hÉireann a chur chun cinn.

Reáchtáil an Dr Rebeca Garcia Lopez (Ionadaí na hÉireann ar Choiste Úsáideoirí ESO) ceardlann scríbhneoireachta tograí ESO Uile-Éireann ag DIAS, Bóthar Burlington an 5-6 Márta, 2020. Ba iad na príomhchainteoirí an Dr Ferdinando Patat agus an Dr Dimitri Gadotti ó Oifig na gClár Breathnóireachta ESO agus d'fhreastail thart ar 25 duine air. Cuireadh faisnéis chúlra ar áiseanna ESO, modhanna breathnóireachta agus Cartlann ESO ar fáil chomh maith le huirlisí togra. Cuireadh seisiúin phraiticiúla maidir le dea-scríbhneoireacht tograí san áireamh freisin.

Lean an tOllamh Gallagher mar Cheann ar Chuibhreannas I-LOFAR agus d'fhóin sé ar Bhord an Teileascóp Idirnáisiúnta LOFAR (ILT). Tháinig an tOllamh Gallagher chun bheith ina bhall de ghrúpa LOFAR ERIC (Cuibhreannas Bonneagair Taighde na hEorpa) a tháinig

School Of Cosmic Physics (continued)

Dr Pauline McGinnis gave a presentation at the Irish National Astronomy Meeting on September 3, 2020, on the magnetic obliquities of accreting T Tauri stars.

Professor Gallagher gave a seminar at the Centro de Rádio Astronomia e Astrofísica Mackenzie, Brazil on October 6 entitled "Tuning into the Radio Universe from Ireland".

Dr Alessio Caratti o Garatti gave an online invited talk at Italian National Institute for Astrophysics on near-IR interferometric observations of young stellar objects with GRAVITY (October 2020).

Dr Alessio Caratti o Garatti gave an online invited talk at the Accretion and luminosity bursts across the stellar mass spectrum'', ONLINE WORKSHOP titled ``Reviewing recent observations of accretion bursts in HMYSOs'' (December 2020)

Professor Ray gave an online seminar to the University of Grenoble (IPAG) on "Low Frequency Radio Observations of Young Stellar Objects" (October 2020).

Professor Gallagher gave an invited talk at the ESA Space Weather Service Workshop in October 2020 on October 14 entitled "LOFAR and Space Weather".

Professor Gallagher gave a public talk for EU Researchers Night entitled "The Low Frequency Universe" on October 27.

Dr Caitriona Jackman gave an online talk about the Solar System to 20 primary and secondary school classes for I-LOFAR's Science Week Programme (November 2020).

Professor Ray gave a public lecture to Limerick Astronomical Society on "Building the Largest Telescope in the World" (November 2020).

Dr Jonathan Mackey organised a virtual "Evening of Meteors, Massive Stars and Citizen Science" as part of the DIAS Samhain agus Science Festival 2020, with talks from JM, DIAS scholar Sam Green, amateur astronomy partners and supporters of Dunsink Citizen Science (November 2020).

Dr Jonathan Mackey and DIAS Hamilton Scholar Sam Green gave virtual talks to Transition Year students from Castleknock Community College (CCC), along with CCC and Dunsink TY Week alumnus Sarah Joyce in November.

Dr Sophie Murray gave an invited talk entitled "Research to operations requirements: a forecasting centre perspective" at the American Geophysical Fall Union Meeting (December 2020).

Dr Corentin Louis gave an invited seminar at the "LESIA Webinar", Observatoire de Paris, France (June 2020), entitled "Latitudinal beaming of Jupiter's radio emissions from Juno/Waves calibrated flux density measurements".

Dr Corentin Louis gave a invited seminar at the "Joint ISPAT (Peking University, China) - IRAP (Toulouse, France) Webinar" (June 2020), entitled "Jovian Auroral Radio Emissions in the Juno Era: simulations, remote observations and in-situ measurements".

Dr Corentin Louis gave an oral presentation at the Europlanet Science Congress (August 2020), entitled "Ganymede-induced decametric radio emission: in-situ measurements by Juno".

Dr Corentin Louis gave an oral presentation at the "Outer Planet Moon-Magnetosphere interaction" workshop (virtual), ESA/ESTEC, Noordwijk, Netherlands (November 2020), entitled "Moon-induced auroral radio emission in the outer solar system : from Voyager to Juno, and to the Ice Giants".

Dr Corentin Louis gave an oral presentation at the American Geophysical Union Conference (virtual), San Francisco, USA (December 2020), entitled "Moon-induced radio emission in the Jovian system : in-situ measurements by Juno".

Goal 2: Internationalization of our research and collaborations thus in simultaneously enhancing global research and promoting Irish research and scholarship.

An All-Ireland ESO proposal writing workshop was held in DIAS Burlington Road from March 5-6, 2020 by Dr Rebeca Garcia Lopez (Irish Representative on the ESO Users' Committee). The primary speakers were Dr Ferdinando Patat and Dr Dimitri Gadotti from the ESO Observing Programmes Office and approximately 25 people attended. Background information on ESO facilities, observing modes and the ESO Archive were provided as well as proposal tools. Practical sessions on good proposal writing were also included.

Professor Gallagher continued as the Head of the I-LOFAR Consortium and served on the Board of the International LOFAR Telescope (ILT). Professor Gallagher also became a member of a LOFAR ERIC (European Research Infrastructure Consortium) group which met numerous times in 2020 with Ministerial representatives from ILT member countries. Professor Gallagher hosted the Dutch Ambassador at I-LOFAR in February 2020 and the French and German Ambassadors in January 2020. The RadioNet Horizon 2020 funded EU infrastructure project in connection with Radio Astronomy came to an end in 2020 and a successor is currently being planned. Professor Ray served on the RadioNet Board. DIAS has already signed the necessary letter of intent in connection with Radionet's planned successor.

Scoil na Fisice Cosmaí (ar lean)

le chéile go minic in 2020 le hionadaithe Aireachta ó thíortha baill ILT. D'óstáil an tOllamh Gallagher Ambasadóir na hÍsiltíre ag I-LOFAR i mí Feabhra 2020 agus Ambasadóirí na Fraince agus na Gearmáine i mí Eanáir 2020. Tháinig deireadh le tionscadal bonneagair AE arna mhaoiniú ag RadioNet Horizon 2020 i ndáil le Réalteolaíocht Raidió in 2020 agus tá comharba á phleanáil faoi láthair. D'fhóin an tOllamh Ray ar Bhord RadioNet. Shínigh DIAS an litir riachtanach rúin cheana maidir le comharba pleanáilte Radionet.

Maidir lenár gcuid oibre ar Theileascóp Spáis James Webb (JWST), bhí foireann na hIonstraime Lár-Infridhearg (MIRI) ag DIAS (an Dr Patrick Kavanagh agus an Dr Martin Topinka) an-ghníomhach i dtástáil agus i dtacaíocht Phíblíne Calabrúcháin JWST i gcomhar leis an Institiúid Teileascóp Spáis in Baltimore, an t-insamhlóir MIRI MIRISim, agus sna hullmhúcháin do MIRI a choimisiúnú tar éis a lainseála. Go háirithe, chuir foireann DIAS go mór le scaoileadh na Píblíne Calabrúcháin JWST i mí an Mhárta 2020 maidir le cáipéisíocht chun an phíblíne a shuiteáil agus a úsáid i dtaca le MIRI.

Tá an chuideachta a bhfuil DIAS ag comhoibriú leis ar mhonarú an scoilteoir bhíoma-scoilteoir príomhúil (déchroic) le haghaidh ARIEL, an tSaotharlann Ilchineálach Infridhearg (IML) anois tar éis bogadh go Oxford le tacaíocht ó Rutherford Appleton Laboratories. Tá an déchroic áirithe seo ríthábhachtach do ARIEL agus tá fréamhshamhla ag teastáil le haghaidh tástála crióigineacha agus speictrim in DIAS toisc nach bhfuil a Leibhéal Ullmhacht Teicneolaíochta (TRL) sách curtha chun cinn. Cuireadh conradh chun trí déchrómaigh tonnfhaid níos giorra a dhearadh, agus fréamhshamhla amháin a mhonarú leis an gcuideachta Francach CILAS. Cé go bhfuil dul chun cinn gasta déanta ag CILAS leis na dearaí, atá críochnaithe anois, chiallaigh paindéim COVID-19 go raibh an chuideachta ag feidhmiú i "mód sábháilte" ar feadh cuid mhaith de 2020.

Is é an tOllamh Aharonian Ceannaire na Meithle H.E.S.S. ar Réada Eachtar-Réaltracha Leathnaithe; D'fhostaigh an Dr Mackey Comhalta Taighde a thosaigh i mí Mheán Fómhair 2019, agus tosóidh an dara ceann i lár 2020 (arna mhaoiniú ag Dámhachtain Laureate Tosaigh IRC), agus iad araon ag cur le H.E.S.S. le linn a oibríochta leathnaithe go dtí mí Dheireadh Fómhair 2022 agus as a dtiocfaidh baint níos mó leis an Eagar Teileascóip Cherenkov i lár na 2020idí. Tá an Dr Davit Zargaryan ag déanamh na príomh-anailíse sonraí faoi láthair do thionscadal ardtosaíochta laistigh den chomhoibriú. Leanann uasghrádú HESS ag cur lena íogaireacht agus lena am freagartha ar fhoinsí neamhbhuana lena n-áirítear comhghleacaithe leictreamaighnéadacha ardfhuinnimh chuig foinsí tonnta imtharraingthe LIGO/VIRGO. Tá Felix Aharonian ag comhordú gníomhaíocht eolaíoch an chomhoibrithe le stádas mar Chomhairleoir Sinsearach Eolaíochta.

Chomhoibrigh an Dr. Caitriona Jackman le comhghleacaithe i ngrúpa Uathrialach um Fhoghlaim agus Ionstraim Meaisín Saotharlainne Tiomáint Scaird NASA ar chás tástála d'anailís sraitheanna ama a d'fhéadfaí a chur i bhfeidhm ar shonraí amach anseo ó mhisean NASA Europa Clipper, d'fhonn feabhas a chur ar roghnú ionstraime le húsáid chun breathnú ar an dúnadh. Is céim é seo i dtreo cinnteoireacht uathrialach méadaithe ar bord do mhisin spáis a chuimsíonn ard-anailísíocht sonraí agus foghlaim meaisín.

Leanaimid orainn ag comhoibriú leis an Breakthrough Foundation agus le hOllscoil California ag Berkeley ar fhorbairt iardhochtúireachta do I-LOFAR agus teileascóip raidió eile. Tá an Scoláire PhD David McKenna (Comh-mhaoirsithe ag an Ollamh Gallagher agus an Dr Evan Keane ón Square Kilometre Array/Ollscoil Náisiúnta na hÉireann, Gaillimh) ag glacadh róil cheannasaigh i bhforbairt bogearraí chun méideanna móra sonraí a ghabháil ó I-LOFAR sa tóir ar fheiniméin réaltfhisiceacha neamhbhuana mar phulsáir agus trasnaí raidió rothlacha. Ina theannta sin, tá I-LOFAR á úsáid i gcomhar le stáisiúin idirnáisiúnta LOFAR sa RA, sa Fhrainc, sa Ghearmáin, sa tSualainn agus sa Pholainn.

Seirbhís Idirnáisiúnta:

- Bhí an tOllamh Gallagher ina Mhodhnóir ar Fhisic Spáis arXiv go luath in 2020.
- Tháinig an tOllamh Gallagher chun bheith ina Eagarthóir Comhlach ar Fhisic Réaltach agus Gréine i dTeorainneacha san Fhisic agus Teorainneacha sa Réalteolaíocht agus sna hEolaíochtaí Spáis.
- Leanann an tOllamh Gallagher ag feidhmiú mar bhall de bhord Teileascóp Idirnáisiúnta LOFAR.
- Tá an tOllamh Ray ina bhall de Bhord Radionet, Comhairle ESO, Grúpa Straitéise ESO (Comhchathaoirleach), Coiste Stiúrtha Thionscnamh Idirfhéirméadrachta na hEorpa (EII) agus tá a théarma críochnaithe aige ar Choiste Bainistíochta Réadlann agus Pláinéadlann Ard Mhacha.
- D'fhóin an tOllamh Ray ar Phainéal Athbhreithnithe Piaraí (PPRP) na Comhairle Áiseanna Eolaíochta agus Teicneolaíochta (STFC) sa RA.
- D'fhóin an tOllamh Ray mar Leas-Chathaoirleach ar Phainéal Fisice Comhaltachta H2020 Marie Skłodowska-Curie sa Bhruiséil.
- Is é an tOllamh Aharonian Ceannaire na Comhairle Chomhairleach Intéirní d'Institiúid Eolaíochtaí Cosmos, Ollscoil Barcelona.
- Tá an tOllamh Aharonian ina bhall de Choiste Comhairleach Eolaíochta AHEAD (Gníomhaíochtaí Comhtháite d'Fhearann Réaltfhisice Ardfhuinnimh Horizon 2020).
- Is é an tOllamh Aharonian Comhairleoir Sinsearach Eolaíochta chomhoibriú LHAASO.

School Of Cosmic Physics (continued)

In terms of our work on the James Webb Space Telescope (JWST), the Mid-Infrared Instrument (MIRI) team at DIAS (Dr Patrick Kavanagh and Dr Martin Topinka) were very active in the testing and support of the JWST Calibration Pipeline in collaboration with the Space Telescope Institute in Baltimore, the MIRI simulator MIRISim, and in the preparations for the commissioning of MIRI after launch. In particular the March 2020 release of the JWST Calibration Pipeline had major contributions from the DIAS team in terms of documentation for installing and using the piperline in connection with MIRI.

The company with which DIAS is collaborating on the manufacture of the prototype primary beam-splitter (dichroic) for ARIEL, the Infrared Multilayer Laboratory (IML) has now moved to Oxford with the support of Rutherford Appleton Laboratories. This particular dichroic is critical for ARIEL and a prototype is required for cryogenic and spectral testing in DIAS as its Technology Readiness Level (TRL) is not sufficiently advanced. A contract for designing three shorter wavelength dichroics, and manufacturing one prototype was also placed with the French company CILAS. Although CILAS has made rapid progress with the designs, which are now complete, the COVID-19 pandemic has meant the company was operating in "safe mode" for much of 2020.

Professor Aharonian is the Leader of the H.E.S.S. Working Group on Extended Extragalactic Objects; Dr Mackey hired a Research Fellow who started in September 2019, and a second will start in mid-2020 (funded by an IRC Starting Laureate Award), both contributing to H.E.S.S. during its extended operation to October 2022 and leading to greater involvement with the Cherenkov Telescope Array into the mid-2020s. Dr Davit Zargaryan is currently doing the main data analysis for a high-priority project within the collaboration. HESS upgrades continue to increase its sensitivity and response time to transient sources including potentially high-energy electromagnetic counterparts to LIGO/VIRGO gravitational-wave sources. Felix Aharonian is coordinating the scientific activity of the collaboration with a status of the Senior Scientific Advisor.

Dr. Caitriona Jackman collaborated with colleagues at the NASA Jet Propulsion Laboratory Machine Learning and Instrument Autonomy group on a test case of time series analysis which could be applied to future data from the NASA Europa Clipper mission, in order to improve the onboard selection of instrument observing cadence. This is a step towards increased on-board autonomous decision-making for space missions incorporating advanced data analytics and machine learning.

We continue to collaborate with the Breakthrough Foundation and the University of California at Berkeley on backend development for I-LOFAR and other radio telescopes. PhD Scholar David McKenna (Co-Supervised by Professor Gallagher and Dr Evan Keane of the Square Kilometre Array/National University of Ireland, Galway) has been taking a leading role in the development of software to capture large volumes of data from I-LOFAR in the search for transient astrophysical phenomena such as pulsars and rotating radio transients. Furthermore, I-LOFAR is being used in collaboration with international LOFAR stations in the UK, France, Germany, Sweden and Poland.

International Service:

- Professor Gallagher became a Moderator for arXiv Space Physics in early 2020.
- Professor Gallagher became Associate Editor for Stellar and Solar Physics in Frontiers in Physics and Frontiers in Astronomy and Space Sciences.
- Professor Gallagher continues to serve as a member of the International LOFAR Telescope board.
- Professor Ray is a member of the Radionet Board, ESO Council, ESO Strategy Group (Co-Chair), the European Interferometry Initiative (EII) Steering Committee and has now completed his term on the Armagh Observatory and Planetarium Management Committee.
- Professor Ray served on the Science and Technology Facilities Council (STFC) Projects Peer Review Panel (PPRP) in the UK.
- Professor Ray served as a Vice-Chair to the H2020 Marie Skłodowska-Curie Fellowship Physics Panel in Brussels.
- Professor Aharonian is the Chair of the Intern. Advisory Council of the Institute of Sciences of Cosmos, University of Barcelona.
- Professor Aharonian is a member of the Science Advisory Committee of the AHEAD (Integrated Activities for the High Energy Astrophysics Domain of Horizon 2020).
- Prof Aharonian is the Senior Scientific Advisor of the LHAASO collaboration.
- Professor Aharonian is a member of the Science Advisory Committee of the AHEAD (Integrated Activities for the High Energy Astrophysics Domain of Horizon 2020).
- Prof Aharonian is an Editor of the International Journal of Modern Physics D.
- Prof Aharonian and Prof Natta continue to serve as ERC Panel members.
- Dr Caitriona Jackman appointed (2020) as Armagh Observatory management committee member for a 5-year term.

Scoil na Fisice Cosmaí (ar lean)

- Tá an tOllamh Aharonian ina bhall de Choiste Comhairleach Eolaíochta AHEAD (Gníomhaíochtaí Comhtháite d'Fhearann Réaltfhisice Ardfhuinnimh Horizon 2020).
- Tá an tOllamh Aharonian ina Eagarthóir ar International Journal of Modern Physics D (Iris Idirnáisiúnta na Fisice Nua-Aimseartha).
- Leanann an tOllamh Aharonian agus an tOllamh Natta ag feidhmiú mar bhaill de Phainéal ERC.
- Cheap an Dr Caitriona Jackman (2020) mar bhall de choiste bainistíochta Réadlann Ard Mhacha ar feadh téarma 5 bliana.
- Cheap an Dr Caitriona Jackman (samhradh 2020) go téarma 3 bliana ar Mheitheal um Chóras Gréine agus Taiscéalaíochta an ESA.
- Tá an Dr Caitriona Jackman ina ball d'Institiúid Alan Turing um Eolaíocht Sonraí sa RA.
- D'fhóin an Dr Caitriona Jackman ar phainéal athbhreithnithe NASA don Chlár Anailíse Sonraí New Frontiers.
- Scrúdaitheoir le haghaidh PhD viva do Leicester ab ea an Dr Caitriona Jackman agus bhí sí ina Scrúdaitheoir Seachtrach do Chórais Taiscéalaíochta Spáis MSc Ollscoil Leicester.
- Leanann an Dr Jonathan Mackey de bheith mar an ionadaí DIAS ar choiste stiúrtha agus bord comhoibrithe um chomhoibriú H.E.S.S.
- D'fhóin an Dr Eoin Carley ar phainéal athbhreithnithe NASA don ghlao 2019 ar Heliophysics Supporting Research (HSR) 2019.
- Chuaigh an Dr Eoin Carley isteach i bPainéal Comhairleach Eolaíochta LOFAR2.0 le déanaí.
- Leanann an Dr Eoin Carley de bheith ag fónamh ar Choiste Leithdháilte Ama Eagar Leathan Murchison.
- Leanann an Dr Sophie Murray ag feidhmiú mar phríomh-mhodhnóir ar bhraisle brúchtadh gréine Fhoirne Gníomhaíochta Aimsire Spáis Idirnáisiúnta COSPAR, Comhairleoir do Mheitheal Bailíochtaithe Aimsire Spáis Feasachta Staid Spáis ESA, agus mar bhall boird de Thionscadal Teileascóp Gréine Réamh-Eorpach Horizon 2020.
- D'fhóin an Dr Sophie Murray ar phainéil athbhreithnithe NASA don Imscrúdaitheoir Gairme Luath agus do Chláir Taighde Tacaíochta Éilifisice.
- Tá an Dr Rebeca Garcia Lopez (Comhalta Aidiachta DIAS/Ollamh Cúnta Ad Astra ag UCD) ina ball de Choiste Úsáideoirí ESO agus de Choiste Comhairleach Náisiúnta an ESO.
- D'fhóin an Dr Patrick Kavanagh ar OTAC XMM-Newton le haghaidh AO19.
- D'fhóin an Dr Alessio Caratti o Garatti mar réiteoir i gCoiste Leithdháilte Ama Teileascóp Subaru na Seapáine.

Sprioc 3: Ceannairí taighde a tharraingt, a choinneáil agus a chothú don lá inniu agus don todhchaí.

Chuir an Dr Caitriona Jackman tús lena Dámhachtain Uachtarán na hÉireann, arna maoiniú ag SFI, i mí na Nollag 2019 agus thosaigh sí ag fás a grúpa taighde in 2020. Is é téama na hoibre "Anailísíocht sonraí agus foghlaim meaisín in Eolaíocht Spáis". Tá a grúpa comhdhéanta de 3 Mhic Léinn PhD agus 3 Thaighdeoir Iardhochtúireachta, lena n-áirítear baill foirne atá ar thaobhú fadtéarmach ó Ollscoil Southampton, agus tá scóip ag an dámhachtain chun baill foirne eile a earcú, lena n-áirítear Mac Léinn PhD atá ag teacht isteach i Meán Fómhair 2021. Oibríonn an grúpa ar fud eolaíocht an chórais ghréine, ag cur teicnící anailíse sonraí agus foghlama meaisín i bhfeidhm ag pláinéid mhaighnéadaithe Mearcair, Domhan, Iúpatar agus Satarn, agus ag úsáid sonraí ó mhisin lena n-áirítear lúnó de chuid NASA ag Iúpatar, Cassini ag Satarn, agus spásárthach ar nós Wind at Earth.

Bronnadh Athnuachan Comhaltachta Taighde Ollscoile ó Fhondúireacht na hÉireann um Eolaíocht an tSochaí Ríoga, "Réaltnéalta Neamhshiméadrach ar Réaltaí Móra" (€450,000) ar an Dr Jonathan Mackey. Díreoidh tionscadal an Dr Mackey ar réaltaí ollmhóra. Is liathróidí ollmhóra gáis iad réaltaí ollmhóra, chomh lonrúil go séideann a radaíocht as a gcuid sraitheanna seachtracha i gaotha láidre réaltacha. Ina gcroíthe táirgtear bloic thógála na beatha ar nós Carbóin agus Ocsaigin trí chomhleá núicléach. Críochnaíonn a saolré gairid (de réir caighdeán cosmaí) le pléascadh ollmhór ollnóva a dhíbraíonn a gcuid sraitheanna seachtracha i spás idir-réaltach, ag fágáil réalta neodrón nó poll dubh ina ndiaidh. Rudaí enigmatacha righne iad, áfach, agus tá go leor ann nach dtuigimid faoina n-éabhlóid, go háirithe na céimeanna deireanacha sin. Tá gaotha ó réaltaí ollmhóra chomh dlúth go dtáirgeann siad réaltnéal geal ar féidir breathnú air ón Domhan. Sa tionscadal seo bainfidh an Dr Mackey úsáid as samhaltú ríomhairí de ghaotha stellar chun comparáid a dhéanamh idir an réaltnéalta a thuarimid (bunaithe ar ár dtuiscint reatha ar éabhlóid stellar) leis an réaltnéaltra a fheicimid inár Réaltra agus sna Scamaill Magellan. Trí mhúnlaí na gaoithe réaltacha a dhéanamh níos réadúla, táirgfidh sé réaltnéalta de chruth orláiste ó réaltaí atá ag rothlú go gasta, agus réaltnéaltra tomógracha ó réaltaí le atmaisféir agus gaotha corracha. Úsáidfidh sé na torthaí freisin chun imscrúdú a dhéanamh ar tháirgeadh Ghathanna Cosmaí ardfhuinnimh i dtonnta turrainge a ghineann gaotha réaltacha, go háirithe i gcórais réalta dhénártha ina mbuaileann gaotha gach réalta. Déanfaidh torthaí an Dr Mackey tástáil ar a mhéid atá ár dtuiscint ar éabhlóid réaltach ceart, agus déanfaidh siad tuartha freisin ar féidir iad a thástáil ag teileascóip reatha agus ag an gcéad ghlúin eile de réadlann a thiocfaidh ar líne sna 2020idí. Cuirfidh an athnuachan ar chumas mac léinn PhD nua a chur leis an ngrúpa in 2021.

School Of Cosmic Physics (continued)

- Dr Caitriona Jackman appointed (summer 2020) to a 3-year term on the ESA Solar System and Exploration Working Group.
- Dr Caitriona Jackman is a fellow of the Alan Turing Institute for Data Science in the UK.
- Dr Caitriona Jackman served on a NASA review panel for the New Frontiers Data Analysis Program.
- Dr Caitriona Jackman was an Examiner for a PhD viva for Leicester and was External Examiner for the University of Leicester's MSc Space Exploration Systems.
- Dr Jonathan Mackey continues as the DIAS representative on the steering committee and collaboration board of the H.E.S.S. collaboration.
- Dr Eoin Carley served on a NASA review panel for the Heliophysics Supporting Research (HSR) 2019 call.
- Dr Eoin Carley recently joined the LOFAR2.0 Science Advisory Panel.
- Dr Eoin Carley continues to serve on the Time Allocation Committee of the Murchison Widefield Array.
- Dr Sophie Murray continues to serve as lead moderator of the solar eruptions cluster of the COSPAR International Space Weather Action Teams, Advisor for the ESA Space Situational Awareness Space Weather Validation Working Group, and board member of the Horizon 2020 Pre European Solar Telescope Project.
- Dr Sophie Murray served on NASA review panels for the Early Career Investigator and Heliophysics Supporting Research Programmes.
- Dr Rebeca Garcia Lopez (DIAS Adjunct Fellow/Ad Astra Assistant Professor at UCD) is a member of the ESO User's Committee and the ESO National Advisory Committee.
- Dr Patrick Kavanagh served on the XMM-Newton OTAC for AO19.
- Dr Alessio Caratti o Garatti served as a referee in the Time Allocation Committee of the Japanese Subaru Telescope.

Goal 3: Attracting, retaining and cultivating research leaders for today and the future.

Dr Caitriona Jackman started her SFI-funded President of Ireland Award in December 2019 and began growing her research group in 2020. The theme of the work is "Data analytics and machine learning in Space Science". Her group consists of 3 PhD Students and 3 Postdoctoral Researchers, including team members who are on long-term attachment from the University of Southampton, and the award has scope for the recruitment of further team members, including an incoming PhD Student in September 2021. The group work across solar system science, applying data analysis and machine learning techniques at magnetised planets Mercury, Earth, Jupiter and Saturn, and using data from missions including NASA's Juno at Jupiter, Cassini at Saturn, and spacecraft such as Wind at Earth.

An Dr Caitriona Jackman ag plé an ghrianchórais leis an Uachtarán Michael D. Higgins ag Áras an Uachtaráin i mí an Mhárta 2020 nuair a fuair sí a dámhachtain Ceannairí Todhchaí Uachtarán na hÉireann SFI.

Dr Caitriona Jackman discussing the solar system with President Michael D. Higgins at Áras an Uachtaráin in March 2020 upon receiving her SFI President of Ireland Future Leaders award.

Dr Jonathan Mackey was awarded a prestigious Royal Society-Science Foundation Ireland University Research Fellowship Renewal, "Asymmetric Nebulae of Massive Stars" (€450,000). Dr Mackey's project will focus on massive stars. Massive stars are huge balls of gas, so luminous that their radiation blows off their outer layers in strong stellar winds. In their cores the building blocks of life such as Carbon and Oxygen are produced through nuclear fusion. Their brief lives (by cosmic standards) end with an enormous supernova explosion that expels their outer layers into interstellar space, leaving behind a neutron star or black hole. They are, however, stubbornly enigmatic objects and there is much that we do not understand about their evolution, especially the latter stages. Winds from massive stars are so dense that they produce a bright nebula that can be observed from Earth. In this project Dr Mackey will use computer modelling of stellar winds to compare the nebulae that we predict (based on our current understanding of stellar evolution) with the nebulae that we see in our Galaxy and the Magellanic

Scoil na Fisice Cosmaí (ar lean)

D'earcaigh DIAS agus Scoláire PhD Réadlann & Pláinéadlann Ard Mhacha Lindsay i mí Mheán Fómhair 2020, ainmnithe i ndiaidh Eric M. Lindsay, seachtú Stiúrthóir Réadlann Ard Mhacha. Bhí an Dr Linsday freagrach as cur ina luí ar Rialtas na hÉireann agus ar Ollscoil Harvard Teileascóp Ard Mhacha-Dún Sinche-Harvard a thógáil ag Stáisiún Boyden san Afraic Theas chun breathnú ar na spéartha theas. Tá an Scoláire, Jeremy Rigney, cómhaoinithe ag DIAS agus AOP agus beidh sé lonnaithe i Réadlann DIAS Dún Sinche agus cláraithe dá PhD in Ollscoil na Banríona, Béal Feirste. Úsáidfidh an Scoláire I-LOFAR agus an tsraith iomlán LOFAR chun iniúchadh a dhéanamh ar bhladhmanna astaíochtaí plasma a tháirgeann aghaidheanna turrainge corónach agus bladhmanna astaíochtaí plasma a tháirgeann aghaidheanna turrainge corónach ar an nGrian, agus i réaltaí eile. Tá droch-iniúchadh á dhéanamh faoi láthair ar astaíochtaí méadracha raidió dwarf M, ach is féidir le hionstraimí nua mar LOFAR an bhearna sin a líonadh. Ina theannta sin, táimid ag súil go n-úsáidfear sonraí optúla ó GOTO agus TESS chun staidéar a dhéanamh ar bhlastáin stellar, agus go háirithe ráta tarlaithe na mblastán ar réaltaí cosúil le gréine.

D'éirigh le Ruben Fedriani ó Star Formation Group an Ollaimh Ray a PhD a chosaint i gColáiste na hOllscoile, Baile Átha Cliath i mí Eanáir 2020. Ansin ghlac sé Comhaltacht Taighde Iardhochtúireachta in Ollscoil Chalmers sa tSualainn.

Chuir an Dr Eoin Carley tús lena Chomhaltacht Schrödinger in Earrach 2020. Tá Scoláire Hamilton (Shilpi Bhunia) earcaithe aige chun obair ar réalteolaíocht raidió gréine agus tá sé i gceannas ar phacáiste oibre i dtionscadal Nasctha H2020 darb ainm STELLAR. Chríochnaigh Shilpi Bhunia Máistreacht ag Institiúid Oideachais agus Taighde Eolaíochta na hIndia (IISER) Pune, faoi mhaoirseacht an Ollaimh Divya Oberoi. Cuireadh tús lena tionscadal PhD leis an anailís ar ghníomhaíocht bhrúchtach ghréine ag baint úsáide as an Sraith Leathanréimse Murchison (Murchison Widefield Array) (MWA) in iarthar na hAstráile.

Sprioc 4: Na disciplíní a neartú go náisiúnta, chun a chur ar chumas an phobail a lánacmhainneacht a bhaint amach agus inbhuanaitheacht sa todhchaí a chinntiú.

D'eagraigh an Dr Eoin Carley (Comhalta Schrödinger) "Ceardlann Eolaíochta & Teicnící LOFAR" ag lonad Oideachais I-LOFAR i mBiorra i mí an Mhárta 2020. D'fhreastail taighdeoirí as Éirinn, an Ríocht Aontaithe, an Ísiltír, an Pholainn agus an Laitvia air. Áiríodh sa cheardlann torthaí nua agus eolaíocht ón bpobal I-LOFAR lena n-áirítear cainteanna le Ollúna DIAS, Comhaltaí Taighde agus mic léinn PhD. Reáchtáil Mic Léinn PhD DIAS, Pearse Murphy, Aoife Ryan agus Ciara Maguire ranganna teagaisc ar úsáid I-LOFAR.

Is é lonad James Joyce agus an Rannóg Réalteolaíochta & Réaltfhisice ag Réadlann DIAS Dhún Sinche a eagraíonn an ócáid Heaventree of Stars i gcomhpháirt.

The Heaventree of Stars event is jointly organised by the James Joyce Centre and the Astronomy & Astrophysics Section at DIAS Dunsink Observatory.

Rannpháirtíocht Phoiblí

Bhí go leor airde sna meáin maidir le seoladh ESA Fithiseoir Gréine i mí Feabhra 2020. Rinne taighdeoirí DIAS nuashonruithe beo a roinnt ón suíomh seolta in Florida ar na meáin shóisialta, agus chlúdaigh an comhoibritheoir an Dr Niamh Shaw imeachtaí ag lonad Oibríochtaí Spáis ESA.

Lean Oícheanta Cuairteoirí Poiblí DIAS Dhún Sinche ag rith go rathúil ag tús 2020, ach i mí an Mhárta d'athraigh taighdeoirí chuig an timpeallacht fhíorúil ar líne d'imeachtaí poiblí don chuid eile den bhliain. Labhair an tOllamh Gallagher faoi iniúchadh a dhéanamh ar an nasc Gréine-Domhain leis an bhFithiseoir Gréine ESA mar chuid de Shraith Léachtaí Dianghlasála DIAS i mí na Bealtaine. I mí an Mheithimh d'óstáil muid an ócáid bhliantúil Heaventree of Stars i gcomhar le hIonad James Joyce agus Seachtain Mata na hÉireann, ceiliúradh Bloomsday ar réalteolaíocht, matamaitic, ceol agus eolaíocht in Ulysses. Mar chuid d'Fhéile Staire Bhaile Átha Cliath agus ceiliúradh DIAS 80, bhí an-áthas orainn léacht a óstáil ag an Ollamh Dame Jocelyn Bell Burnell ar "The Last and Next 100 Year of Astronomy".

School Of Cosmic Physics (continued)

Clouds. By making the models of the stellar wind more realistic he will produce hourglass-shaped nebulae from rapidly rotating stars, and clumpy nebulae from stars with turbulent atmospheres and winds. He will also use the results to investigate the production of high-energy Cosmic Rays in shockwaves that are generated by stellar winds, particularly in binary star systems where the winds of each star collide. Dr Mackey's results will test the degree to which our understanding of stellar evolution is correct, and will also make predictions that can be tested by current telescopes and by the next generation of observatories coming online in the 2020s. The renewal will enable a new PhD student to be added to the group in 2021.

DIAS and Armagh Observatory & Planetarium recruited a Lindsay PhD Scholar in September 2020, named after Eric M. Lindsay, seventh Director of Armagh Observatory. Dr Linsday was responsible for persuading the Irish Government and Harvard University to build the Armagh-Dunsink-Harvard Telescope at Boyden Station in South Africa to observe the southern skies. The Scholar, Jeremy Rigney, is jointly funded by DIAS and AOP and the will be based at DIAS Dunsink Observatory and registered for his PhD at Queen's University Belfast. The Scholar will use I-LOFAR and the full LOFAR array to explore plasma emission bursts produced by coronal shock fronts and plasma emission bursts produced by coronal shock fronts on the Sun, and in other stars. The metric radio emission of M dwarfs is currently poorly explored, but new instruments such as LOFAR can fill that gap. Furthermore, we anticipate that optical data from GOTO and TESS will be used to study stellar flares, and in particular the occurrence rate of super-flares on solar-like stars.

Ruben Fedriani of Professor Ray's Star Formation Group successfully defended his PhD at University College Dublin in January 2020. He then took up a Postdoctoral Research Fellowship at Chalmers University in Sweden.

Dr Eoin Carley started his Schrödinger Fellowship in Spring 2020. He has recruited a Hamilton Scholar (Shilpi Bhunia) to work on solar radio astronomy and he is leading a work package in the H2020 Twinning project called STELLAR. Shilpi Bhunia completed a Masters at the Indian Institute of Science Education and Research (IISER) Pune, under the supervision of Professor Divya Oberoi. Her PhD project has begun with the analysis of solar eruptive activity using the Murchison Widefield Array (MWA) in western Australia.

Goal 4: Strengthening the disciplines nationally, so as to enable the community reach its full potential and ensure future sustainability.

Dr Eoin Carley (Schrödinger Fellow) organised a "LOFAR Science & Techniques Workshop" at the I-LOFAR Education Centre in Birr in March 2020. It was attended by researchers from Ireland, UK, Netherlands, Poland and Latvia. The workshop included new results and science from the I-LOFAR community including talks by DIAS Professors, Research Fellows and PhD students. DIAS PhD Students, Pearse Murphy, Aoife Ryan and Ciara Maguire also ran tutorials on the use of I-LOFAR.

Foireann agus mic léinn DIAS le lucht freastail Cheardlann Eolaíochta & Teicnící I-LOFAR 2020.

DIAS Staff and students with attendees of the I-LOFAR Science & Techniques Workshop 2020.

Public Engagement

There was a lot of media attention surrounding the ESA Solar Orbiter launch in February 2020. DIAS researchers shared live updates from the launch site in Florida on social media, while collaborator Dr Niamh Shaw covered proceedings at the ESA Space Operations Centre.

The DIAS Dunsink Public Visitor Nights continued to run successfully at the beginning of 2020, but March saw researchers switching to the virtual online environment for public events for the rest of the year. Prof Gallagher spoke about exploring the Sun-Earth connection with ESA's Solar Orbiter as part of the DIAS Lockdown Lecture Series in May. In June we hosted the annual Heaventree of Stars event in association with the James Joyce Centre and Maths Week Ireland, a Bloomsday celebration of astronomy, maths, music, and science in Ulysses. As part of the Dublin Festival of History and the DIAS 80 celebrations, we were delighted to host a lecture by Professor Dame Jocelyn Bell Burnell on "The Last and Next 100 Years of Astronomy".

Scoil na Fisice Cosmaí (ar lean)

D'osclaíomar doirse Dhún Sinche beagnach i mí Mheán Fómhair le haghaidh Oíche Chultúir 2020, áit ar thug an tOllamh Gallagher turas fíorúil ar an Réadlann agus ar an gCruinneachán Theas do na céadta duine a bhí i láthair ar Zoom. Ina dhiaidh sin bhí roinnt cainteanna Light Speed leis an Dr Jackman, an Dr Mackey, agus an Dr Purser ar a gcuid taighde is déanaí.

D'oscail an Cruinneachán Theas ach na céadta cuairteoir is gnách in DIAS Dhún Sinche le haghaidh Oíche Chultúir 2020, agus ina ionad sin bhí turas fíorúil agus cainteanna Light Speed thar Zoom. Creidiúintí: Peter T. Gallagher (DIAS).

D'oscail an Cruinneachán Theas ach na céadta cuairteoir is gnách in DIAS Dhún Sinche le haghaidh Oíche Chultúir 2020, agus ina ionad sin bhí turas fíorúil agus cainteanna Light Speed thar Zoom. Creidiúintí: Peter T. Gallagher (DIAS).

The South Dome opened but missing the usual hundreds of visitors at DIAS Dunsink for Culture Night 2020, which instead consisted of a virtual tour and Light Speed talks over Zoom. Credit: Peter T. Gallagher (DIAS).

I mí na Samhna chonacthas níos mó gníomhaíochtaí fíorúla d'Fhéile DIAS 'Samhain agus Samhain'. D'eagraigh an Dr Jonathan Mackey "Evening of Meteors, Massive Stars, and Citizen Science," le cainteanna ón Dr Mackey, Scoláire DIAS Sam Green, agus comhpháirtithe réalteolaíochta amaitéaracha de thionscadal eolaíochta saoránach NEMETODE.

Chomhoibríomar go dlúth freisin leis an Ionad Oideachais I-LOFAR i rith na bliana. Labhair roinnt ball foirne agus mac léinn DIAS ag Campaí Samhraidh Fíorúla AstroLands i rith mí Iúil agus Lúnasa i gcomhar le Coláiste na Tríonóide, Baile Átha Cliath agus Fondúireacht Eolaíochta Éireann. Thug an Dr Carley óráid agus reáchtáil sé C&F lucht féachana mar chuid d'imeachtaí Oíche Chultúir i mí Mheán Fómhair agus labhair an Dr Jackman le meánscoileanna ar fud na tíre mar chuid de ghníomhaíochtaí na Seachtaine Eolaíochta i mí na Samhna. Thug an tOllamh Ray Léacht Grianstad an Gheimhridh I-LOFAR dar teideal "Time Machines: From Newgrange to Pulsars "i mí na Nollag chun deireadh a chur lenár mbliain de ghníomhaíochtaí rannpháirtíochta poiblí. Labhair sé faoin gcaoi ar thomhais daoine am leis na mílte bliain - thosaigh sé ar fad le breathnuithe ar an spéir ó shuíomhanna cosúil le Newgrange, agus anois tagann cuid de na tomhais ama is cruinne ón spéir arís.

Ag Tabhairt Léachta Ollscoile

Lean an tOllamh Gallagher ag tabhairt léachta ar mhodúil ardteicneolaíochta i gColáiste na Tríonóide, Baile Átha Cliath, lena n-áirítear 12 léacht ar Eolaíocht Spáis agus Pláinéadach d'fhochéimithe na bliana deiridh agus 20 léacht ar Fhisic Plasma d'iarchéimithe. Tá an-tóir i gcónaí ar an Modúl Eolaíochta Spáis agus Pláinéadach ag fochéimithe i gColáiste na Tríonóide. Clúdaíonn an cúrsa ábhair a bhfuil baint dhíreach acu le taighdeoirí ag DIAS, lena n-áirítear fisic ghréine, maighnéadaisféar pláinéadacha, eisphlainéid agus gaotha gréine agus réaltach. Tugann an Modúl Iarchéime san Fhisic Plasma réamhrá mionsonraithe ar Fhisic Plasma chun iarchéimithe a thosú san Fhisic agus sa Réaltfhisic.

Thug an Dr Patrick Kavanagh léacht ar mhodúl Réaltfhisice Ardfhuinnimh do mhic léinn na bliana deiridh in Ollscoil Mhá Nuad. Thug an Dr Sophie Murray 9 léacht agus thug an Dr Eoin Carley 6 rang teagaisc don chúrsa Fisic Úr Sóisearach d'Innealtóirí i gColáiste na Tríonóide, Baile Átha Cliath. Thosaigh an Dr Eoin Carley ag soláthar aoi-léachtaí don chúrsa iarchéime Fisic Plasma agus Maighnéada-hidrodinimic i gColáiste na Tríonóide, Baile Átha Cliath agus rinne an Dr Jonathan Mackey agus an Dr Davit Zargaryan maoirseacht ar mhac léinn Máistreachta ó Université Paris-Saclay, an Fhrainc ar réaltfhisic ardfhuinnimh.

Tionscadail Fochéime na Bliana Deiridh

Lean Réaltfhisic DIAS ag cur deise ar fáil do mhic léinn fochéime sa bhliain deiridh tabhairt faoi thionscadail na bliana deiridh sa Rannán. In 2020, rinne Comhaltaí Taighde agus Ollúna óstáil ar chúigear mac léinn ar feadh trí mhí ar ábhair ag dul ó fhisic na gréine, go stoirmeacha geomaighnéadacha, go réaltfhisic ardfhuinnimh agus réalteolaíocht raidió.

Thug Oscar O'Hara, mac léinn Fisice agus Réaltfhisice sa bhliain deiridh i gColáiste na Tríonóide agus iar-Intéirneach Samhraidh DIAS, faoi thionscadal chun staidéar a dhéanamh ar thionchar lasracha gréine ar ianaisféar an Domhain. Mar chuid de seo, thóg sé antenna minicíochta an-íseal (VLF) chun monatóireacht a dhéanamh ar thonnta leictreamaighnéadacha a fhrithchaitear as an ianaisféar. Tá an t-antenna anois mar chuid de líonra domhanda SuperSID antennas VLF.

School Of Cosmic Physics (continued)

Rinne DIAS 80 bliain d'fhionnachtana a cheiliúradh in 2020 le roinnt imeachtaí poiblí i rith na bliana, lena n-áirítear léacht fhíorúil leis an Ollamh Dame Jocelyn Bell Burnell i gcomhar leis an bhFéile Staire.

DIAS marked 80 years of discovery in 2020 with a number of public events throughout the year, including a virtual lecture by Prof Dame Jocelyn Bell Burnell in collaboration with the Festival of History.

We re-opened the doors of Dunsink virtually in September for Culture Night 2020, where Professor Gallagher gave a virtual tour of the Observatory and South Dome to several hundred attendees on Zoom. This was followed by a number of Light Speed talks by Dr Caitriona Jackman, Dr Jonathan Mackey, and Dr Simon Purser on their latest research.

November saw more virtual activities for the DIAS Samhain agus Samhain Festival. Dr Jonathan Mackey organised an "Evening of Meteors, Massive Stars, and Citizen Science," with talks from Dr Mackey, DIAS Scholar Sam Green, and amateur astronomy partners of the NEMETODE citizen science project.

We also collaborated closely with the I-LOFAR Education Centre throughout the year. Several DIAS staff and students spoke at the AstroLands Virtual Summer Camps throughout July and August in collaboration with Trinity College Dublin and Science Foundation Ireland. Dr Eoin Carley gave a talk and held an audience Q&A as part of Culture Night events in September and Dr Caitriona Jackman spoke to secondary schools across the country as part of Science Week activities in November. Professor Ray gave the I-LOFAR Winter Solstice Lecture entitled "Time Machines: From Newgrange to Pulsars" in December to end our year of public engagement activities. He spoke about how people have measured time for thousands of years – it all began with observations of the sky from sites like Newgrange, and now some of the most accurate time measurements come from the sky once again.

University Lecturing

Professor Gallagher continued to lecture advanced modules at Trinity College Dublin, including 12 lectures on Space and Planetary Science for final year undergraduates and 20 lectures on Plasma Physics for postgraduates. The Space and Planetary Science Module continues to be very popular with undergraduates at Trinity. The course covers topics of direct relevance to researchers at DIAS, including solar physics, planetary magnetospheres, exoplanets and solar and stellar winds. The Postgraduate Module in Plasma Physics provides a detailed introduction to Plasma Physics for starting postgraduates in Physics and Astrophysics.

Dr Patrick Kavanagh lectured a High Energy Astrophysics module to final year students in Maynooth University. Dr Sophie Murray gave nine lectures and Dr Eoin Carley gave six tutorials for the Junior Fresh Physics for Engineers course at Trinity College Dublin. Dr Eoin Carley began providing guest lectures for the postgraduate course Plasma Physics and Magnetohydrodynamics at Trinity College Dublin and Dr Jonathan Mackey and Dr Davit Zargaryan supervised a Masters student from Université Paris-Saclay, France on high-energy astrophysics.

Final Year Undergraduate Projects

DIAS Astrophysics continued to offer final year undergraduate students the opportunity to undertake final year projects in the Section. In 2020, Research Fellows and Professors hosted five students for three months on topics ranging from solar physics, to geomagnetic storms, to high-energy astrophysics and radio astronomy.

Oscar O'Hara, a final year Physics and Astrophysics student at Trinity and former DIAS Summer Intern, undertook a project to study the impact of solar flares on the Earth's ionosphere. As part of this, he constructed a very low frequency (VLF) antenna to monitor electromagnetic waves reflected off the ionosphere. The antenna now forms part of the global SuperSID network of VLF antennas.

Scoil na Fisice Cosmaí (ar lean)

D'oibrigh Peter Breslin, mac léinn Fisice agus Réaltfhisice sa bhliain deiridh i gColáiste na Tríonóide, Baile Átha Cliath, leis an Dr Sophie Murray ar thionscadal anailíse staidrimh ag úsáid teanga ríomhchlárúcháin Python. Chruthaigh sé bunachar sonraí de roinnt catalóga d'imeachtaí brúchtadh gréine thar luach dhá thimthriall gréine sonraí ó bhreathnuithe satailíte ar an nGrian. Rinne an Dr Laura Hayes tuilleadh forbartha air seo agus tá sé á úsáid anois ag na comhoibritheoirí ag Oifig Meitéareolaíochta na RA chun críocha taighde aimsire spáis.

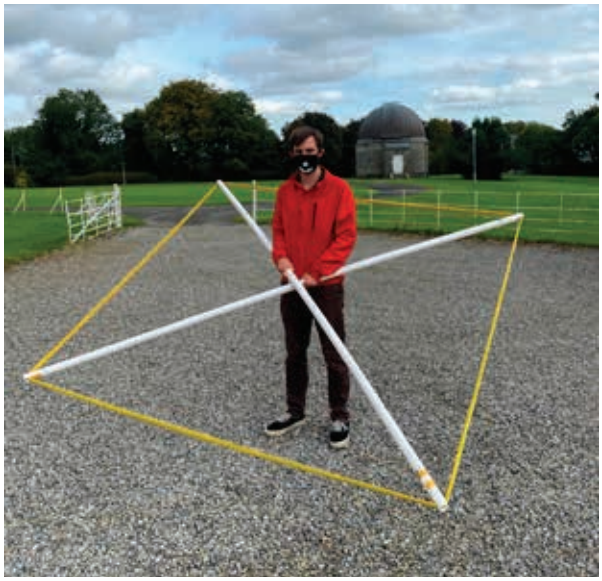
D'oibrigh Elizabeth O'Dwyer, mac léinn Fisice agus Réaltfhisice sa bhliain deiridh i gColáiste na Tríonóide, Baile Átha Cliath, leis an Dr Caitriona Jackman ar anailís sonraí ar astaíochtaí raidió ó Satarn ag úsáid spásárthaí Cassini. Rinne an Dr Jonathan Mackey maoirseacht ar dhá mhac léinn Fisice agus Réaltfhisice sa bhliain deiridh i gColáiste na Tríonóide, Baile Átha Cliath. Rinne Charles Giese staidéar ar shamhaltú ríomhaire de ghaotha imbhuailte ó réaltaí ollmhóra agus rinne Tom Carron staidéar ar astaíochtaí raidió ó réaltnéaltra timpeall réaltaí ollmhóra.

Intéirneachtaí Samhraidh

D'óstáil an Rannóg Réalteolaíochta & Réaltfhisice roinnt mac léinn fochéime mar chuid de Chlár Scoláireachta Samhraidh DIAS. D'oibrigh siad ar thionscadail for-rochtana éagsúla chomh maith le taighde:

- Forbairt ar leagan nua agus feabhsaithe de shuíomh Gréasáin SolarMonitor.org a choinníonn taighdeoirí DIAS.
- Leathanach gréasáin nua a fhorbairt do shonraí ceamara dreige NEMETODE agus GMN, agus deireadh seachtaine chun íomhánna a phróiseáil go huathoibríoch agus bunachar sonraí dreige a chothabháil.
- Tionscadal chun staidéar a dhéanamh ar éagsúlacht ama agus ar shaintréithe speictrim radaíochta ardfhuinnimh ó Núicléas Réaltrach Gníomhach a mhaisiú le FERMI-LAT.
- Ábhair meán sóisialta a fhorbairt, lena n-áirítear agallaimh le réaltfhisiceolaithe DIAS faoina gcuid taighde. Tá an físeán a tháinig as sin ar taispeáint anois ar ár leathanaigh ghréasáin.
- Pleanáil do sheomra éalaithe le téama pláinéadach ag Dún Sinche.

School Of Cosmic Physics (continued)



Thóg mac léinn fochéime Fisice agus Réaltfhisice na bliana deiridh i gColáiste na Tríonóide, Oscar O'Hara, antenna minicíochta an-íseal (VLF) mar chuid dá thionscadal bliana deiridh faoi mhaoirsiú an Ollaimh Gallagher.

Final year undergraduate Physics and Astrophysics student at Trinity, Oscar O'Hara, constructed a very low frequency (VLF) antenna as part of his final-year project supervised by Professor Gallagher.

Peter Breslin, a final year Physics and Astrophysics student at Trinity College Dublin, worked with Dr Sophie Murray on a statistical analysis project using the Python programming language. He created a database of several solar eruption event catalogues over two solar cycles worth of data from satellite observations of the Sun. This has been further developed by Dr Laura Hayes and is now being used by the collaborators at the UK Met Office for space weather research purposes.

Elizabeth O'Dwyer, a final year Physics and Astrophysics student at Trinity College Dublin, worked with Dr Caitriona Jackman on data analysis of radio emissions from Saturn using the Cassini spacecraft. Dr Jonathan Mackey supervised two final year Physics and Astrophysics students at Trinity College Dublin. Charles Giese studied computer modelling of colliding winds from massive stars and Tom Carron studied radio emission from nebulae around massive stars.

Summer Internships

The Astronomy & Astrophysics Section hosted a number of undergraduate students as part of the DIAS Summer Studentship Programme. They worked on various outreach projects as well as research:

- The development of a new and improved version of the SolarMonitor.org website that is maintained by DIAS researchers.
- Development of a new webpage for the NEMETODE and GMN meteor camera data, and a backend for automatically processing images and maintaining a database of meteors.
- A project to study the time-variation and spectral characteristics of high-energy radiation from flaring Active Galactic Nuclei with FERMI-LAT.
- Development of social media materials, including interviews with DIAS astrophysicists about their research. The resulting video is now displayed on our webpages.
- Planning for a planetary-themed escape room at Dunsink.

Scoil na Fisice Cosmaí (ar lean)

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Scoil na Fisice Cosmaí (ar lean)

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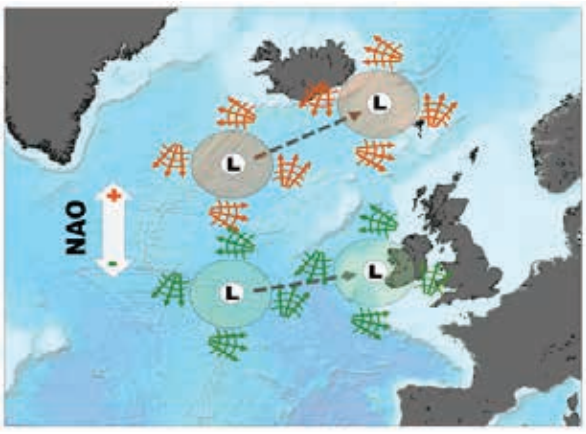
Geoifisic Tuarascáil Bhliantúil 2020

Sprioc 1: Eolas agus tuiscint nua a fhionnachtain trí shármhaitheas agus iarracht faoi stiúir an taighdeora

Buaicphointí (ní thaispeántar an ghníomhaíocht go léir):

Tá taighde suntasach tagtha i réimse na torainn sheismeacha a spreagtar san aigéan. Tá ceangal déanta ar nasc idir AAT (NAO) agus luaineachtaí i bhfarraige a spreagtar torann seismeacha farraige taifeadta amach ón gcósta in Éirinn. Tá na suíomhanna na bhfoinsí Micriseisme tánaisteach á rialú go láidir ag luaineachtaí i rian Stoirm an Atlantaigh Thuaidh, a dhéantar é féin a mhodhnú ag ascalaithe an Atlantaigh Thuaidh. Ar pheirspictíocht fhadtéarmach, nochtann sonraí Múnla an Samhail Tonn Aigéin toilleadh le haghaidh monatóireacht ar luaineachtaí AAT (NAO) ag amscálaí deachúlacha. Mar thoradh ar thaighde breise, aimsíodh bunús na dtonnta Grá seismeach a spreagtar san aigéan - rud a bhí ina bhfreagra le breis agus 100 bliain. Tá tionchar suntasach ag éifeachtaí cosán iomadaithe 3D ar ár dtuiscint ghinearálta ar fhoinsí micreashlándála tonnta Rayleigh agus Grá. Cé go dtarlaíonn tiontuithe tonn go grá Rayleigh feadh an chosáin mhicriseisme, is é an rud is mó a eascraíonn as tonnta grá ó chomhéadain ghéargheolaíochta fodhlíthe agus bataiméadracht, díreach faoi bhun na foinse farraige a lánúineacha leis an domhan soladach. I gcodarsnacht le tonnta Rayleigh, ní bhaineann tonnta grá Micriseisme a breathnaíodh ar thalamh le haer aeráid na n-aigéan ach déanann moirfeolaíocht corrlaigh ilchríochach iad a mhodhnú go mór, le héifeacht chéad ordaithe ó bháisíní dríodair.

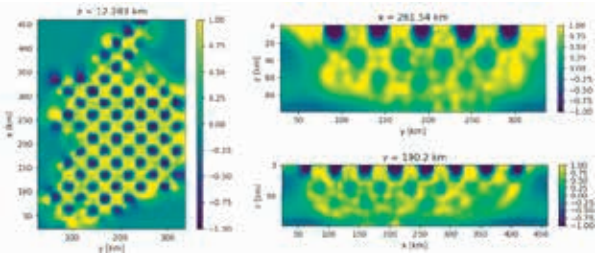


Scéim shimplí a leagann béim ar an gcaoi a n-athraíonn an rian stoirme san Atlantach Thuaidh a bhaineann le céimeanna éagsúla AAT (NAO) ar an gcaoi a n-idirghníomhaíonn stoirm leis féin agus dá bhrí sin giniúint Micriseisme tánaisteach.

Simple scheme highlighting how the storm track changes in the North Atlantic associated with different NAO phases will affect how a storm interact with itself and therefore secondary microseism generation.

D'éirigh le foireann DIAS-ICRAG taighde fairsing a dhéanamh san Abhantrach Thorcáin chun an screamhuisce a imscrúdú go struchtúir uachtaracha maintlíneacha. Áiríodh le cur chuige il-mhodh anailís treoluas, inbhéartú tonnfhoirmte iomlán de na próifílí seismeacha, samhaltú domhantarraingthe, samhaltú maighnéadach, agus con-tiúnta síos (DC) ar na tacair amh sonraí. An Chéad Tomagrafaíocht Taistil Teacht (FATT), Cód atá bunaithe ar an difríocht chríochta Ríomh na n-amanna taistil le ray-rianú taobh thiar freisin. Críochnaíonn an staidéar go bhfuil na struchtúir bholcánacha atá sa Rocal Theas basaltic sa nádúr.

Chruthaigh an fhoireann DIAS-ICRAG scéim le haghaidh comhtháthú sonraí geoifisiceacha atá dírithe ar: (i) a fhorbairt - Creat inbhéartaithe 3-D de thacair sonraí Maignéatóthealúrach, seismeacha agus domhantarraingthe agus (ii) ag tógáil-áirítear il-pharaiméadar comhsheasmhach (Seoltacht leictreach, treoluas agus ollduaslúcht) Íomhá den screamh agus an maintlín is fearr ar oileán na hÉireann. Cuideoidh na tacair chomhtháite sonraí 3D le Geolaíocht dhomhain na hÉireann a shoilsiú le príomhbhuntáiste atá beartaithe le taighde agus forbairt fuinnimh gheoiteirmeach dhomhain, agus le taiscéalaíocht amhábhar.



Ceann de na tástálacha ar an gcód faltóg forbartha (FATT). Is é an tsamhail fíor ná -1 km/s, (25 km) patrún seiceála thar treoluas cúlra líneach (VP = 2. + 0.065 * z). Gineadh sonraí sintéiseacha ar feadh 50 stáisiún agus 1000 imeacht, suite go randamach; 0.1 S Gaussach Uimh.

One of the tests of the developed FATT code. True model is +-1 km/s, (25 km) checkerboard pattern over linear background velocity (Vp = 2. + 0.065*z). Synthetic data were generated for 50 stations and 1000 events, randomly positioned; 0.1 s Gaussian no.

Tá tástálacha déanta ag foireann AE-Aigéan Ciúin an DIAS chun comharthaí a ghintear ar thraenáil a fhiosrú mar fhoinse fhéideartha fuinnimh de chuid an choirp sheismigh. Taispeánann insamhaltaí agus sonraí píolótacha turgnamhacha go bhfuil gaol díreach idir an geoiméadracht traenach (fad vaigín agus luas traenach) agus na minicíochtaí is mó agus, dá bhrí sin, na dtonnta coirp aisghafa ó thonnchuir torainn sheismeacha. Is príomhfhócas taighde é téarnamh tonn an choirp ó thorann comhthimpeallach ar an bpobal seismeolaíoch, ar fud an domhain.

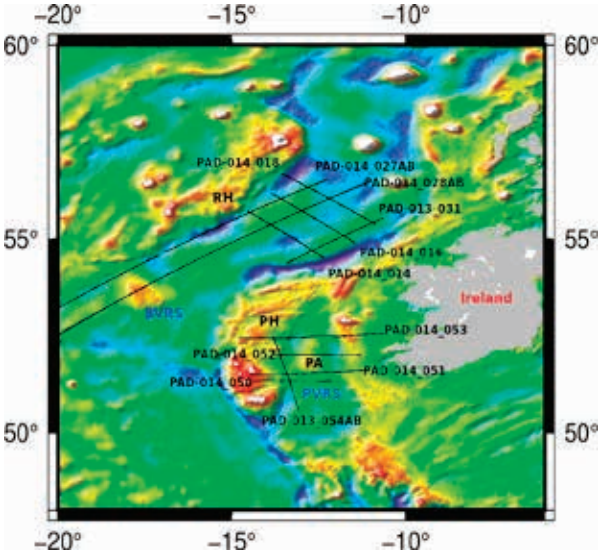
Geophysics

Goal 1: Discovery of new knowledge and understanding through excellence and researcher-led endeavour

Highlights (all activity not shown):

Research in the area of ocean induced seismic noise has yielded a significant breakthrough. A connection has been discovered between climate related North Atlantic Oscillation (NAO) and fluctuations in ocean induced seismic noise recorded offshore Ireland. The locations of secondary microseism sources are strongly controlled by fluctuations in the North Atlantic storm track, which itself is modulated by the North Atlantic Oscillation. On a long-term perspective, the ocean wave model hindcast data reveal a capacity for NAO fluctuations monitoring at decadal timescales. Further research has led to the discovery of the origin of ocean induced seismic Love waves – something that has been a puzzle for over 100 years. Our general understanding of Rayleigh and Love wave microseism sources is significantly impacted by 3D propagation path effects. While Rayleigh to Love wave conversions occur along the microseism path, Love waves predominantly originate from steep subsurface geological interfaces and bathymetry, immediately below the ocean source that couples to the solid Earth. In contrast to Rayleigh waves, microseism Love waves observed on land do not directly relate to the ocean wave climate but are significantly modulated by continental margin morphologies, with a first order effect from sedimentary basins.

The DIAS-iCRAG team has performed extensive research in the Porcupine Basin to investigate the crustal to upper mantle structures. A multi-method approach included velocity analysis, full waveform inversion of the seismic profiles, gravity modelling, magnetic modelling and downward continuation (DC) on the raw-data sets. First-Arrival Traveltime tomography (FATT), a code based on the finite difference computation of traveltimes with posterior ray-tracing was also employed. The study concludes that the volcanic structures present in the south Rockall are basaltic in nature.



Saor in Aisce Aer Domhantarraingt Aimhrialtacht Léarscáil an Iarthar na hÉireann ag taispeáint an aimhrialtacht Umar Rocal chomh maith le Abhantrach Torcáin Léiríonn línte dubha go léir na línte seismeacha go léir a úsáidtear sa staidéar.

Free-air gravity anomaly map of west of Ireland showing the anomaly of Rockall Trough as well as of Porcupine Basin. Black lines indicate all seismic lines used in the study.

The DIAS-iCRAG team has created a scheme for geophysical data integration aimed at: (i) developing a 3-D joint inversion framework of magnetotelluric, seismic and gravity data sets and (ii) building a consistent multi-parameter (electrical conductivity, velocity and mass density) image of the crust and the uppermost mantle of the island of Ireland. The integrated 3D data sets will help better illuminate the deep geology of Ireland with envisaged key benefit to Deep Geothermal Energy Research and Development, and to Raw Material Exploration.

Scoil na Fisice Cosmaí (ar lean)

Tá fionnachtana suntasacha déanta ag baint úsáide as sonraí a fuarthas ó obair allamuigh ar Sierra Negra Bolcán, Oileán Galapagos. Baineadh úsáid as Interferiméadracht Tonn Cód (CWI) chun athruithe ama a thomhas i dtreoluas seismeach ar iolraí seismeacha (creathanna talún den chineál céanna a athrá). Go háirithe, chuir an anailís seo ar ár gcumas na hathruithe treoluas a ríomh ar na sonraí a taifeadadh roimh Bhrúchtadh 2018 de Sierra Negra Bolcán, Oileán Galapagos. Braitheadh athruithe fada agus gearrthéarmacha ar threoluas le linn chéim réamhshocraithe a mholadh d'fhéadfadh damáiste forásach réamhshocraithe don fhoirgneamh. Tá sé tar éis staidéar a dhéanamh freisin ar chreathán bolcánach seismeach ag Sierra Negra a thuiscint níos fearr ar a fhoinse ghinearálta. Le cúnamh ó insamhaltaí uimhriúla de iomadú tonn seismeach agus de réir breathnuithe satailíte de dhífhoirmiú talún, a chinneann muid go bhfuil an chreathán dócha de bharr réamh- bhrúchtach carraig bhriste, agus ní ag sreabhadh sreabhach fo-dhromchla mar a ghlactar leis de ghnáth.

D'fhorbair foireann DIAS-EuroVOLC uirlis bogearraí Python-bhunaithe - RETREAT, chun comharthaí crith bolcánach a chainníochtú agus a aimsiú i bhfíor-am. Mar gheall ar a nádúr atá ag teacht chun críche, ní féidir le creathán a bheith suite ag baint úsáide as modhanna seismeolaíocha atá bunaithe ar thaisteal agus caithfidh sé a bheith suite ag baint úsáide as malairtí eile amhail teicnící atá aimplitiúid-bhunaithe nó anailís eagar seismeach. Tá eagar dlútha, bheagchró oiriúnach go háirithe chun anailís a dhéanamh ar chréatach bolcánach; ach is beag réimse seismeach fadtéarmach atá in úsáid le haghaidh gnáthmhonatóireacht ag faireachlanna bolcáin mar gheall ar chostais a bhaineann le suiteáil, cothabháil agus easpa cóid anailíse atá éasca le húsáid. Is féidir an uirlis a chur i bhfeidhm freisin ar shonraí infreafhuaime chun foinsí fo-aerógacha a bhrath agus a aimsiú. Rinneadh é a thástáil ar shonraí fíor-ama agus cartlainne araon agus tá sé réidh le tástáil agus cur i bhfeidhm i suíomh monatóireachta bolcáin ag faireachlanna. Foilsíodh páipéar tionlacain ina ndéantar cur síos ar an uirlis in Teorainneacha in Eolaíocht na Cruinne agus tá na bogearraí ar fáil go poiblí anois d'fhaireachlanna bolcáin ar fud an domhain.

Tá modh nua á fhorbairt ag foireann tionscadail DIAS-COSESISMIQ do mheastacháin RAPID (Quasi-Fíor-am) agus meastacháin iontaofa ar shraith iomlán de pharaiméadair foinse seismeacha, tar éis creathanna talún nó seismeachas spreagtha. Fostaíonn an cur chuige nár úsáideadh roimhe seo in obair inbhéartaithe foinse samhail líonra néarach dhomhain (CNN) bunaithe ar shonraí insamhalta sintéiseacha ar aghaidh le torann allamuigh breise. Is é an buntáiste a bhaineann leis an gcur chuige seo ná luas. Tá luasanna reatha bainte amach againn thart ar shé ord méide, rud a fhágann go bhfuil an modh oiriúnach do thascanna casta fíor-ama. Tá an scéim á cur i bhfeidhm anois ar réimse geoiteirmeach san Íoslainn.

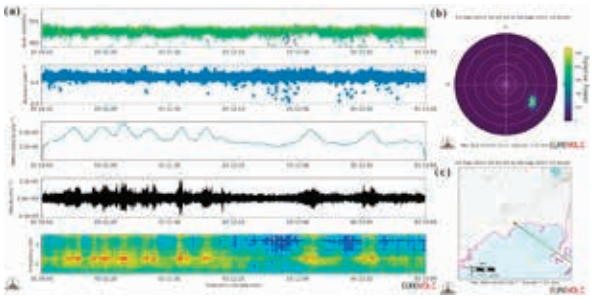
Rinneadh tuilleadh taighde isteach i struchtúr agus éabhlóid mór-ranna an domhain. Rinneadh ardtaifaigh, íomháú ar scála na mór-roinne ag baint úsáide as inbhéartú tonnfhoirm seismeach Rinneadh an Afraic, an Astráil, Meiriceá Theas, Oirthear na hÁise, an Ghraonlainn & Oirthuaisceart an Atlantaigh.

Thug iniúchadh ar struchtúr agus éabhlóid na hÉireann léargas nua ar a tionól Caladónach agus ar na meicníochtaí is bun lena bholcánachas Paleogene (m.sh Cúisbhealach an Fhathaigh) ó thomagrafaíocht ardtaifigh tonnta dromchla, ag baint úsáide as tomhais eagair. Mar thoradh air seo tá sonraí tábhachtacha nua a bhfuil impleachtaí acu do mheasúnú acmhainní geoiteirmeacha ar fud na hÉireann.

School Of Cosmic Physics (continued)

Tests have been carried out by the DIAS EU-PACIFIC team to explore train-generated signals as a potential source of seismic body wave energy. Simulations and pilot experimental data show that there is a direct relationship between the train geometry (wagon length and train speed) and the dominant frequencies and, consequently, the recovered body waves from seismic noise interferometry. Body wave recovery from ambient noise is currently a key research focus in the seismological community, globally.

Significant discoveries have been made using data acquired from fieldwork on Sierra Negra Volcano, Galapagos Island. Coda Wave Interferometry (CWI) has been used to measure time-lapse changes in seismic velocity on seismic multiplets (repeating similar earthquakes). In particular, this analysis allowed us to calculate the velocity changes on the data recorded prior to the 2018 eruption of Sierra Negra volcano, Galapagos Island. Long and short term changes in velocity were detected during a pre-eruptive phase suggesting possible a progressive pre-eruptive damage to the edifice. Studying seismic volcanic tremor at Sierra Negra has also allowed us to better understand its generative source. Aided by numerical simulations of seismic wave propagation and by ground deformation satellite observations, we determine that tremor is likely caused by pre-eruptive rock fracturing, and not by sub-surface fluid flow as is usually assumed.



Sampla de na figiúirí aschuir a tháirgtear leis an uirlis bogearraí RETREAT, a thaispeánann torthaí próiseála eagair agus an tasmatha ag díriú ar an bhfoinse forluí ar léarscáil den eagair.

Example of the output figures produced by the RETREAT software tool, showing array processing results and the azimuth pointing to the source overlain on a map of the array.

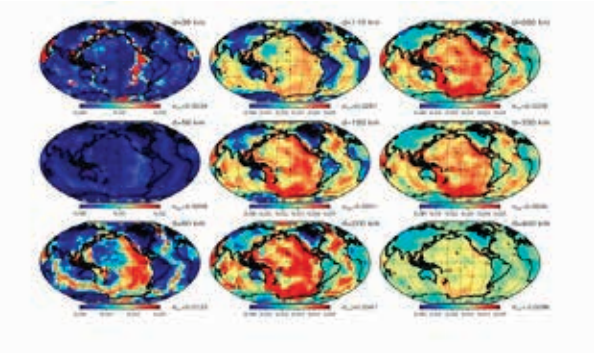
The DIAS-EUROVOLC team has developed a python-based software tool – RETREAT, to quantify and locate volcanic tremor signals in real-time. Due to its emergent nature, tremor cannot be located using travel-time based seismological methods and must be located using alternatives such as amplitude-based techniques or seismic array analysis. Dense, small-aperture arrays are particularly suited for analysing volcanic tremor; yet costs associated with installation, maintenance and the lack of easy-to-use analysis codes have meant few long-term seismic arrays in use for routine monitoring at volcano observatories. The tool can also be applied to infrasound data to detect and locate sub-aerial acoustic sources. It has been tested on both real time and archived data and is ready for testing and implementation in a volcano monitoring setting at observatories. An accompanying paper describing the tool has been published in Frontiers in Earth Science and the software is now publicly available to volcano observatories worldwide.

A new method is under development by the DIAS-COSEISMIQ project team for rapid (quasi-realtime) and reliable estimates of a full suite of seismic source parameters, following earthquakes or induced seismicity. The approach which has not been used before in source inversion work employs a deep convolutional neural network (CNN) model based on synthetic forward simulation data with added field noise. The advantage of this approach is speed. We have achieved current speedups are around six orders of magnitude, making the method ideal for complex real-time tasks. The scheme is now being applied to a geothermal field in Iceland.

Further research has been conducted into the structure and evolution of the Earth's continents. High-resolution, continent-scale imaging using seismic waveform inversion has been carried out for Africa, Australia, South America, East Asia, Greenland & NE Atlantic.

Scoil na Fisice Cosmaí (ar lean)

Cruthaíodh bogearraí nua chun an réimse Maignéatótheallúrach a sheachaint ag cur-cíosanna maighnéadacha taoide le haghaidh samhail seoltachta leictreach 3D nua den mhaintlín uachtarach mar chuid den tionscadal Geimhreadh-e. Forbraíodh samhail shreang de na sruthanna leictreacha maighnéadaigh, na sruthanna ailínithe páirce agus na leictreamaighní Pholacha a tharlaíonn le linn stoirmeacha maighnéadacha an domhain le déanaí. Bainfear úsáid as an tsamhail fhisiciúil seo chun léirmhínithe a fheabhsú Sonraí Maighnéadach Satailíte Swarm le linn stoirmeacha maighnéadacha. Is é ár samhail seoltacht nua geimhridh-e díorthaithe go neamhspleách ó aon tacair sonraí maighnéadacha dromchla nó satailíte, tá sé in ann réimsí maighnéadacha taoide a thuar atá i gcomhaontú an-mhaith leis na samhlacha allamuigh maighnéadacha taoide a mheastar a mheasann na breathnuithe maighnéadacha satailíte.

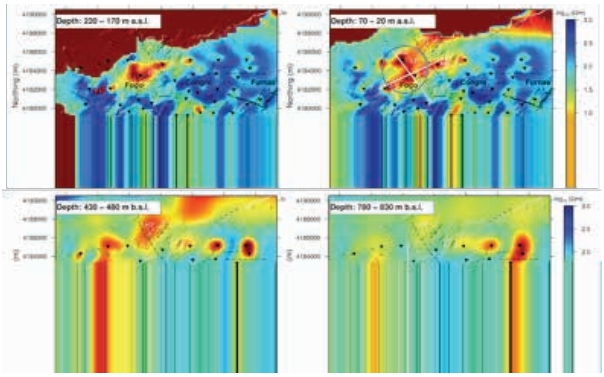


Seoltachtaí leictreacha 3D uachtair-maintlín (i S/m) de mhúnla geimhridh-e do mhianraí maintlín ag naoi sraitheanna ag doimhneacht 36 go 400 km.

Upper-mantle 3D electrical conductivities (in S/m) of model WINTERC-e for mantle minerals at nine layers at depths of 36 to 400 km.

Rinneadh staidéar mar chuid de thionscadal Clár an AE-Geoiteoirímica/GESI GEOURBAN ar thréithriú na struchtúr faoi chathair Bhaile Átha Cliath ag baint úsáide as teicnící seismeacha éighníomhacha (torann tráchta m.sh mar fhoinsí seismeacha). Rinneadh samhail treoluas a ghintear don chuid éadomhain (<2 km) den screamh faoi bhun cuan Bhaile Átha Cliath chun teacht isteach, den chéad uair, doimhneacht na bpríomh-chomhéadain gheolaíochta faoi bhun na cathrach, lena n-áirítear an doimhneacht go dtí an íoslach criostalach atá ar eolas go dona. I staidéar comhlántach a fhostaíonn feidhmeanna glacadóra, baineadh úsáid as taifeadtaí creathanna talún teleseismic chun an struchtúr treoluas a thuiscint faoi bhun stáisiúin seismeacha féin go dtí 2.5km doimhneacht. Is é an príomhthoradh ná go bhfuil an t-íoslach criostalach dócha faoi bhun 2km doimhneacht, le haonaid aolchloiche iolracha inbhraite os a chionn. Feidhmíonn sé seo mar chruthúnas ar choincheap chun an mhodheolaíocht shaor agus neamh-millteach seo a chur i bhfeidhm i gceantar an-daonra.

3D Samhaltú de na sonraí maighnéadacha ar dhá bholcán mar chuid de thaighde leanúnach sna hAsóir tá struchtúir gheo-leictreacha i gcodarsnacht. Tá mapáil níos doimhne agus níos leithne de struchtúir sheoltach aimsithe ar bholcán foirnéise ach, tá struchtúir fhrithsheasmhacha fairsinge mapáilte faoi bhun an strutchúir de Bholcán Fogo. Dheimhnigh na híomhana MT ó Bholcán Fogo go bhfuil an crios seoltaí a fhreagraíonn don chóras geoiteirmeach gníomhach ag Ribeira Grande (Ciorcal Gorm) faoi cheangal an Oirthir de réir locht Falca mar a thuigtear roimhe seo. Is é an síniú geo-leictreacha de Bholcán Fogo ná croí lárnach frithsheasmhach atá díomhaoin le socruithe gníomhacha, stairiúla agus féideartha geoiteirmeacha ar chliatháin theas an bholcáin.

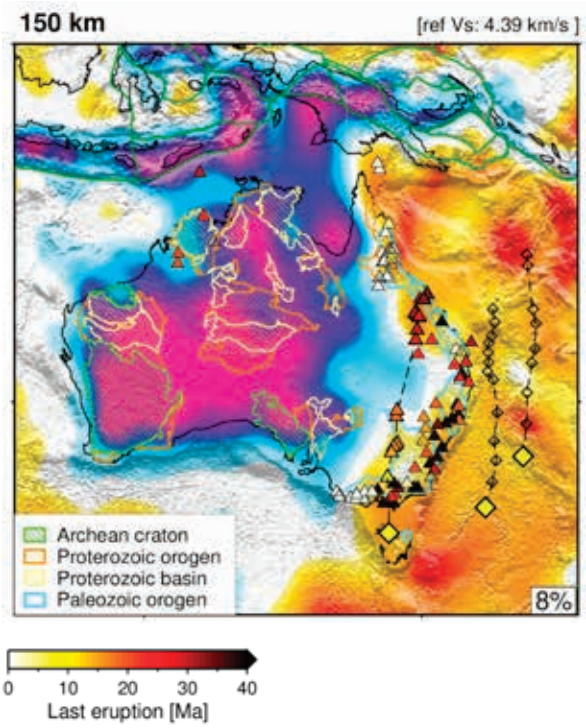


Sisní Doimhneachta Cothrománacha de sheolacht leictreach: Bolcán Fogo, Na hAsóir.

Horizontal Depth Slices of electrical conductivity: Fogo Volcano, Azores.

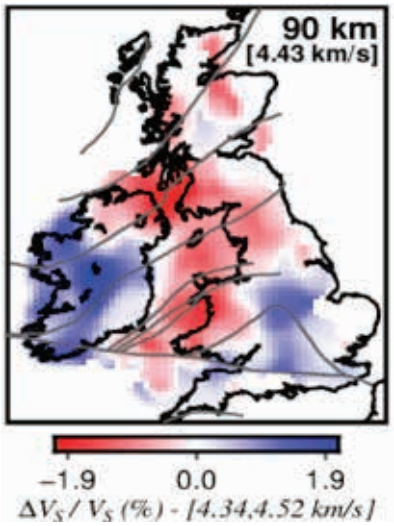
D'aimsigh Líonra Náisiúnta Seismeach Náisiúnta (INSN) 259 imeacht seismeacha le linn na tréimhse tuairiscithe lena n-áirítear trí cinn déag creathanna talún. Breathnaíodh torann seismeach neamhghnách íseal le linn an dianghlasáil COVID-19 as a dtiocfaidh clúdach leathan sna meáin náisiúnta. Thug DIAS tuairimí íseal torainn le haghaidh stáisiúin i Sléibhte Bhaile Átha Cliath (DSB) agus Líoma, Peiriú (NNA) le staidéar domhanda a chuimsigh foireann DIAS/INSN, a foilsíodh in irisleabhar eolaíochta (Lecocq et al., 2020). Lean cuardaigh an láithreáin ag leathnú an Líonra Insn. Fuarthas an Seismiméadar Fadtéarmach Aigéan (OBE) faoi bhun baoi farraige M6 i mí na Bealtaine.

School Of Cosmic Physics (continued)



Is féidir le tomagrafaíocht seismeach íomhá an tiubh, an litisféar fuar (gorm dorcha agus corcra) na Cratons Archean-croílár na hAstráile-fiú nuair nach bhfuil siad nochta ag an dromchla agus ní féidir iad a mhapáil go geolaíoch.

Seismic tomography can image the thick, cold lithosphere (dark blue and purple) of the Archean cratons—the ancient core of Australia—even where they are not exposed at the surface and cannot be mapped geologically.



Struchtúr treoluas S-tonn ag doimhneacht 90 km faoi bhun na hÉireann agus na Breataine. Tá limistéir dhearga teocht réasúnta níos airde sa litisféar.íochtarach.

S-wave velocity structure at 90 km depth beneath Ireland and Britain. Red areas are relatively higher temperature in the lower lithosphere.

Exploration of the structure and evolution of Ireland has given new insights into its Caledonian assembly and the mechanisms underlying its Paleogene volcanism (e.g. the Giant's Causeway) from high-resolution surface-wave tomography, using array measurements. This has resulted in important new data with implications for geothermal resource assessment across Ireland.

New software has been created for computing the magnetic field induced by tidal ocean currents for a new 3D electrical conductivity model of the upper mantle as part of the WINTERC-e project. A wire model of the magnetospheric electric currents, the field aligned currents and polar electrojets occurring during the Earth's magnetic storms has recently been developed. This physical model will be used to improve the interpretations of Swarm satellite magnetic data during magnetic storms. Our new conductivity model WINTERC-e derived independently from any surface or satellite magnetic data sets, is able to predict tidal magnetic fields that are in very good agreement with the tidal magnetic field models estimated from the Swarm satellite magnetic observations.

A study has been conducted as part of the EU-Geothermica programme/GSI GEOURBAN project on the characterisation of structures beneath Dublin City using passive seismic techniques (e.g. traffic noise as seismic sources). A velocity model has been generated for the shallow (<2 km) part of the crust beneath the Dublin Basin to infer, for the first time, the depth of the main geological interfaces beneath the city, including the depth to the poorly known crystalline basement. In a complementary study employing receiver functions, recordings of teleseismic earthquakes were used to infer the velocity structure beneath seismic stations own to 2.5km depth. The main finding is that the crystalline basement is likely below 2km depth, with multiple limestone units detectable above it. This serves as a proof of concept for the application of this cheap and non-destructive methodology in a highly populated area.

3D modelling of the magnetotelluric data on two volcanoes as part of ongoing research in the Azores has yielded contrasting geo-electrical structures. Deeper and broader mapping of conductive structures have been discovered on Furnas volcano whereas, extensive resistive structures have been mapped beneath the edifice of Fogo volcano. The MT images from Fogo Volcano confirmed that the conductive zone corresponding to the active geothermal system at Ribeira Grande (blue circle) is not bound to the east by the Falca Fault as previously understood. The geoelectrical signature of Fogo Volcano is a resistive central core that is dormant with active, historical and potential geothermal settings on the southern flanks of the volcano.

Scoil na Fisice Cosmaí (ar lean)

Comhdhálacha ar fhreastail Pearsanra Geoifisice DIAS:

Mar gheall ar an bpaindéim domhanda tá laghdú ar líon na gcruinnithe a bhfreastalaítear orthu, go ginearálta. Cé go raibh roinnt cruinnithe go luath sa bhliain ar aghaidh ag duine le duine ag pearsanra DIAS, cruinnithe ó Mhárta 2020 cealú nó bhog sé go formáid fhíorúil.

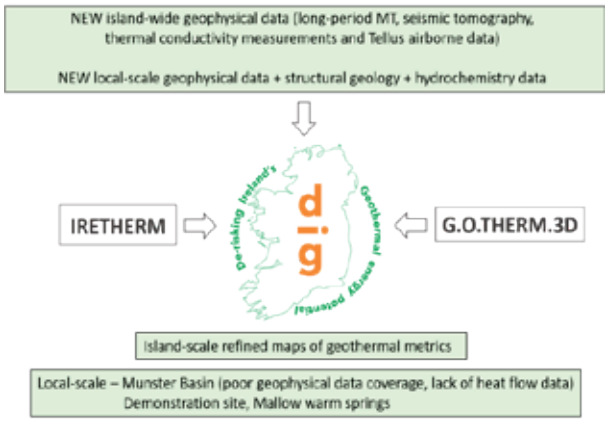
- Cruinniú Deich mBliana Aigéin AE, Halifax, Ceanada, (duine le duine) 6-10 Eanair
- Bord Comhairleach Cathracha an Iae amárach, Katmandu, Neipeal, (duine le duine) 27 Feabhra-1 Márta
- 63 Cruinniú Taighde Geolaíochta na hÉireann (IIGM 2020), Baile Átha Luain, Éire, 28 Feabhra-1 Márta
- Aontas Geoifisiceach Eorpach, Fíorúil, 4-8 Bealtaine
- Cruinniú 3D-Domhan, Fíorúil, 7-8 Meán Fómhair
- Siompóisiam Taiscéalaíochta Mianraí EAGE, Fíorúil, 17-18 Meán Fómhair
- Cruinniú Bliantúil Chumann Geolaíochta Mheiriceá, Fíorúil, 26-30 Deireadh Fómhair
- 5ú Cúrsa Gheimhridh an Réadlann Seismeolaíochta, Ollscoil Brasília, 19 Samhain
- Sraith léachta Cumann Geolaíochta Chorcaí, Fíorúil, 25 Samhain
- Geo-eolaíocht 2020 - Geo-eolaíocht le haghaidh Polasaí, Fíorúil, 18-19 Samhain
- Aontas Geoifisiceach Mheiriceá, Fíorúil, Nollaig, 2020.

Sprioc 2: Comhoibriú Idirnáisiúnta Taighde a Bhaineann le hÉirinn agus ar an Domhan

Leanamar ar aghaidh lenár gcomhoibrithe lenár gcomhpháirtithe idirnáisiúnta i 2020 ar fud an dianghlasáil Covid-19, atá dírithe ar thaighde ardtionchair a choinneáil.

Maoiníodh roinnt tionscadal nua agus turgnaimh i rith na bliana lena n-áirítear tochailt (poitéinseal fuinnimh geoiteirmeach na hÉireann), MTHEK (Measúnú Maignéatótheallúrach ar an mBolcán Hekla), POROCLIM (staidéar ar Abhantrach Torcáin & Rocal chun luas na domhain a thomhas Am Athrú Aeráide), Staidéar Domhan tarraingt ar an cuan Torcáin agus forbairt bhreise HERSK (líonra seismeach ar Hekla Bolcán san Íoslainn i gcomhar leis an Oifig Met Íoslainnis) agus líonraí oiliúna tosaigh an AE (ITNanna), casadh agus feabhsú. Bhí ról lárnach ag Geoifisic DIAS freisin maidir le cuidiú le maoiniú a fháil don dara céim de ICRAG2.

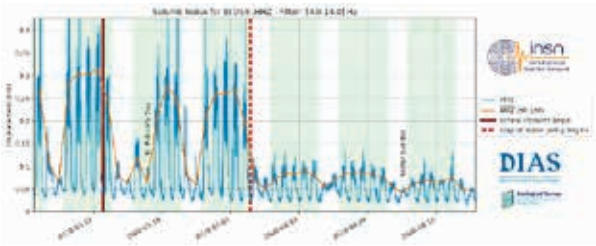
Fuair DIG (An riosca a laghdú don Phoitéinseal Fuinnimh Geoiteirmeach na hÉireann), € 775,606 ó Údarás Fuinnimh Inmharthana na hÉireann (SEAI) agus Suirbhéireacht Gheolaíochta Éireann faoin gClár Maoinithe Taighde, Forbartha agus Taispeántais SEAI 2019. Eolaithe ó DIAS agus UCC mar aon lena nGaeilge agus déanfaidh comhoibrithe tionscadail idirnáisiúnta iniúchadh ar an bpoitéinseal le haghaidh fuinneamh geoiteirmeach íseal-eantalpachta ar oileán na hÉireann. Comhtháthaíonn an tionscadal taighde ceithre bliana sonraí ildisciplíneacha, geoifiseacha ildisciplíneacha, geolaíochta agus geoiceimiceacha trí mheán anailíse, léirmhíniú, samhaltú agus inbhéartú.



Fuair MTHEK (Measúnú Maignéatótheallúrach ar an mBolcán Hekla) maoiniú ó EuroVOLC TNA agus ICRAG chun Suirbhé Píolótach MT a dhéanamh i gcomharsanacht an Bholcáin Hekla i 2020. Is tionscadal comhoibritheach é idir DIAS, Ollscoil na hÍoslainne (UOI) agus an Íoslainn suirbhé tíreolaíochta (ISOR) chun samhail friotachais leictreachais a fhorbairt faoi bhun agus timpeall Hekla Bolcán trí leas a bhaint as sonraí nua MT. Fuarthas sonraí MT (triantáin inbhéartaithe glasa ar an léarscáil) agus sonraí comhlonnaithe am-aimseartha ag 20 stáisiún chun criosanna friotachais íseal a aithint ag doimhneacht, a d'fhéadfadh a bheith ina sheachvótálaí le haghaidh carnadh carnadh agus imirce.

School Of Cosmic Physics (continued)

The Irish National Seismic Network (INSN) detected 259 seismic events during the reporting period including thirteen earthquakes. Unusually low seismic noise was observed the during Covid-19 lockdown leading to wide coverage in national media. DIAS contributed low noise observations for stations in the Dublin mountains (DSB) and Lima, Peru (NNA) to a global study that included DIAS/INSN staff, published in journal Science (Lecocq et al., 2020). Site searches also continued to expand the INSN network. The long-term Ocean Bottom Seismometer (OBS) beneath Ocean buoy M6 was recovered in May.



Aimplitiúid Sheismeach Stáisiún INSN DSB i Sléibhte Bhaile Átha Cliath, Márta - Aibreán 2020.

Seismic amplitude of INSN station DSB in the Dublin mountains, March - April 2020.

Conferences attended by DIAS Geophysics personnel:

Due the global pandemic there is a reduction in the number of meetings attended, in general. While some meetings early in the year were attended face-to-face by DIAS personnel, meetings from March 2020 were either cancelled or moved to a virtual format.

- UN Ocean Decade meeting, Halifax, Canada, (face to face) 6-10 Jan
- Tomorrow's Cities Advisory Board, Kathmandu, Nepal, (face to face) 27 Feb-1 Mar
- 63rd Irish Geological Research Meeting (IGRM 2020), Athlone, Ireland, 28 Feb-1 Mar
- European Geophysical Union, virtual, 4–8 May
- 3D-Earth Meeting, virtual, 7-8 Sep
- EAGE Mineral Exploration Symposium, virtual, 17-18 Sep
- Geological Society of America annual meeting, virtual, 26-30 Oct
- 5th Winter Course of the Seismological Observatory, University of Brasilia, 19 Nov
- Cork Geological Association lecture series, virtual, 25 Nov
- Geoscience 2020 - Geoscience for Policy, virtual, 18-19 Nov
- American Geophysical Union, virtual, Dec, 2020

Goal 2: International research collaboration benefitting Ireland and the world

We continued our collaborations with our international partners in 2020 throughout the COVID-19 lockdown, aimed at maintaining high impact research.

A number of new projects and experiments were funded during the year including DIG (De-risking Ireland's Geothermal energy potential), MTHEK (MagnetoTelluric Assessment of the HEKla Volcano), POROCLIM (a study of POrcupine & ROckall basins to measure the pace of deep-time CLIMate change), a gravity study of the Porcupine Basin and further development of HERSK (a seismic network on Hekla volcano in Iceland in co-operation with the Icelandic Met Office) and the EU Initial Training Networks (ITNs), SPIN and IMPROVE. DIAS Geophysics also played a key role in helping to secure funding for the 2nd phase of iCRAG2.

DIG (De-risking Ireland's Geothermal energy potential), has received €775,606 from Sustainable Energy Authority of Ireland (SEAI) and Geological Survey Ireland under the SEAI Research, Development & Demonstration Funding Programme 2019. Scientists from DIAS and UCC together with their Irish and international project collaborators will explore the potential for low-enthalpy geothermal energy on the island of Ireland. The four-year research project will integrate multi-disciplinary, multi-scale geophysical, geological and geochemical data by means of joint analysis, interpretation, modelling and inversion.

MTHEK (MagnetoTelluric Assessment of the HEKla Volcano) received funding from EUROVOLC TNA and iCRAG to carry out a pilot MT survey in the vicinity of the Hekla Volcano in 2020. It is a collaborative project between DIAS, the University of Iceland (UoI) and Iceland Geosurvey (ISOR) to develop an electrical resistivity model beneath and around Hekla volcano through exploiting new MT data. MT data has been acquired (green inverted triangles on the map) and co-located time-domain EM data at 20 stations to identify low-resistivity zones at depth, which may be a proxy for melt accumulation and migration pathways.

Scoil na Fisice Cosmaí (ar lean)

Casadh & Feabhas a chur ar an AE-ITN atá dírithe ar oiliúint Dochtúir Fealsúnachta (PhD) ardleibhéil agus taighde i réimse na modheolaíochta seismeolaíochta nua. Is é an DIAS Dírigh ar Sheismology Bolcáin.

Comhoibrithe Oibre Tá an bhliain seo san áireamh:

- Suirbhéireacht Gheolaíochta na Breataine: Chuir Geoifisic DIAS ionstraimíocht gheoifisiciúil ar fáil do shuirbhé geolaíochta na Breataine chun cabhrú lena dtaighde ar an aimsir spáis. Ba é an cuspóir a bhí acu ná tomhais maighnéadaiméadair dhifreálacha a chainníochtú ar shruthanna geomaighnéadach a spreagann gréasán ardvoltais. Is comhpháirtithe foirmiúla iad Grúpa DIAS EM anois le BGS i gcur i bhfeidhm ciste chuig an gComhairle um Thaighde Comhshaoil Nádúrtha SPF (ionstraim aimsire spáis ionstraim aimsire, tomhais, samhaltú agus riosca).
- Mathias Fink (ESPCI Páras): Agus tú ag úsáid chúlú ama ar ár samhail 3D de chuid na hÉireann amach ón gcósta chun foinsí torainn aigéin a ghineann tonnta farraige a athlonnú. Braitheann an prionsabal ar an gcomhartha seismeach a taifeadadh ag glacadóirí atá á n-aisiompú in am agus a chothaítear ar ais i múnla 3D ath-dhíriú ar an bhfoinse fuaimiúil bunaidh.
- An tOllamh Satish Singh (IPGP Páras an Fhrainc): Forbairtí modhanna nua chomh maith le socrú geolaíoch na staidéar torainn aigéin.
- Taighdeoirí ag Ollscoil Grenoble na Alp: maidir le comharthaí traenach a fhorbairt mar fhoinse inmharthana d'íomhánna seismeacha an choirp dhromchla (laistigh de thionscadal AE an Aigéin Chiúin).
- Taighdeoirí ag Seirbhís Seismeolaíochta na hEilvéise, ETH Zürich): maidir le cuir chuige meaisínfhoghlaim go tapa le haghaidh inbhéartaithe paraiméadar foinse seismeacha. [Táthar ag súil go mbeidh foghlaim ón tionscadal seo de luach díreach do Líonra Seismeach Náisiúnta na hÉireann (INSN)].
- Taighdeoirí ag 'Instituto Geofisico EPN': obair allamuigh cothabhála a rinneadh thar ceann DIAS ag Bolcán Sierra Negra, Galapagos.

Ina theannta sin, tharla roinnt comhoibrithe ar scála níos mó.

EuroVOLC: Tá sé mar aidhm ag tionscadal EuroVOLC bolcáneolaíoch, bonneagar agus pobail san Eoraip a chomhchuibhiú trí ghníomhaíochtaí éagsúla líonraithe agus comhthaighde. Mar chomhpháirtí sa tionscadal seo, tá DIAS freagrach as an gcomhpháirt fo-dhromchla den tionscadal a chomhtháthú.

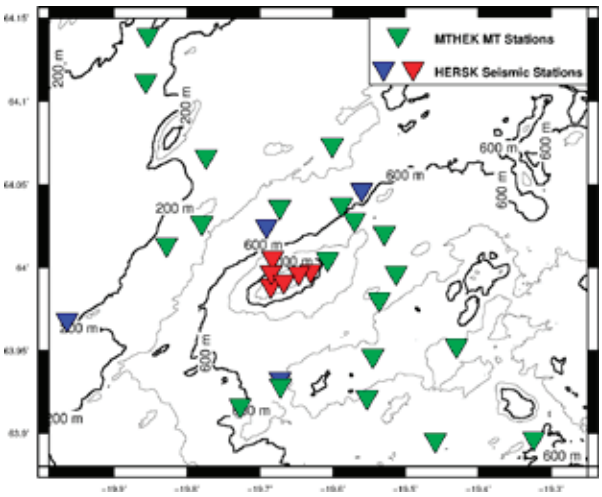
Gníomhaireacht Spáis na hEorpa: Geoifisice DIAS Tá comhoibriú Geoifisice faoi Chuibhreannais Ghníomhaireacht Spáis na hEorpa leathnaithe trí rannpháirtíocht i dtionscadal nua atá dírithe ar struchtúr domhain na talún glaise agus a dáil le héabhlóid an bhileog oighir. An tionscadal leanúnach, an Domhan 3D - Leanann pláinéad maireachtála dinimiciúil, a mhaoiníonn an Ghníomhaireacht Spáis Eorpach ag déanamh dul chun cinn spreagúil.

Múnla Seoltacht Leictreach 3D: Seoladh tionscadal nua ag Zdenek Martinec i gcomhar le J. Velimsky agus L. Sachl i bPoblacht na Seice atá maoinithe ag gníomhaireacht Deontais Phoblacht na Seice. Is éard a bheidh i gceist leis an taighde nua seo ná forbairt ar mhúnlaí nua tríthoiseacha a bhaineann le seoltacht elec-trócaire ar mangán an Domhain a chinntear ó éagsúlachtaí geomaighnéadach i maighnéadsféar agus i n-ianúchán, agus ó réimse maighnéadach taoide a ghintear san aigéan.

Taighde agus Forbairt Fuinnimh Geoiteirmeach: Tá comhoibriú nua bunaithe leis an Dr Staša Borović ón Suirbhé Geolaíochta Cróitis trí HYTHAC nua-mhaoinithe (cur chuige ilfheidhmeach maidir le samhaltú coincheapúil de chórais hidriteirmeacha). Cuireadh tús leis an tionscadal ath-chuardaigh ceithre bliana ar fad i mí Feabhra 2020. Tá Duygu Kiyan ag obair go dlúth leis an Dr Staša Borović (PI an tionscadail) a sholáthraíonn comhairle agus meantóireacht ar chomhpháirt taighde maighnéadotelluric na hoibre. Tabharfaidh an Dr Kiyan ceardlann 5 lá ag Suirbhéireacht Gheolaíochta Cróitis do gach ball den ghrúpa taighde ar Magnetotelluric, idir teoiric go léirmhíniú i 2021/2022.

MTHEK: MTHEK (Measúnú Magnetotelluric ar Thionscadal Bolcán Hekla) Fuair maoiniú ó EuroVOLC chun suirbhé Píolótach MT a dhéanamh i gcóngaracht an Bholcáin Hekla in 2020. Tá sé mar aidhm ag foireann an DIAS mar aon lena gcomhoibrithe ón Íoslainn criosanna friotachais íseal a aithint ag Doimhneacht, a d'fhéadfadh a bheith ina sheachvótálaí chun carnadh agus conairí imirce a leá. Is iad na baill foirne tionscadail Duygu Kiyan (PI an tionscadail), Colin Hogg, Chris Bean ó DIAS, Mastons Tumi Guðmundssson ó Ollscoil na hÍoslainne agus Giolfí Pàll Herseir ó Íoslainn suirbhé geolaíochta.

School Of Cosmic Physics (continued)



Léarscáil suímh na stáisiún MT mar aon le stáisiúin DIAS-IMO seismeacha i gcomharsanacht Hekla Bolcán, an Íoslainn.

Location map of MT stations together with DIAS-IMO Seismic stations in the vicinity of Hekla volcano, Iceland.

SPIN & IMPROVE EU-ITNs are both aimed at high level pan-European PhD training and research in the area of new seismological methodology. The DIAS focus is on volcano seismology.

Working collaborations this year have included:

- British Geological Survey: DIAS Geophysics provided geophysical instrumentation to the British Geological Survey to assist in their research on Space Weather. Their objective was to quantify differential magnetometer measurements of geomagnetically induced currents on a high voltage network. DIAS EM group are now formal partners with the BGS in a funding application to Natural Environment Research Council SPF (Space Weather Instrumentation, Measurement, Modelling and Risk) funding call.
- Mathias Fink (ESPCI Paris): in the use of time reversal on our 3D model of the Irish offshore to re-locate ocean noise sources generated by ocean waves. The principle relies on the seismic signal recorded at receivers being reversed in time and fed back in a 3D model refocusing at the original acoustic source.
- Prof. Satish Singh (IPGP Paris France): developments of new methods as well as the geological setting of the ocean noise studies.
- Researchers at Univ. Grenoble Alpes: on developing train signals as a viable source for sub-surface body wave seismic imagery (within the Pacific EU project)
- Researchers at the Swiss Seismological Service, ETH Zürich): on machine learning approaches to rapid seismic source parameter inversion. [it is envisaged that learnings from this project will be of direct value to the Irish National Seismic Network (INSN)]
- Researchers at Instituto Geofísico EPN: conducted maintenance fieldwork on behalf of DIAS at the Sierra Negra volcano, Galapagos

In addition, a number of larger scale collaborations have taken place.

EUROVOLC: The EUROVOLC project aims to harmonize volcanological, infrastructure and communities in Europe through various networking and joint-research activities. As a partner in this project, DIAS is responsible for integrating the sub-surface component of the project.

European Space Agency: DIAS Geophysics collaboration under European Space Agency consortia has been expanded through participation in a new project focused on the deep structure of Greenland and its relation to the evolution of the ice sheet. The ongoing project 3D Earth - A Dynamic Living Planet, financed by the European Space Agency continues to make exciting progress.

3D Electrical Conductivity Model: A new project has been launched by Zdenek Martinec in co-operation with J. Velimsky and L. Sachl in the Czech Republic funded by the Grant Agency of Czech Republic. This new research will entail the development of new three dimensional models of electrical conductivity of the Earth's mantle determined from geomagnetic variations in magnetosphere and ionosphere, and from ocean-generated tidal magnetic field.

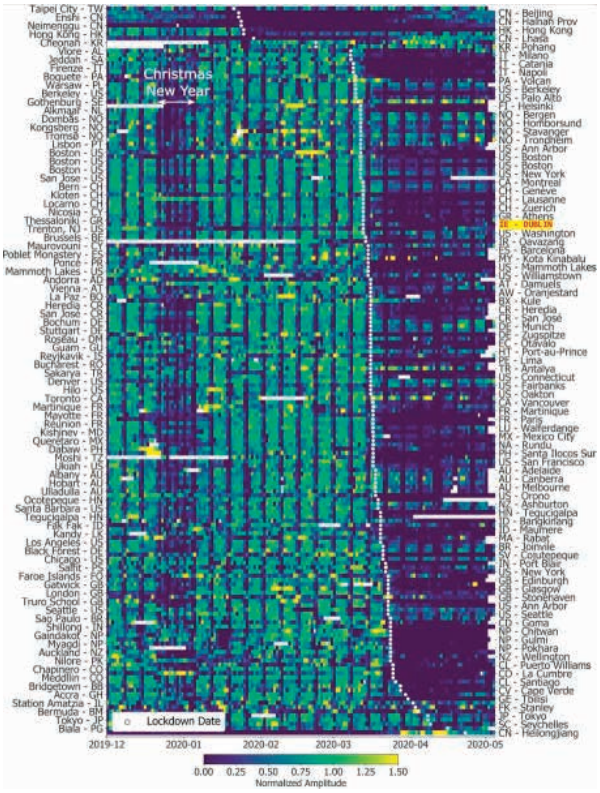
Geothermal Energy Research and Development: A new collaboration has been established with Dr Staša Borović from the Croatian Geological Survey through newly funded HyTheC (Multidisciplinary Approach to Conceptual Modelling of Hydrothermal Systems) project. The four-year-long research project was initiated in February 2020. Duygu Kiyan is working closely with Dr Staša Borović (PI of the project) providing advice and mentorship on the magnetotelluric research component of the work. Dr Kiyan will give a 5-day workshop at the Croatian Geological Survey for all research group members on magnetotellurics, ranging from theory to interpretation in 2021/2022.

MTHEK: MTHEK (MagnetoTelluric Assessment of the HEKla Volcano) project received funding from EUROVOLC to carry out a pilot MT survey in the vicinity of the Hekla Volcano in 2020. The DIAS team together with their collaborators from Iceland aim to identify

Scoil na Fisice Cosmaí (ar lean)

Ollscoil Cambridge: Tá deis spreagúil le haghaidh leathan, fadtéarmach Geoifisice comhoibriú idir DIAS agus Ollscoil Cambridge. Cuirfear tús leis seo tús le bogadh Sergei Lebe-dev go Cambridge i 2021 ach ansin fréamhaithe, san fhadtéarma, de réir leasanna comónta i staidéar na hÉireann, na Breataine agus na timpeallachta.

INSN/CTBTO: Chuir an INSN le staidéar domhanda i dtuairimí torainn seismeacha íseal le linn dianghlasáil Covid-19, a d'fhoilsigh 75 Údar san Eolaíocht Iris. Chuir an INSN piocanna céime láimhe d'imeachtaí teileiséimeacha a taifeadadh ag na stáisiúin INSN faoi bhráid an Choimisiúin Sheismigh Idirnáisiúnta freisin (ISC). Faisnéis faoi chreathanna talún go háitiúil a bhraitear go háitiúil faoi bhráid an Ionaid Seismeolaíochta Eorpaigh-Meánmhara (EMSC). Mar chuid den eagraíocht Church-Thástáil Núicléach-Thástáil Núicléach (CTBTO), d'fhreastail baill fhoirne DIAS ar an 55ú seisiún de Ghrúpa Oibre B agus cumraíodh nasc nua sonraí VPN nua idir DIAS Geoifisice agus CTBTO ionad sonraí isteach Vín.



Athruithe ama i dtorann seismeach ag stáisiúin dhomhanda, curtha in eagar le dáta dianghlasáil.

Temporal changes in seismic noise at global stations, sorted by lockdown date.

HERSK: Mar chuid de thaighde leanúnach i dtionscadal Líonra Seismeach Seismeacha Hekla (HERSK), cuireadh an chéad torthaí tomagrafaíochta seismeacha do Hekla Bolcán san Íoslainn i láthair ag an gcomhdháil EGU 2020. Cé go bhfuil an tionscadal EuroVOLC TNA HERSK fós ar feitheamh faoi láthair mar gheall ar COVID-19, bhí ár n-Institiúid Comhpháirtíochta IMO (Oifig Met Íoslainnis) in ann obair chothabhála a dhéanamh ar an líonra seismeach DIAS ar Hekla, i nDeireadh Fómhair 2020. Fuarthas maoiniú breise isteach 20 Eanáir 2020 trí iarratas rathúil chuig an H2020 EuroVOLC 2ú Trasnáisiúnta Glao.

Chuir an fhoireann DIAS le leibhéal aonair le Boird Eagarthóireachta, Coistí Comhairleacha, srl.:

- Sergei Lebedev sheirbheáil mar eagarthóir comhlach do na hirisí taighde Premackbrian agus Geoiceimic, Geoifisic, Geochórais (G-Ciúbaithe), chomh maith le eagarthóir ar an téama speisialta G-Ciúbaithe ar Geochórais Réigiún Pholach.
- Tá Chris Bean ar an mBord Comhairleach do Chathracha an Iae amárach, arna mhaoiniú ag Taighde & Nuálaíocht na Ríochta Aontaithe (UKRI) Is comhoibriú nua idirdhisciplíneach domhanda é seo. Tá sé mar aidhm aige cabhrú le tíortha móra le meánioncam le mórchathracha i réigiúin an crith talún a fhorbairt chun bearta laghdaithe guaise agus pleanáil laghdaithe guaise a fhorbairt. Reáchtáladh an cruinniú ciceáilte i Katmandu i mí Feabhra 2020.
- Ceapadh Duygu Kiyan ar Choiste Comhairleach Eolaíochta Shuirbhéireacht Gheolaíochta Thuaisceart Éireann.

Sprioc Straitéiseach 4: Disciplíní agus Pobail Taighde Neartaithe go Náisiúnta

Neartaíodh comhoibrithe náisiúnta go mór i mbliana, go háirithe i bhfianaise srianta Covid-19.

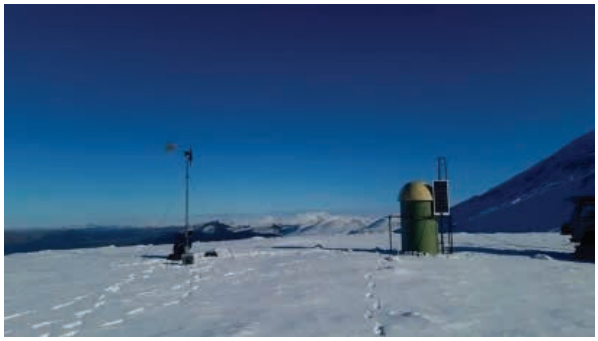
AEMPY: Aempy, bosca uirlisí Python oscailte le haghaidh inbhéartaithe 1-D de shonraí aeriompartha EM a d'fhorbair taighdeoirí DIAS Duygu Kiana Agus Rath Volker faoi Ghearr na hÉireann Geolaíochta (GSI) Gearrghlao 2015, á n-úsáid anois mar uirlis ag an Tellus Foireann ag an GSI chun táirgí sonraí a chruthú do pháirtithe leasmhara Tellus. Cabhraíonn an bosca uirlisí leis an íomháú tapa ar an tsreangán seoltacht leictreach an fodhromchla éadomhain. Fuair an Tionscadal Rafta (Rún anailísí le haghaidh sonraí leictreamaighnéadacha aer-fhearainn agus am-fearainn an chláir insroichte Éireannach) maoiniú ó GSI Gearrghlao Taighde 2020 agus scrúdóidh sé cumas réitigh na sonraí minicíochta-fearainn agus fearainn ag baint úsáide as aempy. Beidh torthaí an tionscadail seo úsáideach chun téamaí a ath-chuardach a aithnítear ag GSI mar acmhainní agus cosaint screamhuisce, ceathartha tíreolaíocht, taiscéalaíocht mianraí, agus geolaíocht buncharraige.

low-resistivity zones at depth, which may be a proxy for melt accumulation and migration pathways. The project team members are Duygu Kiyan (PI of the project), Colin Hogg, Chris Bean from DIAS, Magnús Tumi Guðmundsson from the University of Iceland and Gylfí Pàll Hersir from Iceland Geosurvey.

University of Cambridge: There is an exciting opportunity for a broad, long-term geophysics collaboration between DIAS and the University of Cambridge. This will be kick started by Sergei Lebedev's move to Cambridge in 2021 but then rooted, in the long term, by common interests in the study of Ireland, Britain and surroundings.

INSN/CTBTO: The INSN contributed to global study into low seismic noise observations during COVID-19 lockdown, published by 75 authors in the journal Science. The INSN also submitted regularly manual phase picks of teleseismic events recorded at the INSN stations to the International Seismic Commission (ISC). Information on locally and regionally detected earthquakes is routinely submitted to the European-Mediterranean Seismological Centre (EMSC). As part of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), DIAS staff attended the 55th Session of Working Group B and configured a new real-time VPN data connection between DIAS Geophysics and CTBTO Data Centre in Vienna.

HERSK: As part of ongoing research in the Hekla Real-Time Seismic Network (HERSK) project, the first seismic tomography results for Hekla volcano in Iceland were presented at the EGU 2020 conference. Although the EUROVOLC TNA HERSK project is still currently on hold due to COVID-19, our partner institute IMO (Icelandic Met Office) was able to carry out maintenance work on the DIAS seismic network on Hekla, in October 2020. Further funding was obtained in January 2020 through a successful application to the H2020 Eurovolc 2nd Transnational Access Call.



Suiteáil seismeach Hersk "HN1" ar Hekla Bolcán san Íoslainn, seirbhísithe ag IMO i nDeireadh Fómhair 2020. Sruthlaíonn an líonra Hersk sonraí ó Hekla Ar ais go DIAS '# 5 Cearnóg Mhuirfean, i bhfíor-am.

Seismic HERSK installation "HN1" on Hekla volcano in Iceland, serviced by IMO in October 2020. The HERSK network streams data from Hekla back to DIAS' #5 Merrion Square, in real time.

DIAS staff have contributed on an individual level to editorial boards, advisory committees, etc.:

- Sergei Lebedev served as Associate Editor for the journals Precambrian Research and Geochemistry, Geophysics, Geosystems (G-cubed), as well as Editor for the G-cubed Special Theme on the Polar Region Geosystems.
- Chris Bean is on the Advisory Board for Tomorrow's Cities, funded by UK Research & Innovation (UKRI) this is a new global inter-disciplinary collaboration. It aims to assist low to middle income countries with major cities in earthquake prone regions to develop hazard reduction measures and hazard reduction planning. The kickoff meeting was held in Kathmandu in February 2020.
- Duygu Kiyan has been appointed to the Science Advisory Committee of the Geological Survey of Northern Ireland.

Strategic Goal 4: Strengthened disciplines and research communities nationally

National collaborations were also considerably strengthened this year, particularly in light of COVID-19 restrictions.

Aempy: aempy, an open-source Python toolbox for 1-D inversion of airborne EM data developed by DIAS researchers Duygu Kiyan and Volker Rath under the Geological Survey Ireland (GSI) Short Call 2015, is now being used as a tool by the Tellus team at the GSI for creation of data products for Tellus stakeholders. The toolbox assists in the rapid imaging of the electrical

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Geoiteirmeach: Is iad na samhlacha DIAS an tsreabhadh teasa agus an ghrádán geoiteirmeach ar fud na hÉireann, a tháirgtear i nGrúpa Fullea Javier, staid nua na healaíne sa phobal geoiteirmeach náisiúnta, rud a fhágann go bhfuil clúdach tosaigh an treoraí nua le haghaidh creat beartais agus rialála foilseachán "Measúnú". Tógfaidh an obair leanúnach sa tionscadal DIG ar an móiminteam seo chun meastacháin níos airde a dhéanamh ar theochtaí fo-dhromchla.

iCRAG: Bhí roinnt comhoibrithe náisiúnta laistigh den tionscadal ICRAG i mbliana, lena n-áirítear samhaltú Fuaimiúil le haghaidh lomadú agus ldirghníomhaíocht Aergun Eischósta na hÉireann, chun staidéar a dhéanamh ar éifeachtaí suíomhanna fuaimiúla féideartha a d'fhéadfadh dul i bhfeidhm ar mhamaigh mhuirí le linn suirbhéanna mara seismeacha le Eoghan Daly (ICRAG/NUIG). Reáchtáladh comhoibriú ar ghuaiseacha hiodhráit agus ar struchtúir gheolaíocha éadomhain i Umar Rocal ó Srikumar Roy (ICRAG/UCD) freisin.

INSN: Rinne an INSN tástáil agus suiteáilte trí "sú craobh croith" sheismiméadair saoránach chun a n-oiriúnacht agus a gcumas a thástáil mar chuid de thionscadal eolaíochta saoránach níos leithne sa todhchaí. Bunaíodh teagmháil freisin le saoránaigh a thosaigh seismiméadair saoránach ag feidhmiú i 2020 d'fhonn líonra a chruthú chun é seo a leathnú mar thionscadal leanúnach amach anseo. D'óstáil an INSN seastán ag an taispeántas 2020 BT Taispeántas Eolaí Óg & Teicneolaíochta (BTYSE), 8 - 11ú Eanáir 2020, a thaispeánann an brath creathanna talún ath-gional agus domhanda in Éirinn. Chuir bunú beo ar sheismiméadar leathanbhanda le taispeáint ar chumas cuairteoirí 'a gcrith talún féin a chruthú'.

Suíomhanna suiteálacha sú craobh croith in Éirinn amhail an 2020 Samhain.

Locations of Raspberry Shake installations in Ireland as of November 2020.

NARI: Ghlac DIAS páirt i seoladh oifigiúil an líonra d'Artach Taighde na hÉireann (NARI). Tá sé mar aidhm ag NARI líonra neamhfhoirmiúil taighdeoirí Artacha a chruthú, a chothabháil agus a fhorbairt in Éirinn chun comhoibriú gníomhaíochtaí eolaíochta atá nasctha leis an Artach a éascú, agus chun comhairle eolaíoch neamhspleách a sholáthar don phobal agus don lucht déanta beartas. Tá roinnt Institiúidí Ardoideachais mar chuid den líonra nua seo, DIAS.

Meicneoirí leanúnachais: Thug Zdenek Martinec cúrsa ar mheicníocht leanúntais ag DIAS (Deireadh Fómhair 2019-Feabhra 2020) d'iarrthóirí dochtúir fealsúnachta (PhD). Is fearr an cúrsa a oireann d'fhormáid in-duine agus dá bhrí sin tá sé curtha ar seilbh faoi láthair. Leanfaidh sé ar aghaidh tar éis do na srianta coróinvíreas a fhoirceannadh.

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conductivity structure of the shallow subsurface. Project RAFTA (Resolution Analyses for Frequency- and Time-Domain Airborne Electromagnetic Data of the Irish Tellus Programme) received funding from GSI Short Call Research 2020 and will examine the resolution capabilities of both the frequency-domain and time-domain data using aempy. The outcomes of this project will be useful for research themes identified by GSI such as Groundwater resources and protection, Quaternary geology, Mineral exploration, and Bedrock geology

Geothermal: The DIAS models of the heat flow and geothermal gradient across Ireland, produced in Javier Fullea's group, are the new state of the art in the national geothermal community, making the front cover of the the new Roadmap for a Policy and Regulatory framework "assessment" publication. The ongoing work in the DIG project will build on this momentum to produce higher resolution estimates of sub-surface temperatures.

iCRAG: There were several national collaborations within the iCRAG project this year including full waveform acoustic 3D modelling for airgun signal propagation and interaction with underwater canyons offshore Ireland, in order to study potential acoustic site effects that could affect marine mammals during active seismic surveys with Eoghan Daly (iCRAG/NUIG). Collaborations on gas hydrate hazards and shallow geological structures in Rockall Trough from Srikumar Roy (iCRAG/UCD) also took place.

INSN: The INSN tested and installed three "Raspberry Shake" citizen seismometers to test their suitability and capability as part of a broader future citizen science project. Contact was also established with citizens that had started operating citizen seismometers in 2020 with a view to creating a network to expand this as a future ongoing project. The INSN also hosted a stand at the 2020 BT Young Scientist & Technology Exhibition (BTYSE), 8-11 January 2020, showcasing the detection of regional and global earthquakes in Ireland. A live set-up of a broadband seismometer with display enabled visitors to 'create their own earthquake'.

Méid 5.3 Taifeadadh crith talún san Íoslainn le croith sú craobh in Éirinn.

Magnitude 5.3 earthquake in Iceland recorded with a Raspberry Shake in Ireland

NARI: DIAS took part in the official launch of the Network for Arctic Research Ireland (NARI). NARI aims to create, maintain and develop an informal all-island network of Arctic researchers in Ireland to facilitate collaboration of scientific activities linked to the Arctic, and to provide independent scientific advice to the public and policy makers. A number of HEIs are part of this new Network, including DIAS.

Continuum Mechanics: Zdenek Martinec gave a course on Continuum Mechanics at DIAS (October 2019-February 2020) for PhD candidates. The course is best suited to an in-person format and therefore has currently been put on hold. It will continue after the coronavirus restrictions are lifted.

Scoil na Fisice Cosmaí (ar lean)

List of Selected Publications/Posters:

Publications/In-review/In-revision:

- Arroucau, P., Custódio, S., Civiero, C., Dias, N. A., Silveira, G., Diaz J., Villaseñor A. (2021) PRISM3D: a 3D preliminary reference seismic model for Iberia and adjacent areas. Geophysical Journal International. doi: https://doi.org/10.1093/gji/ggab005.
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- Celli, N.L., S. Lebedev, A.J. Schaeffer, C. Gaina. African cratonic lithosphere carved by mantle plumes. Nature Communications, 11, 92, doi:10.1038/s41467-019-13871-2, 2020.
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- El-Sharkawy, A., T. Meier, S. Lebedev, M. Hamada, L. Cristiano, C. Weidle, D. Kohn. The Slab Puzzle of the Alpine-Mediterranean Region: Insights from a new, High-Resolution, Shear-Wave Velocity Model of the Upper Mantle. Geochemistry, Geophysics, Geosystems, 21, e2020GC008993. https://doi.org/10.1029/2020GC008993, 2020.
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Conferences/Presentations:

- Berdi, L and Tomar, G. Virtual poster and oral presentation at AGU2020, hosted by the American Geophysical Union in mid-December 2020.
- Berdi, L. IGRM conference in late February/March 2020 in Athlone, hosted by GSI, and won runner-up prize for best poster presentation presentations.
- Bonadio, R., Lebedev, S., Arroucau, P., Schaeffer, A., Licciardi, A., Agius, M., Horan, C., Collins, L., O'Reilly, B., Readman, P., and Ireland Array Working Group: Optimal resolution seismic tomography: Lithospheric thinning beneath the British Tertiary Igneous Province and other new observations, talk/poster, 08 May, EGU2020-11942, D1460, EGU General Assembly 2020, Online, 4–8 May 2020, https://doi.org/10.5194/egusphere-egu2020-11942, 2020
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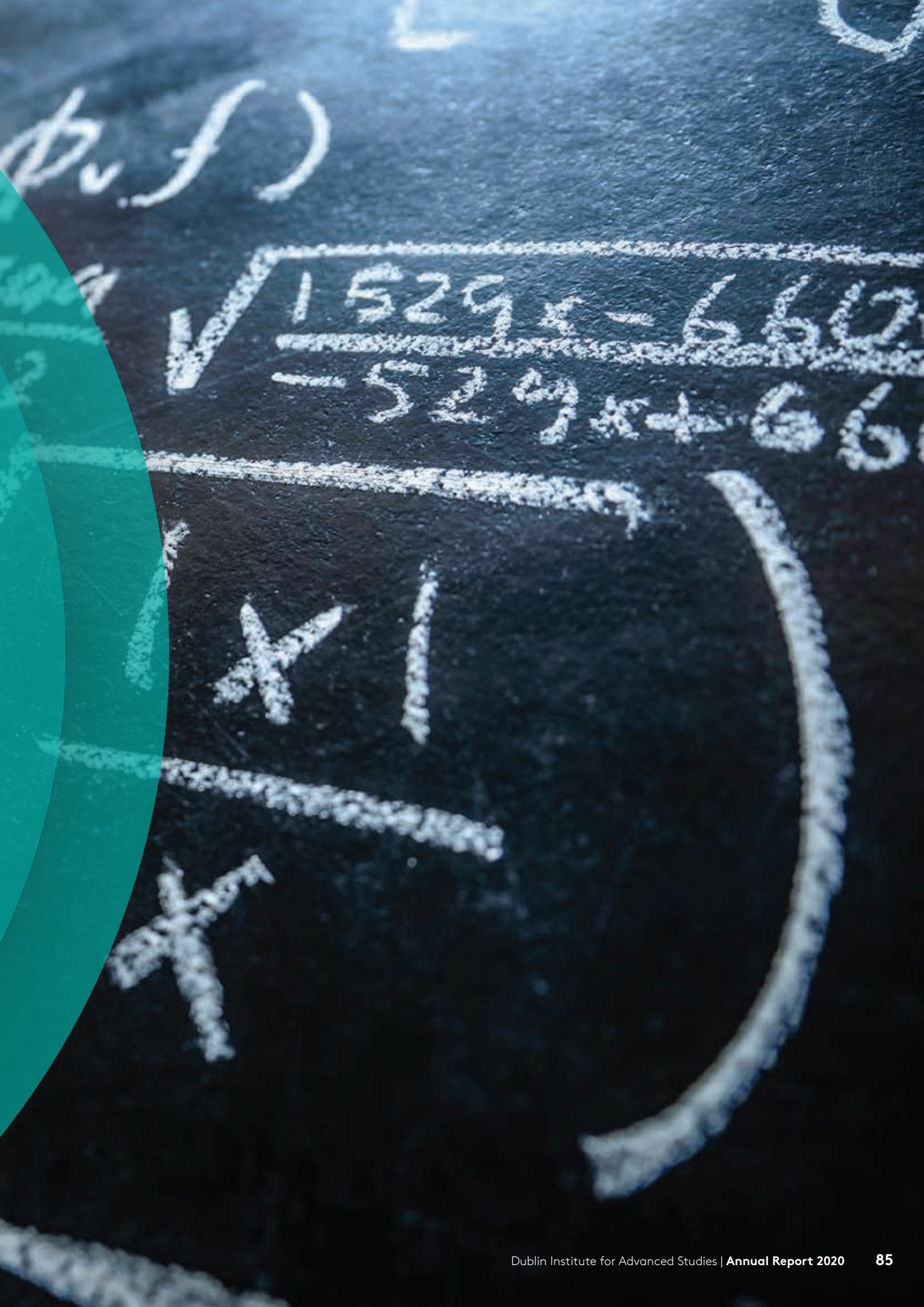
SECTION 3

School of Theoretical Physics

Scoil na Fisice Teoiriciúla



Scoil na Fisice Teoiriciúla

Cuireadh tús le bliain 2020 mar gach bliain eile le filleadh ó thréimhse na hAthbhliana le díograis don bhliain amach romhainn. Ba é an chéad tasc a bhí ann ná na hiarratais iardhochtúireachta ar phoist oscailte a mheas. Fógraítear a leithéid de phoist go déanach i mí na Samhna agus déantar tairiscintí go luath i mí Eanáir. Bhí fógraíocht ag an Scoil do thaighdeoirí iardhochtúireachta Sóisearacha agus Sinsearacha araon agus fuair sí 297 iarratas ó liosta domhanda d'iarratasóirí ardcháilithe, le 190 iarratas ar an bpost sóisearach agus 107 ar chomhaltacht 5 bliana Schrödinger. Rinne coiste ar leithligh na meastóireachtaí agus tairgeadh an scoláireacht iardhochtúireachta sóisearach do Yogesh Bansidhar Dandekar a ghlac leis an tairiscint agus thairg agus ghlac Giandomenico Palumbo comhaltacht Schrödinger.

Faoi lár mhí Feabhra bhí an nuacht gafa leis an víreas SARS-CoV-2 a scaipeadh ón gCóiré go dtí an Iodáil agus níos faide i gcéin agus a shroich Éire go déanach i mí Feabhra. Ba threocht buartha a raibh inti seo agus bhí an Scoil ag éirí amhrasach faoi dhóchas maidir le gnáthghníomhaíochtaí a óstáil agus a chothabháil. Agus de réir mar a chuaigh na seachtainí ar aghaidh ba léir nach rachadh gníomhaíochtaí ar aghaidh mar is gnáth. I mbeagán focal mar a tharla le mórchuid na n-eagraíochtaí, na dtíortha agus na sochaí i gcoitinne, ba bhliain aisteach gan fasach í 2020.

Cuireadh ár bpleananna uile don bhliain - ár gclár cuairteoirí, ceardlanna léachtaí, cuairteanna taighde agus for-rochtana ginearálta, ar fionraí agus caitheadh in aimhréidh iad go luath i mí an Mhárta. Rinne an Scoil atheagrú go tapa agus bhog sí a cuid gníomhaíochtaí ar líne go Zoom go príomha.

Rinneadh dea-dul chun cinn cheana féin maidir le pleananna do cheiliúradh éagsúil a bhaineann leis an 80ú bunú DIAS. Bhí na himeachtaí le tosú leis an STP, Léacht Phoiblí Reachtúil DIAS a bheidh ar siúl Dé Luain 30 Márta 2020 agus dar teideal "Aisling agus Réadú Ríomh Candaim" a bheidh le tabhairt ag an saineolaí idirnáisiúnta is mó ar domhan, an tOllamh Jian-Wei Pan. Tá an tOllamh Panina acadóir ar Acadamh Eolaíochtaí na Síne, Acadamh Eolaíochtaí Domhanda, Leas-Uachtarán Feidhmiúcháin Ollscoil Eolaíochta agus Teicneolaíochta na Síne agus príomh-eagarthóir ar Litreacha Athbhreithnithe Fhisiciúil. Tá an-cháil air mar gheall ar a chuid oibre i réimse an cheangail chandamach agus na teileachumarsáide chandamaí. Liostáil an iris Time é mar cheann den 100 Duine leis an Tionchar is Mó in 2018.

Faraor mar gheall ar an staid atá ag teacht chun cinn le COVID-19 b'éigean Léacht Phoiblí Reachtúil an Ollaimh Pan a chur siar agus tráth na scríbhneoireachta seo tá sé fós ag feitheamh le hathsceidealú deiridh.

Ba é an chéad imeacht eile ar sceideal STP, DIAS ná an DIAS an cruinniú Fondúireachtaí Candaim bliantúil a óstáil. Cruinniú bliantúil é seo a rothlaíonn idir institiúidí na hÉireann agus a thugann deis d'acadóirí acadúla atá ag obair ar ábhair a bhaineann le ceisteanna bunúsacha i bhfisic chandamach a dtorthaí a bhaint amach agus a chur i láthair. Is deis é freisin bualadh leis an tallann óg atá ag teacht chun cinn sna réimsí seo agus dul i dtaithí air. Is gnách go reáchtáiltear an ócáid go déanach i mí na Bealtaine ach arís b'éigean an ócáid seo a chur ar ceal mar gheall ar na srianta a bhaineann leis an éigeandáil sláinte.

Ba é an príomhócáid STP a bhí beartaithe mar chuid de DIAS ag 80 ná Scoil Samhraidh idirnáisiúnta agus comhdháil ar Membranes Maitrís. Bhí sé seo sceidealta do lár mhí an Mheithimh agus bhí liosta de chainteoirí suntasacha idirnáisiúnta ann. Bhí sé le críoch a chur le léachtaí poiblí ceiliúrtha an 19 Meitheamh - an 80ú bliain ó bunaíodh DIAS. Arís b'éigean an Scoil Samhraidh agus gníomhaíochtaí gaolmhara a chur siar agus fanacht le hathsceidealú.

Pleanáladh comhcheardlann idirnáisiúnta ar "Céimseata Candaim, Teoiric Allamuigh agus Domhantarraingt" le hInstitiúid Samhraidh Corfu do Mheán Fómhair 2020 agus faraor chuir an staid idirnáisiúnta iallach ar an gceardlann a chealú.

Bogadh cruinniú boird an 20 Márta go tapa go Zoom agus bhí sé ar cheann de na chéad ghníomhaíochtaí den réimeas nua ar líne. Bhí gach cruinniú Boird de 2020 ina dhiaidh sin ar Zoom freisin. Ba é 20 Márta an cruinniú deiridh don Bhord a bhí ag dul as oifig agus ceapadh Bord nua roinnt míonna ina dhiaidh sin agus tionóladh an chéad chruinniú eile an 13 Deireadh Fómhair agus nuair a bhí an Bord nua i láthair. D'athraigh Stiúrthóireacht na Scoile ag cruinniú an Bhoird an 20 Márta agus tháinig an tOllamh Denjoe O'Connor in áit an Ollaimh Werner Nahm mar Stiúrthóir Scoil na Fisice Teoiriciúla.

In ainneoin an cur isteach mór bhí an Scoil ábalta a **clár gníomhaíochtaí ar líne an-rathúil** a chothabháil. Ba é an rath mór ina leith seo an tsraith seimineár ar líne STP. I gcodarsnacht le cuairteanna taighde, ceardlanna agus comhdhálacha, fuarthas amach go n-oibríonn seimineáir speisialaithe go han-mhaith i dtimpeallacht Zoom agus go raibh an Scoil chun tosaigh sa réimse seo.

Cuireadh tús leis na seimineáir Zoom ar líne an 7 Aibreán le seimineár le Giandomenico Palumbo. Tionóladh seimineáir seachtainiúla Zoom ansin don chuid eile de 2020 le sos i mí Lúnasa. San iomlán, d'óstáil an Scoil 39 Seimineár Zoom in 2020.

School of Theoretical Physics

This year of 2020 began as all other years with a return from the New Year period with enthusiasm for the year ahead. The first task was to evaluate the postdoctoral applications for open positions. Such positions are normally advertised in late November and offers are made in early January. The School had advertised for both Junior and Senior postdoctoral researchers and received a total of 297 applications from a global list of highly qualified applicants, with 190 applications for the junior position and 107 for the 5-year Schrödinger fellowship. The evaluations were made by separate committee and the junior postdoctoral scholarship was offered to Yogesh Bansidhar Dandekar who accepted the offer and the Schrödinger fellowship was offered and accepted by Giandomenico Palumbo.

By mid February the news was dominated by the SARS-CoV-2 virus spreading from Korea to Italy and further afield and reaching Ireland in late February. This was a worrying trend and the School was becoming skeptical of hopes for hosting and maintaining normal activities. And as the weeks progressed it became clear that activities would not proceed as normal. In short as with most organisations, countries and society in general, 2020 was a strange and unprecedented year.

All of our plans for the year—our visitor programme, lectures workshops, research visits and general outreach, were suspended and thrown into disarray in early March. The School quickly reorganised and moved its activities online primarily to Zoom.

Plans for various activities associated with DIAS' 80th foundation celebrations were already well advanced. The events were to begin with the STP, DIAS Statutory Public Lecture to be held on Monday March 30th 2020 and titled "Dream and Realization of Quantum Computation" to be given by the world's leading international expert Professor Jian-Wei Pan. Professor Pan is an academician of the Chinese Academy of Sciences, the World Academy of Sciences, Executive Vice President of the University of Science and Technology of China and a lead editor of Physical Review Letters. He is well known for his work in the field of quantum entanglement and quantum teleportation. Time magazine listed him as one of the 100 Most Influential People of 2018.

Sadly due to the emerging situation with COVID-19 Professor Pan's Statutory Public Lecture had to be postponed and at the time of writing still awaits a final rescheduling.

The next event on the STP, DIAS schedule was to be DIAS hosting the annual Quantum Foundations meeting. This is an annual meeting that rotates between Irish institutions and provides an opportunity for Irish academics working in topics related to fundamental questions in quantum physics to meet and present their results. It is also an opportunity to meet and become familiar with the young talent emerging in these fields. The event is normally held in late May but again this event had to be canceled due to the restrictions associated with the health emergency.

The major STP event planned as part of DIAS at 80 was an international Summer School and conference on Matrix Membranes. This was scheduled for mid June and had a list of prominent International speakers. It was to culminate in celebratory public lectures on June 19th—the 80th anniversary of the foundation of DIAS. Again the Summer School and associated activities had to be postponed and await rescheduling.

A joint international workshop on "Quantum Geometry, Field Theory and Gravity" with the Corfu Summer Institute was planned for September 2020 and sadly the international situation forced the cancellation of the workshop.

The March 20th board meeting was quickly moved to Zoom and was one of the first activities of the new online regime. All subsequent Board meetings of 2020 were also on Zoom. March 20th was also the final meeting for the outgoing Board and a new Board was appointed some months later with the next meeting held Oct 13th and the new Board in attendance. The Directorship of the School changed at the Board meeting on March 20th with Professor Denjoe O'Connor replacing Professor Werner Nahm as Director of the School of Theoretical Physics.

Despite the major disruptions the School maintained a **highly successful programme of online activities**. The major success in this regard was the STP online seminar series. In contrast to research visits, workshops and conferences it turned out that specialised seminars work very well in a Zoom environment and the School was an early mover in this arena.

The online Zoom-seminars began on April 7th with a seminar by Giandomenico Palumbo. Weekly Zoom seminars were then held for the remainder of 2020 with a break in August. In total the School hosted a total of 39 zoom- inars in 2020.

From May 5th seminars were recorded and posted to the DIAS YouTube and linked to on the School's seminar page. These online seminars attracted a global audience which varied with the seminar topic and benefited from speakers from as far a field as China on the East and California to the West. It also allowed STP to host some joint seminars and 3 in the 2020 series were held jointly with the Harvard Picture Language seminar.

Scoil na Fisice Teoiriciúla (ar lean)

Ón 5 Bealtaine rinneadh seimineáir a thaifeadadh agus a phostáil ar YouTube DIAS agus bhí nasc acu ar leathanach seimineár na Scoile. Mheall na seimineáir ar líne seo lucht féachana domhanda a bhí éagsúil le topaic an tseimineáir agus a bhain leas as cainteoirí ó réimse chomh fada leis an tSín san Oirthear agus California san Iarthar. Thug sé deis freisin do STP roinnt comhsheimineár a óstáil agus tionóladh 3 cinn i sraith 2020 i gcomhpháirt le seimineár Teanga Pictiúr Harvard.

Agus í á hoiriúnú don timpeallacht ar líne, bhí an t-ádh ar an Scoil gur chuir an fisiceoir teoiriciúil iomráiteach agus an tOllamh Gerhart Nobel Gerhart'Hooft an léacht Lae DIAS i láthair an 19 Meitheamh 2020. Tharraing sé seo lucht féachana mór agus glacadh go maith leis go ginearálta. Tá físeán ar fáil ar chainéal YouTube DIAS agus mealltar tuairimí go rialta.

Is é príomhghníomhaíocht for-rochtana na Scoile le blianta beaga anuas a clár Intéirnigh Samhraidh. Roghnaítear na rannpháirtithe rathúla as comórtas oscailte d'fhochéimithe 3ú bliana atá ag teacht le haghaidh céim onóracha rang 1 i bhFisic nó Matamaitic agus atá ag staidéar in institiúid 3ú leibhéal in Éirinn. In 2020, d'óstáil an Scoil na ceathrar iarrthóirí a bhuaigh ó liosta de na mic léinn 3ú bliana is fearr sin. Ba iad na ceathrar iarrthóirí rathúla ná Cillian Doherty (Coláiste na Tríonóide, Baile Átha Cliath), Maxime Gadioux (OCBÁC), Maria Graham (OCBÁC) agus Curtis Irvine (Ollscoil na Banríona, Béal Feiriste) agus fuair gach duine stipinn de €3,000. Sa chlár chuaigh siad i mbun gníomhaíochtaí taighde arna gcomhordú ag an Dr. Samuel Kováčik. Críochnaigh an clár nuair a cuireadh i láthair tuairiscí scríofa agus seimineár ar líne, agus tá siad ar fáil ar chainéal YouTube STP.

Mar chuid den chlár Inters Samhraidh grúpa faoi stiúir Luuk Coopmans (mac léinn Ph.D. le DIAS agus Coláiste na Tríonóide), le baill na foirne Dr Ian Jubb (Comhalta Iardhochtúireachta ag DIAS), mic léinn samhraidh DIAS Cillian Doherty (Coláiste na Tríonóide) agus Maria Graham (OCBÁC), agus Dr Rajarshi Tiwari (Iardhochtúireacht ag Tríonóide) an chéad áit sa IBM Qiskit Quantum Summer Jam Hackathon.

Bhog an Dr Rui-Dong Zhu go post dáimhe san Institiúid um Staidéar Adhartha & Scoil na hEolaíochta Fisiciúla agus na Teicneolaíochta, Ollscoil Soochow, Suzhou 215006, an tSín agus an Dr Kováčik go ceann amháin i nDámh na Matamaitice, Fisic agus Faisnéisíocht, Ollscoil Comenius An Bhratasláiv, an tSlóvaic. Ar an drochuair, chuir an Dr Yogesh Dandekar in iúl dúinn nach raibh sé in ann glacadh leis an Scoláireacht a thuilleadh. Mar gheall ar chomh déanach agus a bhí an cinneadh seo agus an staid fhoriomlán leis an bpaindéim, socraíodh an post seo a chur siar agus é a líonadh trí chomórtas sa timthriall rialta.

Bhunaigh an Bord Rialaithe Scoile Coiste Cuardaigh neamhspleách faoi chathaoirleacht an Ollaimh Tom Spencer go déanach in 2019 ar mhaithe le hiarratais a lorg ar phost mar Ollamh Sinsearach i Scoil na Fisice Teoiriciúla. Ba iad baill an choiste:

- An tOllamh Tony Dorlas, Institiúid Ard-Léinn Bhaile Átha Cliath,
- An tOllamh Alice Guionnet, Ecole normale superieure de Lyon,
- An tOllamh Peter Knight, Imperial College London,
- An tOllamh Denjoe O'Connor, Institiúid Ard-Léinn Bhaile Átha Cliath,
- An tOllamh Sinad Ryan, Coláiste na Tríonóide, Baile Átha Cliath,
- An tOllamh Thomas Spencer, Institute for Advanced Studies, Princeton,
- An tOllamh Cumrum Vafa, Ollscoil Harvard,
- An tOllamh Alina Vdovina, Ollscoil Newcastle.

Tháinig an coiste le chéile go rialta trí 2020 agus d'éirigh leo liosta mór d'iarrthóirí réaltach a spreagadh chun iarratais a chur isteach.

Ina dhiaidh sin, cheap Cathaoirleach an Bhoird Rialaithe an tOllamh Peter Goddard, faoi smachtbhanna tarmligthe ón mBord Scoile, Painéal Agallaimh/Roghnúcháin. Ghníomhaigh an tOllamh Goddard mar Chathaoirleach neamhspleách ar an bPainéal Agallaimh/Roghnúcháin, agus bhí an dara ceann comhdhéanta de:

- An tOllamh Fay Dowker, Imperial College London,
- An tOllamh David Evans, Ollscoil Caerdydd,
- An tOllamh Denjoe O'Connor, Institiúid Ard-Léinn Bhaile Átha Cliath,
- An tOllamh Sinad Ryan, Coláiste na Tríonóide, Baile Átha Cliath,
- An tOllamh Tom Spencer, Institute for Advanced Studies, Princeton,
- An tOllamh Anne Taormina, Ollscoil Durham

agus reáchtáladh agallaimh trí Zoom ag deireadh mhí na Samhna agus moladh iarrthóir rathúil a cheapadh.

School of Theoretical Physics (continued)

In its adaptation to the online environment the School was fortunate to have the distinguished theoretical physicist and Nobel Laureate Professor Gerhart 't Hooft present the DIAS Day lecture on June 19th 2020. This attracted a large audience and was generally well received. A video is available on the DIAS YouTube channel and attracts views on a regular basis.

The School's major outreach activity in recent years has become its Summer Interns programme. The successful participants are selected from an open competition of 3rd year undergraduates who are in line for a 1st class honours degree in either Physics or Mathematics and studying in a 3rd level institution in Ireland. In 2020 the School hosted the four winning candidates from a list of these top 3rd year students. The four successful candidates were Cillian Doherty (TCD), Maxime Gadioux (UCD), Maria Graham (UCD) and Curtis Irvine (QUB) with each receiving a stipend of €3,000. In the program they pursued research activities coordinated by Dr. Samuel Kováčik. The program culminated with their presentation of written reports and an online seminar which is available on the STP YouTube channel.

As an ofshoot of the Summer Interns programme a group led by Luuk Coopmans (Ph.D. student with DIAS and Trinity), with team members Dr Ian Jubb (Postdoctoral Fellow at DIAS), DIAS summer students Cillian Doherty (Trinity) and Maria Graham (UCD), and Dr Rajarshi Tiwari (Postdoc at Trinity) too first place in the IBM Qiskit Quantum Summer Jam Hackathon.

Dr Rui-Dong Zhu moved to a faculty position in the Institute for Advanced Study & School of Physical Science and Technology, Soochow University, Suzhou 215006, China and Dr Kováčik to one in the Faculty of Mathematics, Physics and Informatics, Comenius University Bratislava, Slovakia. Unfortunately, Dr Yogesh Dandekar informed us he was no longer in a position to accept the Scholarship. Due to the lateness of this decision and the overall situation with the pandemic it was decided to postpone filling this position and fill it via a competition in the regular cycle.

An independent Search Committee chaired by Professor Tom Spencer was established by the School Governing Board in late 2019 for the purpose of seeking applications for the post of Senior Professor in the School of Theoretical Physics. The committee members were:

- Professor Tony Dorlas, Dublin Institute for Advanced Studies,
- Professor Alice Guionnet, E´cole normale supérieure de Lyon,
- Professor Peter Knight, Imperial College London,
- Professor Denjoe O'Connor, Dublin Institute for Advanced Studies,
- Professor Sinad Ryan, Trinity College Dublin,
- Professor Thomas Spencer, Institute for Advanced Studies, Princeton,
- Professor Cumrum Vafa, Harvard University,
- Professor Alina Vdovina, Newcastle University.

The committee met on a regular basis through 2020 and successfully enouraged a large list of stellar candidates to submit applications.

Subsequently, the Chair of the Governing Board Professor Peter Goddard, under delegated sanction from the School Board, appointed an Interview/ Selection Panel. Professor Goddard acted as the independent Chair of the Interview/Selection Panel, the latter being comprised of:

- Professor Fay Dowker, Imperial College London,
- Professor David Evans, Cardiff University,
- Professor Denjoe O'Connor, Dublin Institute for Advanced Studies,
- Professor Sinad Ryan, Trinity College Dublin,
- Professor Tom Spencer, Institute for Advanced Studies, Princeton,
- Professor Anne Taormina, Durham University

and interviews took place via Zoom in late November and a successful candidate was recommended for appointment.

Research

Despite all the disruptions of 2020 the School of Theoretical Physics maintained its usual active research program.

Despite the fact that the research compliment of the School of Theoretical Physics is very modest the School managed to provide new research results in wide range of areas of research from the exotic properties of higher dimensional gravitational theories through novel phases of matter, quantum computing and even as far afield as Professor Nahm's work on improvements in Middle Babylonian and Middle Assyrian chronology which in turn can have implications for a better understanding of the implications of climate change. Professor Dorlas dedicated much effort to his upcoming book "Statis- tical Mechanics, Fundamentals and Model Solutions" which is due to appear in 2021. Professor O'Connor continued his study of matrix membranes and continued simulations using the DIAS cluster.

Scoil na Fisice Teoiriciúla (ar lean)

Taighde

In ainneoin na gcur isteach go léir in 2020, choinnigh Scoil na Fisice Teoiriciúla a gnáthchlár taighde gníomhach.

In ainneoin go bhfuil moladh taighde Scoil na Fisice Teoiriciúla an-measartha, d'éirigh leis an Scoil torthaí taighde nua a sholáthar i raon leathan réimsí taighde ó airíonna coimhthíocha teoiricí imtharraingthe déthoiseacha níos airde trí chéimeanna nua ábhair, ríomhaireacht chandamach. agus fiú chomh fada i gcéin le hobair an Ollaimh Nahm ar fheabhsuithe ar chroineolaíocht na Meán-Bablóine agus na Meán-Assyrian a bhféadfadh impleachtaí a bheith aige ar thuiscint níos fearr ar impleachtaí an athraithe aeráide. Rinne an tOllamh Dorlas an-iarracht ar a leabhar "Statistical Mechanics, Fundamentals and Model Solutions" atá le foilsiú in 2021. Lean an tOllamh O'Connor lena staidéar ar sheicní maitrís agus insamhaltaí leanúnacha ag úsáid braisle DIAS.

Buaicphointí Taighde Roghnaithe:

- "The Confining Transition in the Bosonic BMN Matrix Model" le Yuhma Asano, Samuel Kováčik, Denjoe O'Connor [arXiv:2001.03749].
- "Ground state wave functions for the quantum Hall effect on a sphere and the Atiyah-Singer index theorem" le Brian P. Dolan, Aonghus Hunter-McCabe [arXiv:2001.02208].
- "The matrix regularization for Riemann surfaces with magnetic fluxes" le Hiroyuki Adachi, Goro Ishiki, Takaki Matsumoto, Kaishu Saito [arXiv:2002.02993].
- "SO(2) gauged Skyrmions in 4+1 dimensions" le Francisco Navarro- Lerida, Eugen Radu, D. H. Tchrakian [arXiv:2003.05899].
- "A renormalisation group equation for transport co-efficients in (2+1)- dimensions derived from the AdS/CMT correspondence" le Brian P. Dolan [arXiv:2006.16819].
- "The nonperturbative phase diagram of the bosonic BMN matrix model" le Samuel Kováčik, Denjoe O'Connor, Yuhma Asano [arXiv:2004.05820].
- "Conserved Quantities in General Relativity & Quantum Anomalies" le B. P. Dolan [DIAS-STP-20-04].
- "Enhancing the effect of quantum many-body scars on dynamics by minimising the effective dimension" le Shane Dooley, Graham Kells [arXiv:2006.03099].
- "Protocol Discovery for the Quantum Control of Majoranas by Differ- ential Programming and Natural Evolution Strategies" by Luuk Coop-mans, Di Luo, Graham Kells, Bryan K. Clark, Juan Carrasquilla [arXiv:2008.09128].
- "A remark on black holes of Chern-Simons gravities in 2n + 1 dimen- sions: n = 1, 2, 3" by D.H. Tchrakian [arXiv:1910.00315].
- "On the group generated by C, P and T: I2=T2=P2=IPT=1, with ap- plications to pseudo-scalar mesons" by Brian P. Dolan [arXiv:2009.12557].

School of Theoretical Physics (continued)

Selected Research Highlights:

- "The Confining Transition in the Bosonic BMN Matrix Model" by Yuhma Asano, Samuel Kováčik, Denjoe O'Connor [arXiv:2001.03749].
- "Ground state wave functions for the quantum Hall effect on a sphere and the Atiyah-Singer index theorem" by Brian P. Dolan, Aonghus Hunter-McCabe [arXiv:2001.02208].
- "The matrix regularization for Riemann surfaces with magnetic fluxes" by Hiroyuki Adachi, Goro Ishiki, Takaki Matsumoto, Kaishu Saito [arXiv:2002.02993].
- "*SO(2)* gauged Skyrmions in 4+1 dimensions" by Francisco Navarro- Lerida, Eugen Radu, D. H. Tchrakian [arXiv:2003.05899].
- "A renormalisation group equation for transport co-efficients in (2 +1)- dimensions derived from the AdS/CMT correspondence" by Brian P. Dolan [arXiv:2006.16819].
- "The nonperturbative phase diagram of the bosonic BMN matrix model" by Samuel Kováčik, Denjoe O'Connor, Yuhma Asano [arXiv:2004.05820].
- "Conserved Quantities in General Relativity & Quantum Anomalies" by B. P. Dolan [DIAS-STP-20-04].
- "Enhancing the effect of quantum many-body scars on dynamics by minimising the effective dimension" by Shane Dooley, Graham Kells [arXiv:2006.03099].
- "Protocol Discovery for the Quantum Control of Majoranas by Differential Programming and Natural Evolution Strategies" by Luuk Coopmans, Di Luo, Graham Kells, Bryan K. Clark, Juan Carrasquilla [arXiv:2008.09128].
- "A remark on black holes of Chern-Simons gravities in 2n + 1 dimensions: $n = 1, 2, 3$" by D.H. Tchrakian [arXiv:1910.00315].
- "On the group generated by C, P and T: I2=T2=P2=IPT=1, with applications to pseudo-scalar mesons" by Brian P. Dolan [arXiv:2009.12557].

Scoil na Fisice Teoiriciúla (ar lean)

PUBLICATIONS 2020

Papers Published in Refereed Journals

1. Y. Asano, **S. Kováčik** and **D. O'Connor** (2020), 'The Confining Transition in the Bosonic BMN Matrix Model', *JHEP* 06 174.
2. Y. Asano, **S. Kováčik** and **D. O'Connor** (2020), 'The Nonperturbative Phase Diagram of the Bosonic BMN Matrix Model', *POS Corfu* 2019 221.
3. **T. C. Dorlas**, A. Rebenko and B. Savoie (2020), 'Correlation of Clusters: Partially Truncated Correlation Functions and Their Decay', *J. Math. Phys.* 61 03.
4. **S. Dooley**, **T. C. Dorlas**, H. Katsura and **G. Kells** (2020), 'Simulating Quantum Circuits by Adiabatic Computation: Improved Spectral Gap Bounds', *Phys. Rev. A* 101 042302.
5. **W. Nahm** (2020), 'The Eponym Enlil-Nadin-Apli and the Capture of Kaštiliaš IV', NABU 2020 19.
6. **B. P. Dolan**, A. Hunter-McCabe and J. Twamley (2020), 'Shaking Photons from the Vacuum: Acceleration Radiation from Vibrating Atoms', *New J. Phys.* 22 033026.
7. **B. P. Dolan** (2020), 'A Renormalisation Group Equation for Transport Coefficients in (2 + 1)- Dimensions Derived from the AdS/CMT Correspondence', *JHEP 09* 169.
8. **B. P. Dolan** and A. Hunter-McCabe (2020), 'Ground State Wave Functions for the Quantum Hall Effect on a Sphere and the Atiyah–Singer Index Theorem', *J. Phys A: Math & Theo.* 53 215306.
9. **S. Dooley** and **G. Kells** (2020), 'Enhancing the Effect of Quantum Many-Body Scars on Dynamics by Minimizing the Effective Dimension', *Phys. Rev. B* 102 195114.
10. S. Nulty, J. Vala, D. Meidan, and **G. Kells** (2020), 'Constrained Thermalization and Topological Superconductivity', *Phys. Rev. B* 102 054508.
11. D. Pellegrino, **G. Kells**, N. Moran and J. K Slingerland (2020), 'Constructing Edge Zero Modes Through Domain Wall Angle Conservation', *J. Phys A: Math & Theo.* 53 095006.
12. **M. Leitner** (2020), 'Convolutions on the Complex Torus', *Int. J. Number Theory* 2020. 1-21.
13. **M. Pandey** and S. Vaidya (2020), 'Light Hadron Masses from a Matrix Model for QCD', *Phys. Rev. D* 101 114020.
14. A. Watanabe and **R-D. Zhu** (2020), 'Testing Macdonald Index as a Refined Character of Chiral Algebra', *JHEP* 02 004.
15. O. Foda and **R-D. Zhu** (2020), 'Closed Form Fermionic Expressions for the Macdonald Index', *JHEP* 06 157.

Papers Published in Conference Proceedings or Edited Works

1. **B. P. Dolan** (2020), 'Conserved Quantities in General Relativity and Quantum Anomalies' : Proceedings of the Corfu Summer Institute 2019: School and Workshops on Elementary Particle Physics and Gravity, 31 August - 25 September 2019 Corfu, Greece.

Talks

1. **D. O'Connor**, 'Testing Gauge Gravity Duality with Matrix Models' : Given at Perimeter Institute, Waterloo, Canada. 1 December 2020.
2. **D. O'Connor**, 'Matrix Membranes' : Given at City University New York (CUNY). 4 December 2020.
3. **D. O'Connor**, 'Hagedorn transitions in Matrix Membranes' : Given at Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia. 11 December 2020.
4. **W. Nahm**, 'Automorphic Forms and Quantum Field Theory' : Given at Sirius Mathematics Centre, Sochi, Russia. 27 February 2020.
5. **L. Coopmans**, 'Optimal Transport of Majorana Zero Modes' : Given at Internationa Centre for Theoretical Physics, Al Hoceima, Morocco. 2 March 2020.
6. **L. Coopmans**, 'The Thoughts of Hamilton and Schrödinger That Stood the Test of Time' : Given at DIAS. 8 June 2020.
7. **L. Coopmans**, 'Controlling Majorana Zero Modes with Machine Learning' : Given at Perimeter Institute, Waterloo, Canada. 2 October 2020.
8. **L. Coopmans**, 'Controlling Majorana Zero Modes in Topological Superconductors' : Given at Trinity College, Dublin. 4 December 2020.
9. **B. P. Dolan**, 'Weighing a Black Hole: the Definition of Mass in General Relativity': Given at Dublin City University. 11 March 2020.
10. **B. P. Dolan**, 'Revisiting the CPT Theorem: Discrete Symmetries and the Lorentz Group' : Given at City University New York (CUNY). 11 December 2020.
11. **I. Jubb**, 'The Problem of Superluminal Signalling in (naïve) QFT' : Given at University of York. 30 January 2020.
12. **I. Jubb**, 'The Problem of Superluminal Signalling in (naïve) QFT' : Given at University College Dublin. 5 February 2020.

School of Theoretical Physics (continued)

13. **I. Jubb**, 'The Problem of Superluminal Signalling in (naïve) QFT' : Given at Dublin City Univercity. 26 February 2020.
14. **I. Jubb**, 'Topology Change' : Given at University of Southern Denmark, Odense. 3 June 2020.
15. **I. Jubb**, 'Horizon Molecules' : Given at The Virtual Causet Conference. 25 August 2020.
16. **I. Jubb**, 'Einstein's Relativity – Pythagoras for Space and Time' : Given at Maths Week, Ireland. 15 November 2020.
17. **G. Kells**, 'Constrained Thermalisation and Topological Superconductivity' : Given at University of Lancaster. 11 March 2020.
18. **G. Kells**, 'Topological Order, Error Suppression and Spectral Correlations' : Given at University College Dublin. 11 November 2020.
19. **K. Kavanagh**, 'Tensor Networks - An Introduction to Tensor Network Methods for 1D Systems' : Given at Utrecht University. 5 November 2020.
20. **K. Kavanagh**, 'QTASEP - Combining Quantum and Classical Transport' : Given at Univercity College Dublin. 25 November 2020.
21. **M. Leitner**, 'Convolutions on the Complex Torus' : Given at Sirius Mathematics Centre, Sochi, Russia. 24 February 2020.
22. **M. Leitner**, 'Integrability, Rationality and Convolutions ' : Given at Harvard University. 11 August 2020.

Preprints (Unpublished Articles)

1. **B. P. Dolan** and A. Hunter-McCabe (2020), 'Ground State Wave Functions for the Quantum Hall Effect on a Sphere and the Atiyah-Singer Index Theorem'.
2. H. Adachi, G. Ishiki, **T. Matsumoto** and K. Salto (2020), 'The Matrix Regularization for Riemann Surfaces with Magnetic Fluxes'.
3. F. Navarro-Lerida, E. Radu and **D. H. Tchrakian** (2020), 'SO(2) Gauged Skyrmions in 4+1 Dimensions'.
4. **B. P. Dolan** (2020), 'Conserved Quantities in General Relativity & Quantum Anomalies'.
5. **B. P. Dolan** *(2020)*, 'A Renormalisation Group Equation for Transport Co- efficients in (2+1)-Dimensions Derived from the AdS/CMT Correspondence'.
6. Y. Asano, **S. Kováčik** and **D. O'Connor** (2020), 'The Nonperturbative Phase Diagram of the Bosonic BMN Matrix Model'.
7. **B. P. Dolan** (2020), 'On the Group Generated by C, P and T: I2=T2=P2=IPT=–1, with Applications to Pseudo-Scalar Mesons'.
8. **S. Dooley** and **G. Kells** (2020), 'Enhancing the Effect of Quantum Many-Body Scars on Dynamics by Minimising the Effective Dimension'.
9. **L. Coopmans**, D. Luo, **G. Kells**, B. K. Clark and J. Carrasquilla (2020), 'Protocol Discovery for the Quantum Control of Majoranas by Differential Programming and Natural Evolution Strategies'.
10. **D. H. Tchrakian**, F. Navarro-Lerida and E. Radu (2020), 'On the Effects of the Chern-Simons Term in an Abelian Gauged Skyrme Model in d=4+1 Dimensions'.
11. **D. H. Tchrakian** (2020), 'A Remark on Black Holes of Chern-Simons Gravities in 2n+1 Dimensions: n=1,2,3'.
12. V. Errasti, **M. Pandey** and S. Vaidya (2020), 'Born-Oppenheimer Quantization of the Matrix Model for N=1 super-Yang-Mills'.
13. **M. Leitner** (2020), 'Convolutions on the Complex Torus'.
14. **B. Dolan**, A. Hunter-McCabe and J. Twamley (2020), 'Shaking Photons from the Vacuum: Acceleration Radiation from Vibrating Atoms'.
15. Y. Para, **G. Palumbo** and T. Macri (2020), 'Probing non-Hermitian Phase Transitions in Curved Space via Quench Dynamics'.
16. S. Nulty, J. Vala, O. Meldan and **G. Kells** (2020), 'Constrained Thermalisation and Topological Superconductivity'.
17. P. Feehan and T. G. Leness (2020), 'Introduction to Virtual Morse-Bott Theory on Analytic Spaces, Moduli Spaces of SO(3) Monopoles, & Applications to Four- Manifolds'.
18. M. Beau, S. M. Pittman, G. E. Astraharchik and A. Del Campo (2020), 'Exactly- Solvable System of One-Dimensional Trapped Bosons with Short and Long-Range Interactions'.
19. M. Beau (2020), 'On Generalized Forces in Higher Derivative Lagrangian Theory'.
20. **W. Nahm** (2020), 'The Eponym Enlil-Nadin-Apli and the Capture of Kaštiliaš IV'.

Scoil na Fisice Teoiriciúla (ar lean)

Seminars (Hosted by the School)

1. Aleksandra A. Ziolkowska (Oxford University), 'Yang-Baxter Integrable Lindblad Equations'. 8 January 2020.
2. Eoin O'Colgain (Asia Pacific Centre of Theoretical Physics), 'The Case for New Physics Beyond the Current Cosmology'. 12 March 2020.
3. **Giandomenico Palumbo** (Université Libre de Bruxelles), 'Fermion-Fermion Duality in 3+1 Dimensions'. 7 April 2020.
4. Felix Flicker (Oxford University), 'Classical Dimers on Penrose Tilings'. 14 April 2020.
5. Anne Taormina (Durham University), 'Mathieu Moonshine: Quarter BPS States at the Kummer Point'. 17 April 2020.
6. Jürg Fröhlich (ETH Zürich), 'Kochen, Specker, Bell, and Others'. 21 April 2020.
7. Donal O'Connell (University of Edinburgh), 'Quantum Amplitudes and Classical Gravity'. 28 April 2020.
8. Parameswaran Nair (City College of New York, CUNY), 'Entanglement in the Quantum Hall System and a Generalized Chern-Simons Form'. 5 May 2020.
9. **W. Nahm** (DIAS), 'Euclidean Quantum Field Theory: Axioms and Automorphic Forms'. 12 May 2020.
10. Sudeshna Sen (University College Dublin), 'Interplay of Molecular Symmetry and Strong Correlations in Molecular Junctions'. 19 May 2020.
11. Alina Vdovina (University of Newcastle), 'Buildings, Quaternions and Yang- Baxter Equations'. 27 May 2020.
12. Sean A. Hartnoll (Stanford University), 'Bootstrapping Matrix Quantum Mechanics'. 9 June 2020.
13. David Tong (University of Cambridge), 'Chiral Boundary States for Fermions'. 16 June 2020.
14. Gerald V. Dunne (University of Connecticut), 'Resurgence, Phase Transitions and Extrapolation'. 23 June 2020.
15. Viv Kendon (Durham University), 'How to Compute Using Quantum Walks'. 1 July 2020.
16. Matthias Gaberdiel (ETH, Zurich), 'An Exact AdS/CFT Duality'. 8 July 2020.
17. Kevin Costello (Perimeter Institute), 'Twisted Holography'. 15 July 2020.
18. Wei Li (Institute of Physics, Chinese Academy of Sciences), 'Quiver Yangian from Crystal Melting'. 22 July 2020.
19. Dan Browne (University College London), 'Universal Fault Tolerant Quantum Computing with 3D Surface Codes'. 29 July 2020.
20. **Marianne Leitner** (DIAS), 'Integrability, Rationality and Convolutions'. 11 August 2020.
21. Ruth Gregory (University of Durham), 'Accelerating Black Hole Chemistry'. 9 September 2020.
22. Sergei Gukov (Caltech), 'From Ramanujan to Rokhlin, via Quantum States'. 23 September 2020.
23. Steve Simon (University of Oxford), 'Thermal Conductance of the nu=5/2 Fractional Quantum Hall State'. 24 September 2020.
24. James Drummond (University of Southampton), 'Tropical Geometry, Cluster Algebras and Scattering Amplitudes'. 30 September 2020.
25. Yasaman Yazdi (Imperial College, London), 'Entanglement Entropy from Spacetime Correlations'. 7 October 2020.
26. Michal P. Heller (Albert Einstein Institute, Hannover), 'Complexity and Quantum Field Theory'. 8 October 2020.
27. Zhengwei Liu (Tsinghua University, Beijing), 'Topological Complexity for Quantum Information'. 14 October 2020.
28. Joseph Conlon (University of Oxford), 'Moduli Stabilisation and the Holographic Swampland'. 15 October 2020.
29. Johanna Erdmenger (Universität Würzburg), 'Gauge/Gravity Duality – Further Insights and New Applications: Modular Flow and New Dirac Materials'. 21 October 2020.
30. Ville Vaskonen (King's College London), 'Primordial Black Holes in Light of LIGO/Virgo Observations'. 22 October 2020.
31. Ben Gripaios (University of Cambridge), 'Differential Cohomology and Topological Actions'. 28 October 2020.
32. John Goold (Trinity College Dublin), 'Quantum Transport and Eigenstate Thermalisation'. 29 October 2020.
33. Michael Spannowsky (Durham University), 'Novel (Quantum) Computational Methods for Quantum Field Theories'. 4 November 2020.

School of Theoretical Physics (continued)

34. Georg Bergner (Universität Jena), 'Non-perturbative Results for Supersymmetric Yang-Mills Theory and Supersymmetry on the Lattice'. 5 November 2020.

35. Wojciech De Roeck (Katholieke Universiteit Leuven), 'Many-Body Localization'. 12 November 2020.

36. **Brian Dolan** (Maynooth University), 'Revisiting the CTP Theorem: The Quaternion Group and Discrete Symmetries of the Lorentz Group'. 18 November 2020.

37. Lei Wang (Chinese Academy of Sciences, Beijing), 'Differentiate Everything: A Lesson from Deep Learning'. 19 November 2020.

38. Dirk Kreimer (Humboldt-Universität zu Berlin), 'Algebra and Monodromy in Amplitudes'. 26 November 2020.

39. Renate Loll (Radboud University, Nijmegen), 'Quantum Gravity and Curvature'. 2 December 2020.

40. Zohar Komargodski (Stony Brook University), 'Generalised Symmetries, QCD3 & Naturalness'. 9 December 2020.

41. Bryan K. Clark (University of Illinois Urbana-Champaign), 'What Numerics Tells us About Entanglement Transitions'. 16 December 2020.

Institute Staff

Council of the Institute 2020

Chairman
V. Cunnane (to 30 June)
P. Heffernan (from 1 July)

Ex-Officio Members
A. Deeks, President, UCD
P. Prendergast, Provost, TCD
M. Kennedy, President, RIA (to 30 June)
M. Canning, President, RIA (from 1 August)

Members Appointed by the Governing Boards of Constituent Schools
G. Wrixon (to 30 June)
A. Jaffe (to 30 June)
W. Nahm (to 30 June)
R. Ó hUiginn (from 1 August)
C. Bean (from 1 August)
M. Ní Mhaonaigh (from 1 August)
M. Fowler (from 1 August)
P. Goddard (from 1 August)
D. O'Connor (from 1 August)

Governing Board of the School of Celtic Studies

Acting Chair
M. Ní Mhaonaigh (to 31 March)

Chairman
M. Ní Mhaonaigh (from 1 August)

Senior Professor
L. Breatnach
R.Ó hUiginn

Appointed Members
M. Ní Mhaonaigh
U. Mac Gearailt
R. Chapman Stacey
D. Stifter
M. Haycock

Governing Board of the School of Theoretical Physics

Chairman
A. Jaffe (to 31 March)
P. Goddard (from 1 August)

Senior Professors
W. Nahm
D. O'Connor
T. Dorlas

Appointed Members
P. Knight
D. Zagier
A. Taormina
H. Braun
S. Ryan

Governing Board of the School of Cosmic Physics

Chairman
G. Wrixon (to 31 March)
M. Fowler (from 1 August)

Senior Professors
C. Bean
P. Gallagher

Appointed Members
A. Watson
K. Verbruggen
L. Maraschi

Administrative Staff of the Institute 2019

Registrar:
Eucharia Meehan

Finance Officer:
Grace Forkin

Senior Executive Officer:
Richard Gow (from 6 July)

Senior Administrative Officer:
Mary Burke

Assistant Finance Officer:
Ronan Byrne

Policy Development & Impact Officer:
Caoimhe Mulhall (Contract position)

Clerical Staff:
Helena Moynihan
Elena Stoenescu (from 12 October)
Pauline Hutton (from 19 October)

Head of IT:
Dmitri Grigoriev

Senior Systems Administrator:
Jean-François Bucas

Systems Administrator:
Philippe Grange

Support Staff:
Colette Doyle
Karen Earley (to 4 September)
Patrick Wynne
Stephen McCullagh (part-time IT support)

Communication Interns:
Matthew Lundy (1-30 June)
Nicole Pajovic (1-30 June)

Staff and Scholars of the School of Celtic Studies 2020

Senior Professor
R. Ó hUiginn (Director)
L. Breatnach

Professor
B. Lewis

Assistant Professors
A. Nic Dhonnchadha
M. O Riordan (Publications Officer)

Dialectologist
B. Ó Curnáin

Librarian
M. Irons

Library Assistant
Ó. Ní Chanainn

School Administrator
E. Nic Dhonncha

Technical Staff
ISOS
A.M. O'Brien

IT Support
A. McCarthy (part-time)

Bibliographer
A. Guilarte

Bergin Fellow
M. Hoyne (Ireland)
C. Kobel (Switzerland)

Scholars
N. Stam (Netherlands)
A. Palandri (Italy)
D. Watson (Canada) (to 31 August)
C. Cleary (Ireland)

Professor Emeritus
M. Ó Murchú
F. Kelly
P. Breatnach

Summer Students
A. Nuijten (Netherlands) (from 2 June to 1 August)
C. O Faolain (Ireland) (from 2 June to 1 August)
C. Ni Mhurchu (Ireland) (from 2 June to 1 August)

Staff and Scholars of the School of Theoretical Physics 2020

Senior Professors
W. Nahm (Director) (to 29 March)
D. O'Connor (Director) (from 30 March)
T. Dorlas

Librarian/School Administrator
G. Rogers

Scholars
L. Coopmans (Holland) Externally funded
K. Kavanagh (Ireland) Externally funded
M. Pandey (India)
T. Matsumoto (Japan)
R. Zhu (China) (to 31 October)
S. Kovacik (Slovakia) (to 30 September)
I. Jubb (UK) (from 1 December)

Schroedinger Fellows
G Kells (Ireland)
L. Borsten (Holland) (to 31 December)
G. Palumbo (Italy) (from 1 October)

Institute Staff (continued)

Irish Research Council Government of Ireland Fellows

I. Jubb (UK) (to 30 November)

Project Staff

S. Dooley (Ireland) SFI Project

Summer Studentship

C. Doherty (Ireland) (from 2 June to 1 August)
C. Irvine (Ireland) (from 2 June to 1 August)
M. Graham (Ireland) (from 2 June to 1 August)
M. Gadioux (Ireland) (from 2 June to 1 August)

Staff and Scholars of the School of Cosmic Physics 2020

Senior Professors

C. Bean (Director)
P. Gallagher
T. Ray (from 16 November)

Professors

T. Ray (to 15 November)
F. Aharonian
Z. Martinec

Assistant Professors

S. Lebedev
B. O'Reilly

Schroedinger Fellows

D. Kiyan (Turkey)
E. Carley (Ireland)

Director of Seismic Networks

M. Möllhoff

Senior Technical Assistants

C. Horan
M. Smyth

Technical Assistants

E. Flood
A. Grace (to 6 May)
L. Collins
C. Hogg

Administrative Staff

H. Mohamad Research Project Officer
C. Moriarty Secretary

Scholars

R. Delhaye (France/New Zealand) (to 30 November)
N. Celli (Italy)
G. Maggio (Italy)
C. Gomez Garcia (Spain)
S. Subasic (Croatia)
L. Berdi (Hungary) (from 1 April)
S. Green (U.K.)
M. de Lucia (Italy)
E. Baldwin (Ireland)
A. Feeney-Johansson (Ireland)
M. Moutzouri (Greece)
C. Stock (U.S.A)
M. Nelissen (Belgium)
M. Longobardi (Italy)
J. de Laat (Netherlands)
B. C. de Melo (Brazil)
E. Liang Chua (Singapore)
H. Dou (China)
Y. Bouarour (Algeria) (to 29 February)
L. Alberto Canizares (Ireland/Spain)
D. McKenna (Ireland)
J. Malone-Leigh (Ireland)
J. Rigney (Ireland) (from 1 September)
S. McEntee (Ireland) (from 4 September)
S. Bhunia (India) (from 5 October)

Project Staff

F. le Pape (France) SFI iCRAG

A. Caratti o Garatti (Italy) ERC EASY

R. Garcia Lopez (Spain) EU Marie Curie Fellowship, (to 13 January) SIRG

D. Craig (Ireland) Technical Officer, GSI INSN

J. Grannell (Ireland) Technical Officer, GSI INSN

J. Mackey (Ireland) Royal Society/SFI

M. Topinka (Czech Republic) (to 30 June) MIRI project

P. Kavanagh (Ireland) MIRI project

G. Tomar (India) SFI iCRAG

G. Ulbricht (Germany) SFI MKIDS

S. Purser (U.K.) ERC EASY

M. Rezaeifar (Iran) EU Pacific Project

D. Molodtsov (Russia) ITHERC Project

C. Civiero (Italy) SFI SEA-SEIS

D. Hariri Naghadeh (Iran) EU Pacific Project

P. Smith (UK) EU Eurovolc

P. McGinnis (Brazil/America) ERC EASY

Y. Xu (China) EU Pacific Project

H. Karbal Ali (Iran) SFI iCRAG

N. Nooshiri (Iran) GSI COSEISMIQ

M. Tsekhmistrenko (Germany) SFI SEA-SEIS

D. Rangaswamy (India) ERC EASY

D. Zargaryan (Armenia) IRC Laureate

R. Bonadio (Italy) SFI SEA-SEIS

C. Jackman (Ireland) SFI Future Leaders

E. Chambers (UK) (from 3 August) SEAI DIG

R. Brose (Germany) (from 1 August) IRC Laureate

A. Fogg (UK) (from 1 October) SFI Future Leaders

C. Louis (France) (from 1 November) SFI Future Leaders

Irish Research Council Government of Ireland Fellows

K. Lok Li (Hong Kong) (to 30 September)

Professor Emeritus

P. Readman

D. O'Sullivan

A. Thompson

A. Jones

L. Drury

Summer Studentship

H. Collier (Ireland) (from 2 June to 21 August)

J. Green (Ireland) (from 2 June to 1 August)

N. Pochinkov (Ireland) (from 2 June to 31 August)

O. O'Hara (Ireland) (from 2 June to 31 August)

R. Moore (Ireland) (from 2 June to 1 August)

K. Prendiville (Ireland) (from 2-10 June)

T. Barnoin (France) (from 15 June to 22 August)

A. Benaim (Ireland) (from 1 July to 31 August)

J. Bollard (Ireland) (from 1 July to 31 August)

Sláinte agus Sábháilteachta 2020

I measc na dtosaíochtaí Sláinte agus Sábháilteachta in 2020 bhí measúnuithe riosca agus pleananna gníomhaíochta sábháilteachta a nuashonrú inár láithreacha. Ní raibh súil leis an ngá le bearta sábháilteachta Covid a cheapadh agus a chur i bhfeidhm ag tús na bliana, ach ba mhaith liom buíochas a ghabháil le coiste sábháilteachta S&S agus le scoileanna as a gcuid oibre lena chinntiú go gcuirfí beartais i bhfeidhm, a bhaineann le gach aonad agus láithreán ar leith.

I rith na bliana tionóladh naoi gcruinniú de Choiste S&S. Bhí ceisteanna a d'eascair as an bpaindéim dhomhanda chun tosaigh sna cláir oibre. Ba é an príomhchúram a bhí orainn timpeallacht shábháilte oibre a chruthú don fhoireann agus do scoláirí.

Tá oiliúint Sláinte agus Sábháilteachta fós mar thosaíocht ag DIAS. Bhí oiliúint do dhaoine teoranta i 2020, ach cuireadh roinnt cúrsaí i gcrích go pearsanta idir glasáil; críochnaíodh cúrsaí eile ar líne.

D'fhreastail 4 dhuine ar oiliúint Earraí Contúirteacha (riachtanas faoi rialacháin iompair de bhóthar agus farraige (ADR).

D'fhreastail 2 dhuine ar PST iomlán (oiliúint ar mharthanas farraige), d'fhreastail 2 dhuine eile ar an gcuid teoirice ar líne den oiliúint.

Rinne 5 dhuine cúrsa oiliúna feasachta ar shlándáil farraige ar líne.

D'fhreastail 8 duine ar oiliúint ar láimhsiú sábháilte, rinne duine amháin seisiún teoirice amháin.

D'fhreastail duine amháin ar chúrsa garchabhrach athnuachana OFA.

D'fhreastail 2 dhuine ar oiliúint Mheasúnóra VDU.

Maidir leis an taifead a bhí ag DIAS ar an láithreán ag deireadh 2020: 44 Freagróir Covid Traenáilte, 13 gharchabhróir deimhnithe agus 13 Maor Dóiteáin oilte.

Maidir le timpistí le linn 2020, déanann Tábla 1 thíos achoimre ar na príomhstaitisticí.

	Uimhir	Tráchtaireacht
Taismí taifeadta	2	Beirt bheag
Neasteagmhais	1	
Laethanta caillte (FTE)	0	
Éilimh árachais	0	

An Dr. Eucharia Meehan
22 Lúnasa 2021

Cláraitheoir/POF - i gcáil mar Oifigeach Sláinte & Sábháilteachta DIAS

Health and Safety 2020

Priorities for Health and Safety in 2020 included updating risk assessments and safety action plans at our locations. The need to devise and implement Covid safety measures was unexpected at the start of the year, but I would like to thank the H&S safety committee and schools for their work to ensure that policies were put in place, relevant to each specific unit and site.

In the course of the year nine H&S Committee meetings were held. Issues arising from the global pandemic dominated the agendas. Creating a safe work environment for staff and scholars was our main concern.

Health and Safety training remains a priority at DIAS. In-person training was limited in 2020, however some courses were completed in-person between lockdowns; other courses were completed online.

4 persons attended Dangerous Goods training (a requirement under road and sea transport regulations (ADR).

2 persons attended full PST (sea survival training), 2 further persons attended the online theory portion of the training.

5 persons did online sea security awareness training course.

8 persons attended full manual handling training, 1 did theory session only.

1 person attended OFA refresher first aid course.

2 persons attended VDU Assessor training.

For the record DIAS had on site at end of 2020: 44 Trained Covid Responders, 13 certified First Aiders and 13 trained Fire Wardens.

In terms of accidents in the course of 2020, Table 1 below summarises the key statistics.

	Number	Comment
Accidents recorded	2	Both minor
Near misses	1	
Days lost (FTE)	0	
Insurance claims	0	

Dr. Eucharia Meehan
22 August 2021

Registrar/CEO – in capacity as Health & Safety Officer DIAS

Dublin Institute for Advanced Studies

Financial Statements

for year ended 31 December 2020

Institiúid Ard-Léinn Bhaile Átha Cliath

Ráitis Airgeadais

don bhliain dár críoch 31 Nollaig 2020

Information

Members of the Council of the Dublin Institute for Advanced Studies: 2020

Chairman
P. Heffernan

Ex-Officio Members
A. Deeks, President, UCD
P. Prendergast, Provost, TCD
M. Canning, President, RIA

Members Appointed by the Governing Boards of Constituent Schools
M. Fowler
P. Goddard
M. Ní Mhaonaigh
D. O' Connor
R. Ó hUiginn
C. Bean

Registrar and Chief Executive Officer:
Dr. Eucharia Meehan

Head Office:
10 Burlington Road, Dublin 4

Accountants:
Mazars, Block 3, Harcout Centre, Harcourt Road, Dublin 2

Auditors:
The Office of the Comptroller and Auditor General, 3A Mayor Street Upper, Dublin 1

Bankers:
Bank of Ireland, College Green, Dublin 2
Bank of Ireland, Baggot Street, Dublin 2

Governance Statement and Council Members' Report

The Dublin Institute for Advanced Studies (DIAS) is a statutory corporation and was established in 1940 under the Institute for Advanced Studies Act of that year.

The Council is accountable to the Minister for Further and Higher Education, Research, Innovation and Science and is responsible for ensuring good governance and performs this task by setting strategic objectives and targets and taking strategic decisions on all key business issues. The regular day-to-day management, control and direction of the Institute are the responsibility of the Registrar/CEO and the senior management team. The Registrar/CEO and the senior management team must follow the broad strategic direction set by the Council, and must ensure that all Council Board members have a clear understanding of the key activities and decisions related to the entity, and of any significant risks likely to arise. The Registrar/CEO acts as a direct liaison between the Council and management of the Institute.

Council Responsibilities

The work and responsibilities of the Council are set out in the Institute for Advanced Studies Act 1940. Standing items considered by the members of Council include:

- reports from committees,
- financial reports/management accounts,
- performance reports, and
- reserved matters.

The Council is responsible for keeping adequate accounting records which disclose with reasonable accuracy at any time the financial position of the Institute and which enable it to ensure that the financial statements comply with Section 28(2) of the Act.

In preparing those financial statements, the Council is required to:

- select suitable accounting policies and apply them consistently,
- make judgements and estimates that are reasonable and prudent,
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that it will continue in operation, and disclose and explain any material departures disclosed from applicable standards. The maintenance and integrity of the corporate and financial information on the Institutes website is the responsibility of the Registrar/CEO.

The Council is also responsible for safeguarding the assets of the Institute and for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Council considers that the financial statements of the Institute give a true and fair view of the financial performance and the financial position of the Institute at 31 December 2020.

Council Structure

The Council consists of a Chairman appointed by the President, on the advice of the Government, three ex-officio members and six members appointed by the Governing Boards of the constituent schools. DIAS has a Registrar/CEO and a Central Administration. The members of Council were appointed for a period of five years and meet on a bi-annual basis the table below details the appointment period for current members:

Governance Statement and Council Members' Report (continued)

Council Member	Role	Date Appointed
Dr. Peter Heffernan	Chairman	1 July 2020 to 30 June 2025
A. Deeks, Presid. UCD	Ex-Officio Member	1 Aug 2020 to 30 June 2025
P. Prendergast, Prov., TCD	Ex-Officio Member	1 Aug 2020 to 30 June 2025
M. Canning, President, RIA	Ex-Officio Member	1 Aug 2020 to 30 June 2025
Prof. M. Fowler	Appointed by Gov. Board	1 Aug 2020 to 30 June 2025
Prof. P. Goddard	Appointed by Gov. Board	1 Aug 2020 to 30 June 2025
Prof. M. Ní Mhaonaigh	Appointed by Gov. Board	1 Aug 2020 to 30 June 2025
Prof. D. O' Connor	Appointed by Gov. Board	1 Aug 2020 to 30 June 2025
Prof. R.Ó hUiginn	Appointed by Gov. Board	1 Aug 2020 to 30 June 2025
Prof. C. Bean	Appointed by Gov. Board	1 Aug 2020 to 30 June 2025

The Council has established an Audit and Risk Committee.

The Audit and Risk Committee comprises four members. The role of the Audit and Risk Committee is to support the Council in relation to its responsibilities for issues of risk, control and governance and associated assurance. The Audit and Risk Committee is independent from the financial management of the organisation. In particular the Committee ensures that the internal control systems including audit activities are monitored actively and independently. The Audit and Risk Committee reports to the Council twice a year and formally in writing annually.

The members of the Audit and Risk Committee are: Mr. John Boland, Chairman, Prof. Dervilla Donnelly, Mr. Stewart Roche and Ms. Lesley Goulding. In 2020 the Audit and Risk Committee met on four occasions.

Schedule of Attendance, Fees and Expenses

A schedule of attendance at the Council and Audit and Risk Committee meetings for 2020 is set out below including the fees and expenses received by each member.

	Council	Audit & Risk Committee	Fees * 2020 €	Expenses 2020 €
No. of Meetings	2	4		
Dr. Peter Heffernan (Ch)	2		-	
A. Deeks, Presid. UCD	0		-	-
P. Prendergast, Prov., TCD	0		-	-
M. Canning, President, RIA	1		-	-
Prof. M. Fowler	2		-	-
Prof. P. Goddard	2		-	-
Prof. M. Ní Mhaonaigh	2		-	-
Prof. D. O' Connor	2		-	-
Prof. R.Ó hUiginn	2		-	-
Prof. C. Bean	2		-	-
Mr. J. Boland (Ch)		4	-	-
Prof. D Donnelly		4	-	-
Mr. S. Roche		4	-	-
Ms. L.Goulding		4	-	-

Key Personnel Changes

The membership of the Council changed during 2020.

Dr. P. Heffernan was appointed as Chairman of Council from 1st July 2020.

Professor Mary Fowler, Professor Peter Goddard, Professor Máire Ní Mhaonaigh, Professor Denjoe O' Connor, Professor Ruairí Ó hUiginn and Professor Chris Bean were appointed as members of Council from 1st August 2020.

* Mr. John Boland, Chairman of the Audit and Risk Committee received a fee of €5,985 which relates to 2019.

Disclosures Required by Code of Practice for the Governance of State Bodies (2016)

The Council is responsible for ensuring that the Institute has complied as appropriate with the requirements of the Code of Practice for the Governance of State Bodies ("the Code"), as published by the Department of Public Expenditure and Reform in August 2016. The following disclosures are required by the Code:

Consultancy Costs

Consultancy costs include the cost of external advice to management and exclude outsourced "business-as-usual" functions.

	2020 €	2019 €
Legal Fees	43,409	23,294
Financial/actuarial	36,340	30,197
Communication	87,058	83,574
External Review	1,400	35,875
ICT Strategy	-	22,887
Performance Framework Review	4,683	23,370
Other	124,585	118,475
Total Consultancy Costs charged to the Income and Expenditure	**297,475**	**336,672**

Travel and Subsistence Expenditure

Travel and Subsistence Expenditure is categorised as follows:

	2020 €	2019 €
Domestic		
Council	720	107
Employees & Board	15,838	18,510
Academic Visitors	3,215	6,377
Project	53,457	94,525
Field	10,981	1,516
International		
Council	-	-
Employees & Board	20,269	60,250
Academic Visitors	6,285	29,208
Project	46,851	178,548
Field	1,956	1,855
Total	**159,572**	**390,896**

Governance Statement and Council Members' Report (continued)

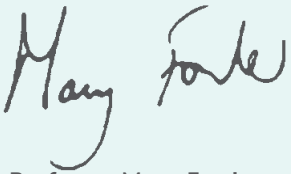
Hospitality Expenditure

The Income and Expenditure includes the following hospitality expenditure:

	2020 €	2019 €
Staff Hospitality	337	6,798
Client Hospitality	173	12,542
Total	**510**	**19,340**

Statement of Compliance

The Institute has complied with the requirements of the Code of Practice for the Governance of State Bodies in 2020.



Professor Mary Fowler
Designated Signatory for Chairman of Council

Date 7th July 2021

Dr. Eucharia Meehan
Registrar/CEO

Date 7th July 2021

Statement of Responsibilities of the Council

The Council of the Dublin Institute for Advanced Studies is required under section 28(2) of the Institute for Advanced Studies Act 1940 to prepare financial statements in such form as shall be approved by the Minister for Education & Skills with the concurrence of the Minister for Finance. In preparing those financial statements the Council is required to:

- select suitable accounting policies and apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Institute will continue in operation; and
- disclose and explain any material departures from applicable accounting standards.

The Council is responsible for keeping adequate accounting records which disclose with reasonable accuracy at any time the financial position of the Institute and which enable it to ensure that the financial statements comply with Section 28(2) of the Act. The Council is responsible for safeguarding the assets of the Institute and for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Ruairí Ó hUiginn
Council Member

Date 7th July 2021

Denjoe O' Connor
Council Member

Date 7th July 2021

Statement on Internal Control

Scope of Responsibility

On behalf of the Council of the Institute we acknowledge our responsibility for ensuring that an effective system of internal control is maintained and operated. This responsibility takes account of the requirements of the Code of Practice for the Governance of State Bodies (2016).

Purpose of the System of Internal Control

The system can only provide reasonable and not absolute assurance that assets are safeguarded, transactions authorised and properly recorded, and that material errors or irregularities are either prevented or would be detected in a timely period.

Capacity to Handle Risk

The Council has an Audit and Risk Committee comprising of four external members.

The Audit and Risk Committee continues to review internal control matters and issues raised by the Comptroller and Auditor General. In 2020, the Audit and Risk Committee met on four occasions.

In addition, the 2020 report on internal control systems as provided by the Internal Auditor has been made available to Members of Council.

Risk and Control Framework

The Council has taken steps to ensure an appropriate control environment by

- clearly defining management responsibilities;
- adopting the principles of corporate governance contained in the 2016 Code of Practice for Governance of State bodies;
- establishing formal procedures for reporting significant control failures and ensuring appropriate corrective action; and
- establishing formal procedures to monitor the activities and safeguard the assets of the organisation.

The Council has established processes to identify and evaluate business risks by

- identifying the nature, extent and financial implication of risks facing the Institute including the extent and categories which it regards as acceptable;
- assessing the likelihood of identified risks occurring;
- assessing the Institute's ability to manage and mitigate the risks that do occur;
- assessing the costs of operating particular controls relative to the benefit obtained.

Ongoing Monitoring and Review

The system of internal control is based on a framework of regular management information, administrative procedures including segregation of duties, and a system of delegation and accountability. In particular it includes:

- comprehensive budgeting system with an annual budget which is reviewed and agreed by the Council of the Institute;
- regular reviews by the Council of periodic and annual financial reports which indicate financial performance against forecasts;
- setting targets to measure financial and other performance;
- adherence to public procurement guidelines;
- regular reviews by the Council of external research projects.

Procurement

We confirm that the DIAS has procedures in place to ensure compliance with current procurement rules and guidelines. Matters arising regarding controls over procurement are highlighted under internal control issues below.

Internal Control Issues

During 2020, expenditure of €151,528 was incurred in relation to goods and services where the procedures employed did not comply with procurement guidelines. The expenditure costs identified by DIAS were in respect of agency, cleaning and security costs.

Agency cost €31,422.

DIAS had planned to recruit for the replacement of the Receptionist post but was delayed during 2020. This post was filled in October 2020.

Agency cost €34,547

DIAS had planned to recruit for the replacement of the Clerical Office post in the Finance department but was delayed during 2020. This post was filled in May 2021.

Cleaning costs €60,126.

DIAS was due to go to tender for the provision of cleaning services in 2020 but the process was delayed by the severe disruption brought about by the Covid-19 emergency. This contract was awarded in April 2021.

Security costs €25,433.

Due to Covid-19, it was necessary to increase security measures at one of the DIAS sites. As a consequence, the cost of security exceeded the €25,000 threshold. It is anticipated that once the staff and scholars return to working on site and monitoring cameras have been

installed, these temporary security measures will be reversed. This is expected to happen by July 2021.

Impact of Covid-19 on the Control Environment

DIAS management have sought to ensure that the strong control environment has been maintained despite staff working remotely during the period. DIAS operations have been aligned with government policy and the senior management team have been meeting on a weekly basis in order to manage the DIAS response to Covid-19.

Emphasis has been placed on research and advanced study work to continue as normal and to ensure a minimum disruption to output. A number of critical national fieldwork activities were maintained and DIAS provided on-line events and seminars where possible.

Financial Controls

Roles and responsibilities have remained the same throughout and there continues to be segregation of duties across all of the finance operations. Authorisation limits and payment thresholds were not changed. Sign-off and evidence of approval are now via electronic signature and/or email as opposed to manual sign-off pre-pandemic. The process around the posting and approval of journals has not changed as a result of the new working arrangements. Monthly balance sheet reconciliations continue to be performed in a timely manner. Strong controls remain in place regarding the changing of employee and supplier bank details.

Budgeting and Forecasting

DIAS has a robust budgeting and forecasting process. There is a comprehensive annual budgeting system in place and Council continue to review the periodic and annual financial reports and forecasts. Expenditure in the schools and sections is constantly monitored against budget to ensure there is not significant overspends. The financial impact of Covid-19 on the Institute is closely monitored.

Risk Management

A Covid-19 Risk Register was implemented in 2020 to deal specifically with the risks associated with the pandemic. The Risk Register was presented to Council in June and December 2020 and Risk is a standing item on the ARC agenda. A Covid-19 Response Plan was adopted by Council in June 2020. The Covid -19 Risk Register was reviewed and the key aspects of the impact of Covid was considered by Council in June and December 2020 and by the ARC in May, September and November 2020.

Information Technology

DIAS procured a number of laptops for central administration staff. There was an upgrade to the primary and failover DIAS routers. In relation to IT security, there is secure VPN based on individual password-protected SSL certificates specifically authorised for access to the DIAS server. Access to VPN was rolled out for all DIAS research staff and scholars. Procedures were established for carrying out IT support for home working.

Training and guidance was provided on Zoom and Microsoft Teams in order to facilitate meetings and to access seminars.

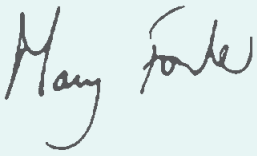
Review of Effectiveness

We confirm that the DIAS has procedures to monitor the effectiveness of its risk management and control procedures.

The Council's monitoring and review of the effectiveness of the system of internal control is informed by the work of the internal auditor, the Registrar and other officers within the Institute who have responsibility for the development and maintenance of an appropriate internal control framework and comments made by the Audit and Risk Committee and the Comptroller and Auditor General in his management letter or other reports.

We confirm that in the year ended 31st December 2020, Council conducted a review of the effectiveness of the internal controls of the Institute. This was accepted as evidence that the system of Internal Control was operating as intended for the entirety of the 2020 period. We confirm that the Institute has an appropriate system of internal and financial control in place.

Signed on behalf of the Council of the Institute.



Professor Mary Fowler
Designated Signatory for
Chairman - Council of the Institute

DATE 7th July 2021

Dr. Eucharia Meehan
Registrar/CEO

DATE 7th July 2021

Ard Reachtaire Cuntas agus Ciste
Comptroller and Auditor General
Report for presentation to the Houses of the Oireachtas

Opinion on financial statements

I have audited the financial statements of the Dublin Institute for Advanced Studies for the year ended 31 December 2020 as required under the provisions of the Institute for Advanced Studies Act 1940. The financial statements comprise

- the statement of income and expenditure and retained revenue reserves
- the statement of comprehensive income
- the statement of financial position
- the statement of cash flows, and
- the related notes, including a summary of significant accounting policies.

In my opinion, the financial statements give a true and fair view of the assets, liabilities and financial position of the Institute at 31 December 2020 and its income and expenditure for the year then ended in accordance with Financial Reporting Standard (FRS) 102 — *The Financial Reporting Standard applicable in the UK and the Republic of Ireland*.

Basis of opinion

I conducted my audit of the financial statements in accordance with the International Standards on Auditing (ISAs) as promulgated by the International Organisation of Supreme Audit Institutions. My responsibilities under those standards are described in the appendix to this report. I am independent of the Institute and have fulfilled my other ethical responsibilities in accordance with the standards.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Report on information other than the financial statements, and on other matters

The Institute has presented certain other information together with the financial statements. This comprises the governance statement and Council members' report, the statement of responsibilities of the Council and the statement on internal control.

My responsibilities to report in relation to such information, and on certain other matters upon which I report by exception, are described in the appendix to this report.

I have nothing to report in regard to those matters.

Peter Kinsley
For and on behalf of the
Comptroller and Auditor General

8 July 2021

Appendix to the report

Responsibilities of Council members

The members are responsible for

- the preparation of financial statements in the form prescribed under the Institute for Advanced Studies Act 1940
- ensuring that the financial statements give a true and fair view in accordance with FRS102
- ensuring the regularity of transactions
- assessing whether the use of the going concern basis of accounting is appropriate, and
- such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Responsibilities of the Comptroller and Auditor General

I am required under the Institute for Advanced Studies Act 1940 to audit the financial statements of the Institute and to report thereon to the Houses of the Oireachtas.

My objective in carrying out the audit is to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement due to fraud or error. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with the ISAs, I exercise professional judgment and maintain professional scepticism throughout the audit. In doing so,

- I identify and assess the risks of material misstatement of the financial statements whether due to fraud or error; design and perform audit procedures responsive to those risks; and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- I obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the internal controls.
- I evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures.
- I conclude on the appropriateness of the use of the going concern basis of accounting and, based on the audit evidence obtained, on whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Institute's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my report. However, future events or conditions may cause the Institute to cease to continue as a going concern.
- I evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

Information other than the financial statements

My opinion on the financial statements does not cover the other information presented with those statements, and I do not express any form of assurance conclusion thereon.

In connection with my audit of the financial statements, I am required under the ISAs to read the other information presented and, in doing so, consider whether the other information is materially inconsistent with the financial statements or with knowledge obtained during the audit, or if it otherwise appears to be materially misstated. If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact.

Reporting on other matters

My audit is conducted by reference to the special considerations which attach to bodies in receipt of substantial funding from the State in relation to their management and operation. I report if I identify material matters relating to the manner in which public business has been conducted.

I seek to obtain evidence about the regularity of financial transactions in the course of audit. I report if I identify any material instance where public money has not been applied for the purposes intended or where transactions did not conform to the authorities governing them. I also report by exception if, in my opinion,

- I have not received all the information and explanations I required for my audit, or
- the accounting records were not sufficient to permit the financial statements to be readily and properly audited, or
- the financial statements are not in agreement with the accounting records.

Statement of Income and Expenditure and Retained Revenue Reserves

	Notes	2020 €	2019 €
Income	2		
Oireachtas Grant	3	7,210,250	6,882,200
Net deferred funding for retirement benefits	10.d	1,043,730	1,203,040
Sales of Publications		43,934	37,166
Projects	4	3,316,581	3,660,690
Other	5	172,048	14,940
		11,786,543	**11,798,036**
Transfer (to)/from Capital Reserve	14	223,395	(455,490)
Amount released on Disposal		324,363	-
		12,334,301	**11,342,546**
Expenditure	2		
School of Celtic Studies		1,778,585	1,821,653
School of Theoretical Physics		1,690,290	1,874,735
School of Cosmic Physics		5,752,966	5,120,898
Administration		3,462,939	2,695,740
		12,684,780	**11,513,026**
Surplus/(Deficit) for the year		**(350,479)**	**(170,480)**
Balance at 1 January		891,415	1,061,895
Balance at 31 December		**540,936**	**891,415**

Statement of Comprehensive Income		2020 €	2019 €
Surplus/(Deficit) for the year		(350,479)	(170,480)
Experience gains/(losses) on retirement benefit obligations		(906,000)	(2,048,000)
Changes in assumptions underlying the present value of retirement benefit obligations		(4,969,000)	(7,216,000)
Actuarial Gain/(Loss) on Retirement Benefit Obligations	10.c	**(5,875,000)**	**(9,264,000)**
Adjustment to Deferred Retirement Benefit Funding		**5,875,000**	**9,264,000**
Total Recognised Gain/(Loss) for the Year		**(350,479)**	**(170,480)**

The Statement of Cash Flows and notes 1 to 17 form part of these financial statements.

Ruairí Ó hUiginn
Council Member

Date 7th July 2021

Denjoe O'Connor
Council Member

Date 7th July 2021

Statement of Financial Position

	Notes	2020 €	2019 €
Assets			
Fixed Assets: Property, Plant and Equipment	13	2,633,912	3,181,670
Current Assets:			
Cash on Hand and at Bank		3,496,626	3,744,547
Receivables	16	304,880	143,723
Project Receivables	4(a)	1,738,164	1,296,540
Total Assets		**8,173,582**	**8,366,480**
Less Liabilities			
Payables - Amounts falling due within one year			
Payables	15	2,594,518	1,754,181
Project Payables	4(a)	2,376,422	2,511,431
Payables - Amounts falling due after one year	15	27,794	27,783
		4,998,734	**4,293,395**
Assets Less Liabilities Before Retirement Benefits		**3,174,848**	**4,073,085**
Deferred Retirement Benefit funding	10.d	77,496,117	70,580,000
Retirement Benefit Obligations	10.c	(77,496,117)	(70,580,000)
		0	**0**
Net Assets		**3,174,848**	**4,073,085**
Financed by:			
Income and Expenditure Account		540,936	891,415
Capital Reserve	14	2,633,912	3,181,670
		3,174,848	**4,073,085**

The Statement of Cash Flows and notes 1 to 17 form part of these financial statements.

Ruairí Ó hUiginn
Council Member

Date 7th July 2021

Denjoe O'Connor
Council Member

Date 7th July 2021

Statement of Cash Flows

	Notes	2020 €	2019 €
Reconciliation of Operating Surplus to Net Cash (Outflow)/ Inflow from Operating Activities			
Surplus/(Deficit) for the Year		**(350,479)**	**(170,480)**
Increase/(Decrease) in Payables		840,348	298,378
(Increase)/Decrease in Receivables		(161,157)	236,445
Net Decrease in Research Programmes and Fees		(576,633)	(180,251)
Depreciation	13	456,851	530,003
Capital Reserve Transfer	14	(547,758)	455,490
Amount Released on Disposal		324,363	-
Net Cash (Outflow)/Inflow from Operating Activities		**(14,465)**	**1,169,585**
Cash Flow Statement			
Net Cash (Outflow)/Inflow from Operating Activities		(14,465)	1,169,585
Cash Flow from Financing Activities			
Bank Interest Received	5	-	-
Cash Flow from Investing Activities			
Purchase of Tangible Assets	13	(233,456)	(985,493)
(Decrease)/Increase in Cash		**(247,921)**	**184,092**
Reconciliation of Net Cash Flow to Movement in Net Funds			
(Decrease)/Increase in Cash		(247,921)	184,092
Net Funds at 1 January		3,744,547	3,560,455
Net Funds at 31 December		**3,496,626**	**3,744,547**

Analysis of Change in Net Funds	Cash at bank and in hand €	Cash at bank and in hand €
At Beginning of Year	3,744,547	3,560,455
Cash Flows	(247,921)	184,092
At End of Year	**3,496,626**	**3,744,547**

The Statement of Cash Flows and notes 1 to 17 form part of these financial statements.

Ruairí Ó hUiginn
Council Member

Date 7th July 2021

Denjoe O'Connor
Council Member

Date 7th July 2021

Notes to the Financial Statements

1. Accounting Policies

The Institute was established under the Institute for Advanced Studies Act, 1940.

Its functions include the provision of facilities for the furtherance of advanced studies and the conduct of research in specialised branches of knowledge. It comprises three Schools - Celtic Studies, Theoretical Physics and Cosmic Physics.

a) Basis of Preparation and Statement of Compliance

Going concern

The Financial statements have been prepared on a going concern basis. The Council has considered the impact of Covid-19 on the operations of the Institute at meetings held in June and December 2020.

An assessment on the projected financial impact of Covid-19 on the Institute has been completed to the end of December 2021 and the Council are satisfied that the Institute has sufficient resources to continue in operation for at least 12 months from the signing of the financial statements.

b) Basis of Accounting

This set of financial statements is prepared by the Dublin Institute for Advanced Studies in accordance with accounting standards issued by the Financial Reporting Council, including FRS 102 "The Financial Reporting Standard applicable in the UK and Republic of Ireland" ("FRS 102").

The preparation of financial statements in compliance with FRS 102 requires the use of certain critical accounting estimates. It also requires management to exercise judgement in applying the Institute's accounting policies. (See Note 17).

The financial statements have been prepared on an accruals basis under the historical cost convention and comply with the financial reporting standards of the Financial Reporting Council.

The following accounting policies have been applied:

c) Oireachtas Grants

Income from Oireachtas grants represents accrued income in the year.

d) Fixed Assets: Property, Plant and Equipment

Fixed Assets comprise the furniture, equipment, computers and motor vehicles of the Institute and are shown at cost less accumulated depreciation. The rates of depreciation, calculated on a straight line basis, are as follows:

Furniture and Equipment	10%
Computers	25%
Motor Vehicles	25%

Fixed assets below the capitalisation threshold are charged to the Statement of Income and Expenditure in the year of purchase.

The capitalisation threshold amount is €3,000 exclusive of VAT.

The Fixed Assets are made up of exchequer and project funded assets. The depreciation of project funded assets are calculated on a straight line basis as outlined above.

Premises occupied by the Institute are leased from the Office of Public Works.

1. Accounting Policies (continued)

At each reporting date the Institute assesses whether there is any indication of impairment. If such indication exists, the recoverable amount of the asset is determined which is the higher of its fair value less costs to sell and its value in use. An impairment loss is recognised where the carrying amount exceeds the recoverable amount.

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount and are recognised within the Income and Expenditure Account.

Heritage Assets

The Institute holds and maintains certain heritage assets, such as libraries holding manuscripts, book and pamphlet collections, as well as antique scientific instruments. Included in the list of assets is a book collection and antique astronomical equipment and clocks which are itemised on the contents of insurance.

The Institute conserves these assets for research and for interaction between the Institute and the public.

In accordance with accounting standard FRS102, heritage assets acquired pre 1 January 2007 are not capitalised in the financial statements since reliable estimates of cost or value are not available at a reasonable cost.

There have been no heritage assets acquired subsequent to 1 January 2007, within the thresholds as specified in this policy. The Institute will capitalise any assets acquired after this date at either their cost (in the case of acquisitions made by the Institute) or their fair value (in the case of donations). Donated heritage assets will be capitalised with reference to recent sales of similar objects.

Heritage assets valued at less than €10,000 are not capitalised in the financial statements.

As funds permit and if judged necessary, conservation is carried out on heritage items and the expenditure incurred is recognised in the income and expenditure accounts.

The Institute does not dispose of heritage items, whether acquired, donated or bequeathed.

e) Capital Reserve

The capital reserve represents the unamortised value of income used for the purchase of Fixed Assets from state sources.

Capital income received from non-state sources is recognised in full when the asset is purchased.

f) Library

Expenditure on library books and materials is written off in the year in which it is incurred.

g) Publications

Expenditure on publications is written off in the year in which it is incurred.

h) Superannuation

The Dublin Institute for Advanced Studies operates a defined benefit retirement benefit scheme which is funded annually on a pay as you go basis from monies available to it, including monies provided by the Department of Further and Higher Education, Research, Innovation and Science and from contributions deducted from staff salaries. Staff appointed before 1 January 2013 have pension terms under the relevant DIAS Superannuation Scheme as set out in:

(a) Dublin Institute for Advanced Studies (Superannuation) Scheme 1947 as amended

(b) Dublin Institute for Advanced Studies Spouses and Children's Contributory Scheme 1991

(c) Dublin Institute for Advanced Studies Non-Established Employees (Superannuation) Scheme 1983

(d) Dublin Institute for Advanced Studies Staff Superannuation (Consolidation) Scheme, 2008 and Dublin Institute for Advanced Studies Staff Superannuation Spouses' and Children's Contributory Pension (Consolidation) Scheme, 2008.

1. Accounting Policies (continued)

h) Superannuation (continued)

The Dublin Institute for Advanced Studies also operates the Single Public Service Pension Scheme (Single Scheme) which is the defined benefit retirement benefit scheme for pensionable public servants appointed on or after 1 January 2013. Single Scheme member's contributions are paid over to the Department of Public Expenditure and Reform.

As required under circular 28/2016, the Dublin Institute for Advanced Studies also pays Single Scheme employer contributions, at the rate of three times the employee contribution, over to the Department of Public Expenditure and Reform in respect of members of the single scheme engaged on self-financing projects (note 15).

Retirement benefit costs reflect retirement benefits earned by employees in the period and are shown net of staff retirement benefit contributions which are retained by the Dublin Institute for Advanced Studies. An amount corresponding to the retirement benefits charge is recognised as income to the extent that it is recoverable, and offset by grants received in the year to discharge retirement benefit payments.

Actuarial gains or losses arising on scheme liabilities are reflected in the Statement of Comprehensive Income and a corresponding adjustment is recognised in the amount recoverable from the Department of Further and Higher Education, Research, Innovation and Science.

Retirement benefit liabilities represent the present value of future retirement benefit payments earned by staff to date. Deferred retirement benefits funding represents the corresponding asset to be recovered in future periods from the Department of Further and Higher Education, Research, Innovation and Science.

i) Projects

The Dublin Institute for Advanced Studies receives external funding from industry, government bodies and the European Commission.

A chart of accounts is maintained for each project.

Project receipts are applied as project income, at a level that equals the annual expenditure incurred on direct costs and overheads earned by the associated project.

At the end of the life of the project any surplus or deficit balance left on the project is reflected in the financial statements.

The Dublin Institute for Advanced Studies receives overhead income on a number of externally funded projects.

Overhead income from projects is credited to the income and expenditure account in the period in which it is earned.

Depending on the level of overhead expenditure on the project within the period, this may result in a surplus or deficit on overhead income being reflected in the financial statements.

Overhead income is recognised in line with funding arrangements.

j) Payables

Short term payables are measured at the transaction price.

k) Cash and Cash Equivalents

Cash is represented by cash in hand and deposits with financial institutions repayable without penalty on notice of not more than 24 hours. Cash equivalents are highly liquid investments that mature in no more than three months from the date of acquisition and that are readily convertible to known amounts of cash with insignificant risk of change in value.

1. Accounting Policies (continued)

l) Financial Instruments

The Institute only enters into basic financial instrument transactions that result in the recognition of financial assets and liabilities like trade and other accounts receivable and payable. Basic financial instruments are recorded at transaction price.

m) Holiday Pay

A liability is recognised to the extent of any unused holiday pay entitlement which is accrued at the balance sheet date and carried forward to future periods. This is measured at the undiscounted salary cost of the future holiday entitlement and accrued at the balance sheet date.

n) Operating leases

Rentals payable under operating leases are charged to the Income and Expenditure Account as incurred over the term of the lease.

o) Functional Currency

The Institute's functional and presentational currency is euro.

p) Non Project Grants.

Grants from third parties are recorded in the financial statements using the Accruals Method and are allocated to income so as to match with the related expenditure to which they relate.

q) Judgements in Applying Accounting Policies and Key Sources of Estimation

The preparation of these financial statements requires management to make judgements, estimates and assumptions that affect the application of policies and reported amounts of assets and liabilities, income and expenses. Judgements and estimates are continually evaluated and are based on historical experiences and other factors, including expectations of future events that are believed to be reasonable under the circumstances.

The Institute makes estimates and assumptions concerning the future. The resulting accounting estimates will, by definition, seldom equal the related actual results. The estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are discussed below.

Useful Lives of Tangible Fixed Assets

Long-lived assets comprising primarily of Furniture and Equipment, Computers and Motor Vehicles represent a significant portion of total assets. The annual depreciation charge depends primarily on the estimated lives of each type of asset and, in certain circumstances, estimates of residual values. The Council regularly review these useful lives and change them if necessary to reflect current conditions. In determining these useful lives management consider technological change, patterns of consumption, physical condition and expected economic utilisation of the assets. Changes in the useful lives can have a significant impact on the depreciation charge for the financial year.

Actuarial Assumptions in Respect of Defined Benefit Retirement Benefit Schemes

The application of actuarial assumptions relating to defined benefit retirement benefit schemes is incorporated in the financial statements in accordance with FRS 102. In applying FRS 102, advice is taken from independent qualified actuaries. In this context, significant judgement is exercised in a number of areas, including future changes in salaries and inflation, mortality rates and the selection of appropriate discount rates. A defined benefit asset is recorded matching the liability on the basis that the liability is funded by the state.

Provisions

The Institute makes provisions for legal and constructive obligations, which it knows to be outstanding at the period end date. These provisions are generally made based on historical or other pertinent information, adjusted for recent trends where relevant. However, they are estimates of the financial costs of events that may not occur for some years. As a result of this and the level of uncertainty attaching to the final outcomes, the actual out-turn may differ significantly from that estimated.

2. Detailed Analysis of Income & Expenditure for the year ended 31/12/2020

INCOME	Notes	School of Celtic Studies €	School of Theoretical Physics €	School of Cosmic Physics €	Adminis-tration €	2020 Total €	2019 Total €
Dept.of Further and Higher Education, Research, Innovation and Science Grant (Annual)	3	1,731,542	935,544	2,636,975	1,906,189	7,210,250	6,882,200
*Net Deferred Funding for Retirement Benefits	10.d	316,762	69,526	535,811	121,631	1,043,730	1,203,040
Sales of Publications		43,934	-	-	-	43,934	37,166
Project Income	4.a	-	162,539	3,006,495	147,546	3,316,581	3,660,690
Other	4	390	-	117,358	54,300	172,048	14,940
		2,092,628	**1,167,609**	**6,296,639**	**2,229,567**	**11,786,543**	**11,798,036**
Transfer (to)/from Capital Reserve	14	-	-	-	223,395	223,395	(455,490)
Amount released on disposal	14	-	-	-	324,363	324,363	-
		2,092,628	**1,167,609**	**6,296,639**	**2,777,425**	**12,334,301**	**11,342,546**
EXPENDITURE							
Payroll Costs	6	1,211,542	757,447	1,582,250	1,180,082	4,731,321	4,208,278
*Retirement Benefit Costs	10.b	472,821	686,390	994,092	428,808	2,582,111	2,706,184
**Project Costs	4.a	-	157,516	2,889,581	-	3,047,097	2,569,703
Library and Book Storage		30,392	62,597	10,355	-	103,344	118,538
Depreciation	13	-	-	-	456,851	456,851	530,003
Rent, Rates and Insurance		-	-	-	202,681	202,681	201,433
General Expenses	8	9,687	289	50,474	332,179	392,629	487,517
Travel and Seminar Expenses		3,734	5,908	35,357	9,365	54,364	117,824
**Survey Ship Time Costs				115,000	-	115,000	-
Premises Maintenance and Security		-	-	795	262,517	263,312	205,049
Computer and Internet Expenses		5,218	14,811	38,686	84,727	143,442	141,986
Fuel Light and Power		-	-	-	130,106	130,106	126,303
Postage and Telephone		-		(1)	17,012	17,011	19,763
Stationery		6,515	2,738	10,594	4,597	24,444	40,026
Publications		31,802	-	2,387	2,065	36,254	17,655
Advertising		621	-	1,986	18,082	20,689	12,693
Minor Office Equipment		6,253	2,594	21,410	9,504	39,761	10,071
Disposal of Asset					324,363	324,363	-
		1,778,585	**1,690,290**	**5,752,966**	**3,462,939**	**12,684,780**	**11,513,026**
SURPLUS/(DEFICIT) FOR YEAR		**314,043**	**(522,681)**	**543,673**	**(685,514)**	**(350,479)**	**(170,480)**
Balance at 1 January		**1,174,261**	**(1,734,007)**	**7,063,336**	**(5,612,175)**	**891,415**	**1,061,895**
Balance at 31 December		**1,488,304**	**(2,256,688)**	**7,607,009**	**(6,297,689)**	**540,936**	**891,415**

Note (a) * The Net Deferred Funding for Retirement Benefits are allocated on a pro rata basis to the amount paid to pensioners in the year.
* The Retirement Benefits Costs are allocated on a pro rata basis to the pension contributions from staff in the year.
Note (b) Costs directly related to research (e.g., pay, library, computer expenses, travel) have been apportioned to the schools. Overhead costs such as rent, insurance, utilities and property maintenance have been charged to Administration.

2. Detailed Analysis of Income & Expenditure for the year ended 31/12/2020 (continued)

Note (c) Grant An amount of 7,210,250, (2019 6,882,200) was received from the Department of Further and Higher Education, Research, Innovation and Science. The grant is provided by the Department of Further and Higher Education, Research, Innovation and Science towards liabilities under pay and general non-pay expenses and is drawn down by the Institute on an annual basis.

Note (d) Survey Ship Time Costs ** In 2020, shipping costs of €476,000 was incurred following the retrieval of seismic equipment from the sea-bed. A cost of €361,000 was posted to projects costs and €115,000 which was covered by Insurance was posted to a separate line item.

3. Oireachtas Grant

	2020 €	2019 €
Dept. of Further and Higher Education, Research, Innovation and Science		
Grant for Recurrent Purposes	7,091,000	6,882,800
Supplementary Grant Covid-19	461,250	-
	7,552,250	**6,882,800**
Less Supplementary Grant Covid-19 deferred to 2021	(342,000)	-
	7,210,250	**6,882,800**

4. (a) Projects

	2020 €	2019 €
Opening Balances	1,214,891	1,395,142
Receipts	2,739,948	3,480,439
	3,954,839	**4,875,581**
Closing Balances (Project Receivables €1,738,164, Project Payables €2,376,422)	(638,258)	(1,214,891)
Applied as Income	**3,316,581**	**3,660,690**
Income Allocation		
Administration	147,547	104,957
School of Celtic Studies	-	-
School of Theoretical Physics	162,539	205,772
School of Cosmic Physics	3,006,495	3,349,961
	3,316,581	**3,660,690**
Total Project Income *	**3,316,581**	**3,660,690**

Note * This figure is made up of project Income to Central Admin €147,546, project income to Schools €3,023,304 and capital expenditure on projects of €145,727.

4. (a) Projects (continued)

Project Costs	Celtic Studies €	Theoretical Physics €	Cosmic Physics €	2020 Total €	2019 Total €
* Salaries/Scholarships	-	141,286	1,867,392	2,008,678	1,921,360
Travel					
- Domestic	-	-	46,851	46,851	44,525
- International	-	2,659	50,798	53,457	228,548
Survey – Ship Time Costs	-	-	361,000	361,000	50,000
Other	-	13,571	563,540	577,111	325,270
Total Project Cost	**-**	**157,516**	**2,889,581**	**3,047,097**	**2,569,703**

***Note (a)** Externally Funded Research Staff and Scholars Numbers (WTE) 47 (2019: 47).

4. (b) Project Detail

	Funding Authority	Opening Balance €	Receipts €	Recurrent Expenditure €	Applied as Income Central Admin Charge €	Applied as Income Schools (including Capital) €	Closing Balance €	Capital €
School of Celtic Studies								
Celtic Studies Summer School		-	500	-	-	-	500	-
Total Celtic Studies		**-**	**500**	**-**	**-**	**-**	**500**	**-**
School of Theoretical Physics								
G Kells	SFI	88,980	110,506	119,839	7,660	125,118	66,708	-
I Jubb IRC Fellowship	IRC	14,460	22,961	37,677	-	37,421	-	-
Total Theoretical Physics		**103,440**	**133,467**	**157,516**	**7,660**	**162,539**	**66,708**	**-**
School of Cosmic Physics								
NGST Project	ESA	(176,283)	178,426	104,205	-	104,205	(102,242)	-
Lindsay Scholar	Armagh Observatory	-	5,000	-	-	-	5,000	-
J Mackey Royal Society Fellowship	Royal Society	24,398	99,389	106,325	5,886	96,133	21,768	-
MKID Camera IP T Ray	SFI	55,210	451,465	147,957	9,058	121,091	376,526	-
Radionet EC Project	EC	(16,723)	-	-	-	-	(16,723)	-
T Ray ERC Easy	EC	400,611	556,977	413,043	22,771	432,645	502,172	19,360
Royal Society Enhancement Award	Royal Society	12,468	34,450	25,819	1,815	29,643	15,460	-
HIRES IRC -Laureate Award	IRC	175,810	132,744	75,334	4,307	81,837	222,410	-
SIRG-PIGS-Lopez	SFI	41,019	(33,626)	6805	628	6,765	-	-
Massive Stars Conference 2020	Various	5,792	(4,300)	5,241	-	1,492	-	-
David Mckenna IRC Scholarship	IRC	1,413	24,000	22,194	-	22,194	3,219	-

4. (b) Project Detail (continued)

	Funding Authority	Opening Balance €	Receipts €	Recurrent Expenditure €	Applied as Income Central Admin Charge €	Applied as Income Schools (including Capital) €	Closing Balance €	Capital €
Luis Alberto Canizares IRC Scholarship	IRC	2,169	24,000	22,750	-	22,750	3,419	-
C Jackman – SSDA	SFI	179,149	-	129,867	4,912	107,705	66,532	16,000
ARIEL- Prodex	ESA	(2,731)	-	31,406	-	31,406	(34,137)	-
Royal Society Engagement	Royal society	-	11,599	7,160	-	7,160	4,439	-
John Malone IRC Scholarship	IRC	-	24,000	17,750	-	17,750	6,250	-
Stellar EC CSA	EC	-	153,673	-	-	-	153,673	-
Regional Museum Exhibition Scheme 20	Dept./ Culture & Heritage& Gaelt.	-	10,000	10,000	-	10,000	-	-
Total Astrophysics		**702,302**	**1,667,617**	**1,125,856**	**49,377**	**1,092,776**	**1,227,766**	**35,360**
ICRAG	SFI	(995,179)	175,357	529,861	32,668	664,793	(1,519,283)	103,808
ICRAG GeoHazard	SFI	(3,246)	-	37,508	756	37,356	(41,358)	
ERC Development iTHERC	SFI	(51,213)	51,213	-	-	-	-	-
ESA 3D Earth	ESA	(51,165)	30,000	3,256	-	3,256	(24,421)	-
SEA-SEIS	SFI	446,474	285,0116	634,701	38,729	626,562	66,194	-
GSI Seimic Network Support	GSI	254,458	125,000	123,139	-	123,139	256,319	-
Eurovolc -Research and Innovation	EC	42,394	27,583	48,317	2,534	48,143	19,300	-
Geothermica EC Call-URBAN	GSI	36,237	-	3,567	89	3,835	32,313	-
Geothermica EC Call-COSEISMIQ	GSI	77,309	-	55,717	1,384	59,495	16,430	-
Geo External MT	Various	-	35,000	14,568	-	21,127	13,873	6,559
EC-PACIFIC	EC	257,577	67,513	234,268	12,871	244,543	67,676	-
Ka Lok Li Fellowship	IRC	7,700	22,961	30,739	-	30,661	-	-
SEAI-DIG	SEAI	387,803	-	26,270	1,479	28,995	357,329	-
PIPCO	PIPCO RSG	-	25,000	21,814	-	21,814	3,186	-
Geothermica 005 Deep	GSI	-	66,653	-	-	-	66,653	-
GSI Kiyan 2020 sc 049 Short Call	GSI	-	15,000	-	-	-	15,000	-
GSI Bean 2020 sc 040 Short Call	GSI	-	14,073	-	-	-	14,073	-
Total Geophysics		**409,149**	**938,364**	**1,763,725**	**90,510**	**1,913,719**	**(656,717)**	**110,367**
Total Cosmic Physics		**1,111,451**	**2,605,981**	**2,889,581**	**139,887**	**3,006,495**	**571,050**	**145,727**
Total Net Balances - DIAS		**1,214,891**	**2,739,948**	**3,047,097**	**147,547**	**3,169,034**	**638,258**	**145,727**

Note Project receipts are applied as project income, at a level that equals the annual expenditure (recurrent plus capital) and overheads earned by the associated project.

The closing balances above represent overhead earned and advance funding to meet financial commitments in 2021.

The capital column outlines the expenditure on fixed assets during 2020.

5. Other Income

	2020 €	2019 €
Insurance	115,000	-
Historical Funds Grant	50,000	-
Other	7,048	14,940
Total	**172,048**	**14,940**

6. Remuneration

	Celtic Studies €	Theoretical Physics €	Cosmic Physics €	Admin. €	2020 Total €	2019 Total €
Core Funded Posts						
* Salaries/Wages	1,110,876	652,778	1,426,185	1,177,082	4,366,921	3,874,753
Retirement Benefit Costs	-	-	-	-	-	-
** Scholarships	100,666	104,669	156,065	3,000	364,400	333,525
Honoraria	-	-	-	-	-	-
	1,211,542	**757,447**	**1,582,250**	**1,180,082**	**4,731,321**	**4,208,278**

Note on Core Funded Posts
* Core Staff Numbers (WTE) 51.7 (2019:52.3), ECF Numbers (WTE) 61 (2019: 63).
** Core Scholars (WTE) 14 (2019: 12).

Note on Externally Funded Posts
Externally Funded Research Staff and Scholars Numbers (WTE) 47 (2019: 47).

Additional Superannuation Contributions of €207,268 (2019: €222,778) were paid to the Dept. of Further and Higher Education, Research, Innovation and Science 2020.

(a) Aggregate Employee Benefits

	Celtic Studies €	Theoretical Physics €	Cosmic Physics €	Admin. €	2020 Total €	2019 Total €
Salaries/Wages	1,045,459	604,402	1,344,020	1,116,133	4,110,014	3,622,360
Overtime	-	-	-	-	-	-
Allowances	-	-	-	-	-	-
Employer's PRSI	65,417	48,376	82,165	60,949	256,907	252,393
Retirement Benefit Costs	-	-	-	-	-	-
	1,110,876	**652,778**	**1,426,185**	**1,177,082**	**4,366,921**	**3,874,753**

(b) Key Management Personnel

Key management personnel in the Dublin Institute for Advanced Studies include the Registrar/CEO, the three School Directors, the Finance Officer and Higher Executive Officer for whom the total remuneration cost was €722,213 (2019 €654,287) in the year. Key management personnel are in receipt of a salary only. They are not paid any bonus.

Their retirement benefit entitlements do not exceed the standard entitlements in the model public sector defined benefit superannuation scheme.

6. Remuneration (continued)

(c) Registrar and Chief Executive Officer Salary

	2020 Total €	2019 Total €
The Registrar/CEO remuneration package for the financial period was as follows:		
Basic Pay	107,936	106,167
	107,936	**106,167**

The Registrar & CEO is in receipt of a salary only. She is not paid any bonus. The Registrar's retirement benefit entitlements does not exceed the standard entitlements in the model public sector defined benefit superannuation scheme.

7. Number of Employees with Benefits in 2020 that fall within bands of €10,000 from €60,000 onwards.

	2020	2019
€60,000 to €69,999	4	1
€70,000 to €79,999	2	2
€80,000 to €89,999	5	5
€90,000 to €99,999	1	-
€100,000 to €109,999	1	3
€110,000 to €119,999	4	2
€120,000 to €129,999	-	-
€130,000 to €139,999	-	-
€140,000 to €149,999	-	-
€150,000 to €159,999	3	3
€160,000 to €169,999	4	4

The average number of employees (whole-time equivalents) during the year excluding externally funded posts was 51.7 (2019:52.3)

The table above shows the number of employees whose total employee benefits fell into the respective bands.

8. General Expenses

	Celtic Studies €	Theoretical Physics €	Cosmic Physics €	Admin. €	2020 Total €	2019 Total €
Miscellaneous	8,764	150	37,204	5,679	51,797	67,107
Catering/Lunches	723	139	3,090	2,147	6,099	33,256
Professional Fees/ Consultancy	-	-	9,630	199,387	209,017	218,223
Training	200	-	550	3,885	4,635	8,991
Bank Charges	-	-	-	3,461	3,461	1,612
Board Meeting Expenses	-	-	-	4,900	4,900	30,929
External Review	-	-	-	1,400	1,400	34,875
Health & Safety	-	-	-	24,262	24,262	8,950
Communications	-	-	-	87,058	87,058	83,574
	9,687	**289**	**50,474**	**332,179**	**392,629**	**487,517**

9. Leasing

Operating Leases

The premises occupied by the Institute are leased from the Office of Public Works.

The premises include Observatory House Dunsink, 5 Merrion Square, 9-10 Burlington Road and 31 Fitzwilliam Place.

There is a term of 78 years left on the lease for Observatory House and the other leases are renewed on an annual basis.

The commitment on foot of such leases in respect of 2021 is €113,609.

Office of Public Works Leases	Annual Rent €
Observatory House Dunsink	330
5 Merrion Square	5,022
9-10 Burlington Road	50,167
31 Fitzwilliam Place	58,090
	113,609

At 31 December 2020 the Institute had the following future minimum lease payments under non-cancellable operating leases for each of the following periods:

	2020 €	2019 €
Payable within one year	113,609	113,609
Between two and five years	990	990
After five years	24,420	24,750

Note
The Institute has a licence agreement with the OPW for a stores area located in Fenian Street at a cost of €1,000 per annum.

10. Retirement Benefit Costs

a) General Description of the Schemes

Staff members appointed before 1 January 2013 have pension terms under the relevant DIAS Superannuation Scheme as set out in:

(a) Dublin Institute for Advanced Studies (Superannuation) Scheme 1947 as amended

(b) Dublin Institute for Advanced Studies Spouses and Children's Contributory Scheme 1991

(c) Dublin Institute for Advanced Studies Non-Established Employees (Superannuation) Scheme 1983

(d) Dublin Institute for Advanced Studies Staff Superannuation (Consolidation) Scheme, 2008 and Dublin Institute for Advanced Studies Staff Superannuation Spouses' and Children's Contributory Pension (Consolidation) Scheme, 2008

The retirement benefits scheme is a defined benefit final salary retirement benefit arrangement with benefits and contributions defined by reference to current "model" public sector scheme regulations. The scheme provides a retirement benefit (eightieths per year of service), a gratuity or lump sum (three eightieths per year of service) and spouse's and children's retirement benefits.

Normal Retirement Age is a member's 65th birthday, and pre 2004 members have an entitlement to retire without actuarial reduction from age 60. Retirement Benefits in payment (and deferment) normally increase in line with general public sector salary inflation.

The valuation used for FRS 102 disclosures has been based on a full actuarial valuation by a qualified independent actuary taking account of the requirements of the FRS in order to assess the scheme liabilities at 31 December 2020.

The Single Public Service Pension Scheme (Single Scheme) is the defined benefit retirement benefit scheme for pensionable public servants appointed on or after 1 January 2013 in accordance with the Public Service Pension Scheme (Single Scheme and Other Provisions) Act 2012. The scheme provides for a retirement benefit and retirement lump sum based on career-average pensionable remuneration and spouse's and children's pensions. The minimum pension age is 66 years (rising in line with State pension age changes). It includes an actuarially-reduced early retirement facility from age 55. Retirement Benefits in payment increase in line with the consumer price index.

The principal actuarial assumptions were as follows:

	2020	2019	2018
Rate of Increase in Salaries	2.50%	2.50%	2.75%
Rate of Increase in Retirement Benefits in Payment	2.00%	2.00%	2.25%
Discount Rate	0.70%	1.10%	2.00%
Inflation Rate	1.50%	1.50%	1.75%

The mortality basis adopted allows for improvements in life expectancy over time, so that the life expectancy at retirement will depend on the year in which a member attains retirement age (age 65). The table below shows the life expectancy for members attaining age 65 in 2020 and 2040.

	31/12/2020		31/12/2019	
Year of Attaining Age 65	2020	2040	2019	2039
Life Expectancy – Male	88.2	89.6	87.3	89.9
Life Expectancy – Female	89.8	91.3	88.7	90.9

10. Retirement Benefit Costs (continued)

b) Analysis of total retirement benefit costs charged to Expenditure

	2020 (€'000)	2019 (€'000)
Current Service Cost	1,966	1,669
Interest on Retirement Benefit Obligations	768	1,186
Employee Contributions	(434)	(440)
	2,300	**2,415**

c) Movement in Net Retirement Benefit Obligations during the financial year

	2020 (€'000)	2019 (€'000)
Retirement Benefit Obligations at 1 January	(70,580)	(60,113)
Current Service Cost	(1,966)	(1,669)
Interest Costs	(768)	(1,186)
Actuarial Gain/(Loss)	(5,875)	(9,264)
Retirement Benefits Paid in the Year	1,693	1,652
*** Retirement Benefit Obligations at 31 December**	**(77,496)**	**(70,580)**

*Liabilities relating to the Single Scheme amount to €2,100,000 and for the DIAS Scheme amounts to €75,396,000.

d) Deferred Funding for Retirement Benefits

DIAS recognises these amounts as an asset corresponding to the unfunded retirement benefit obligations on the basis of the set of principal actuarial and mortality assumptions set out in a) General Description of the Schemes and a number of past events. These events include the statutory basis for the establishment of the retirement benefit scheme, and the policy and practice in relation to funding public service retirement benefits including contributions by employees and the annual estimates process. While there is no formal agreement regarding these specific amounts with the Department of Further and Higher Education, Research, Innovation and Science, DIAS has no evidence that this funding policy will not continue to meet such sums in accordance with current practice.

The Net Deferred Funding for Retirement Benefit Obligations recognised in Income and Expenditure Account was as follows:

	2020 (€'000)	2019 (€'000)
Funding Recoverable in Respect of Current Year Retirement Benefit Costs	2,734	2,855
State Grant Applied to Pay Pensioners	(1,693)	(1,652)
	1,041	**1,203**

The deferred funding asset for retirement benefits as at 31 December 2020 amounted to €77.496 million (2019: €70.580 million).

e) History of defined benefit obligations

	2020 (€'000)	2019 (€'000)	2018 (€'000)
Defined Benefit Obligations	74,496	70,580	60,113
Experience (Gains)/Losses on Scheme Liabilities Amount	906	2,048	(241)
Percentage of Scheme Liabilities	1.17%	2.90%	(.40%)

The cumulative actuarial gain recognised in the Statement of Comprehensive Income amounts to €10,356,000 (2019: €9,450,000).

11. Disclosure of Transactions

The Council of the Institute adopts procedures in accordance with guidelines issued by the Department of Finance in relation to the disclosure of interests by Council Members and these procedures have been adhered to by the Council Members during the year. No Council Member has declared an interest.

12. Council Member and Registrar/CEO Payments 2020

Appointed	Start Date	Finish Date	Total Remuneration 2020 €	Total Expenses 2020 €	Total Remuneration 2019 €	Total Expenses 2019 €
Council Member						
Dr Vincent Cunnane	1/7/15	to 30/6/20	-	720	-	-
Dr. Peter Heffernan	1/7/20	to 30/6/25	-	-	-	-
			-	-	-	-
Members Appointed by the Governing Boards of Constituent Schools			-	-	-	-
Professor Gerry Wrixon	1/7/15	to 30/6/20	-	-	-	288
Professor Arthur Jaffe	1/7/15	to 30/6/20	-	-	-	4,222
			-	-	-	-
Professor A. Deeks	1/8/20	to 30/6/25	-	-	-	-
Professor P. Prendergast	1/8/20	to 30/6/25	-	-	-	-
Professor M. Canning	1/8/20	to 30/6/25	-	-	-	-
Professor Mary Fowler	1/8/20	to 30/6/25	-	-	-	-
Professor Peter Goddard	1/8/20	to 30/6/25	-	-	-	-
Professor Máire Ní Mhaonaigh	1/8/20	to 30/6/25	-	-	-	499
Professor Denjoe O' Connor	1/8/20	to 30/6/25	-	-	-	-
Professor Ruairí Ó hUiginn	1/8/20	to 30/6/25	-	-	-	-
Professor Chris Bean	1/8/20	to 30/6/25	-	-	-	-
Registrar & CEO						
Dr. Eucharia Meehan *			107,936	2,506	106,167	2,952
			107,936	**3,226**	**106,167**	**7,961**

Council Members travel and subsistence payments are paid in accordance with rates set by the Department of Public Expenditure and Reform.

*** Registrar & CEO remuneration and expenses**

The Registrar & CEO is in receipt of a salary only. She is not paid any bonus. The Registrar's retirement benefit entitlements does not exceed the standard entitlements in the model public sector defined benefit superannuation scheme.

13. Fixed Assets: Property, Plant and Equipment

Cost	Furniture & Equipment €	Motor Vehicles €	Computers €	2020 Total €	2019 Total €
Opening Balance 1/1/2020	7,017,712	15,131	2,501,952	9,534,795	8,630,394
Additions*	170,682	-	62,774	233,456	985,493
Disposals	(400,556)	-	(3,163)	(403,719)	(81,092)
	6,787,838	**15,131**	**2,561,563**	**9,364,532**	**9,534,795**
Depreciation					
Opening Balance 1/1/2020	4,030,967	15,131	2,307,027	6,353,125	5,904,214
Charge	370,091	2,154	86,759	456,850	530,003
Disposals	(76,192)	-	(3,163)	(79,355)	(81,092)
	4,324,866	**15,131**	**2,390,623**	**6,730,620**	**6,353,125**
Net book value 31/12/2020	**2,462,972**	**-**	**170,940**	**2,633,912**	**3,181,670**

Note
* All fixed assets in excess of €3,000 are capitalised in the books of DIAS.

14. Capital Reserve

	2020 €	2019 €
Balance at 1 January	3,181,670	2,726,180
Transfer to Income and Expenditure Account		
Income allocated to acquire fixed assets (Project Funded)	145,727	960,433
Income allocated to acquire fixed assets (Exchq. Funded)	87,729	25,060
Amortisation in line with asset depreciation	(456,851)	(530,003)
Amount released on disposals	(324,363)	-
	(547,758)	455,490
Balance at 31 December	**2,633,912**	**3,181,670**

15. Payables due within twelve months

	2020 €	2019 €
Trade Payables	186,871	204,895
Accruals	698,408	370,067
VAT	32,162	16,080
Revenue Payables	179,344	165,021
Deferred Income 2021 Expenditure	145,800	150,000
Retirement Benefit Control Account*	1,009,933	848,118
Deferred Supplementary Covid-19 Grant	342,000	-
	2,594,518	**1,754,181**

*** Note**
This figure relates to employer contributions for externally funded Research staff. The DIAS is liaising with DES/DFHERIS in relation to the payment of the contributions.

Payables due after twelve months	2020 €	2019 €
The following funds are held on deposit.		
These comprise: Vernam Hull Bequest	25,333	25,322
Carmody Fund	2,461	2,461
	27,794	**27,783**

16. Receivables

	2020 €	2019 €
Prepayments	165,294	124,733
Book Sales Receivables	818	784
Sundry	19,912	18,206
Accrued Income	118,856	-
	304,880	**143,723**

17. Approval of Accounts

The Financial Statements were approved by Council on the 30th June 2021.

Eolas

Baill de Institiúid Ard-Léinn Bhaile Átha Cliath: 2020

Cathaoirleach
P. Heffernan

Ball Ex.Officio
A. Deeks, President, UCD
P. Prendergast, Provost, TCD
M. Canning, President, RIA

Baill arna gCeapadh ag Boird Rialaithe Scoileanna Comhtháite
M. Fowler
P. Goddard
M. Ní Mhaonaigh
D. O' Connor
R. Ó hUiginn
C. Bean

Cláraitheoir agus POF
Dr.Eucharia Meehan

Príomhoifig
10 Burlington Road, Dublin 4

Cuntasóirí
Mazars, Block 3, Harcout Centre, Harcourt Road, Dublin 2

Iniúchóirí
The Office of the Comptroller and Auditor General, 3A Mayor Street Upper, Dublin 1

Baincéirí
Bank of Ireland, College Green, Dublin 2
Bank of Ireland, Baggot Street, Dublin 2

Ráiteas Rialachais agus Tuairisc na gComhaltaí Comhairle

Corparáid reachtúil is ea Institiúid Ard-Léinn Bhaile Átha Cliath agus bunaíodh í sa bhliain 1940 faoi Acht um Institiúid Ard-Léinn na bliana sin.

Tá an Chomhairle cuntasach don Aire Oideachais agus Scileanna agus freagrach as rialachas maith a chinntiú agus cuireann an tasc seo i gcrích trí chuspóirí straitéiseacha agus spriocanna a leagan síos agus trí chinntí straitéiseacha a ghlacadh i dtaca le gach mórábhar ghnó. Tá freagracht ag an gCláraitheoir/Príomhfheidhmeannach agus an fhoireann ardbhainistíochta as an mbainistiú rialta ó lá go lá, rialú agus treoir na hInstitiúide. Ní mór don Chláraitheoir/Príomhfheidhmeannach agus an fhoireann ardbhainistíochta an treo straitéiseach leathan atá leagtha síos ag an gComhairle a leanúint, agus ní mór dóibh a chinntiú go mbíonn tuiscint shoiléir ag comhaltaí uile na Comhairle ar na príomhghníomhartha agus cinntí a bhaineann leis an aonán, agus maidir le haon rioscaí suntasacha is dócha a bheidh ann. Feidhmíonn an Cláraitheoir/Príomhfheidhmeannach mar chaidreamh díreach idir an Chomhairle agus bainistíocht na hInstitiúide.

Freagrachtaí na Comhairle

Leagtar amach obair agus freagrachtaí na Comhairle san Acht um Institiúid Ard-Léinn 1940. Áirítear i measc na mbuanmhíreanna a bhíonn idir lámha ag baill na Comhairle:

- tuairiscí ó choistí,
- tuairiscí airgeadais/cuntais bainistíochta,
- tuairiscí feidhmíochta, agus
- nithe forchoimeádta.

Tá an Chomhairle freagrach as taifid imleor cuntasaíochta a choimeád a nochtaíonn le cruinneas réasúnta ag am ar bith staid airgeadais na Institiúid agus a chuidíonn lena chinntiú go gcloíonn na ráitis airgeadais le hAlt 28(2) den Acht.

Agus an Chomhairle ag ullmhú na ráitis airgeadais sin éilítear uirthi:

- polasaithe chuntasaíochta oiriúnacha a roghnú agus iad a chur i bhfeidhm go comhleanúnach,
- breithiúnais agus meastacháin a dhéanamh atá réasúnach agus stuama,
- na ráitis airgeadais a ullmhú ar bhonn gnóthais leantach mura bhfuil sé míchuí glacadh leis go leanfaidh an Institiúid ag oibriú, agus aon imeacht ábhartha ó chaighdeáin chuntasaíochta infheidhme a nochtadh agus a mhíniú. Tá an Cláraitheoir/Príomhfheidhmeannach as cothabháil agus iontaofacht na faisnéise corporáidí agus airgeadais ar shuíomh gréasáin na hInstitiúide.

Tá an Chomhairle freagrach freisin as cosaint a dhéanamh ar shócmhainní na hInstitiúide agus as bearta réasúnta a dhéanamh chun calaois agus mírialtachtaí eile a chosc agus a bhrath.

Measann an Chomhairle go dtugann ráitis airgeadais na hInstitiúide léargas fíor agus cóir ar fheidhmíocht airgeadais agus ar staid airgeadais na hInstitiúide ag 31 Nollaig 2020.

Struchtúr na Comhairle

Is iad comhaltaí na Comhairle an Cathaoirleach a cheapann an tUachtarán, ar chomhairle an Uachtaráin, triúr comhaltaí ex-officio agus seisear comhaltaí ceaptha ag Boird Rialaithe na gcomhscoileanna. Tá Cláraitheoir/Príomhfheidhmeannach agus Riarachán Lárnach ag DIAS. Ceapadh comhaltaí na Comhairle do thréimhse cúig bliana agus tagann siad le chéile dhá uair sa bhliain. Sa tábla thíos taispeántar an tréimhse ceapacháin do na comhaltaí reatha:

Comhalta Comhairle	Ról	Dáta a Ceapadh
An Dr. Peter Heffernan	Cathaoirleach	1 Iúil 2020 go 30 Meitheamh 2025
A. Deeks, Uachtarán COBÁC	Ball Ex-Officio	1 Lúnasa 2020 go 30 Meitheamh 2025
P. Prendergast, Prov., TCD	Ball Ex-Officio	1 Lúnasa 2020 go 30 Meitheamh 2025
M. Canning, Uachtarán, ARÉ	Ball Ex-Officio	1 Lúnasa 2020 go 30 Meitheamh 2025
An tOll. M. Fowler	Ceaptha ag an mBord Rialaithe	1 Lúnasa 2020 go 30 Meitheamh 2025
An tOll. P. Goddard	Ceaptha ag an mBord Rialaithe	1 Lúnasa 2020 go 30 Meitheamh 2025
An tOll. M. Ní Mhaonaigh	Ceaptha ag an mBord Rialaithe	1 Lúnasa 2020 go 30 Meitheamh 2025
An tOll. D.Ó Connor	Ceaptha ag an mBord Rialaithe	1 Lúnasa 2020 go 30 Meitheamh 2025
An tOll. R.Ó hUiginn	Ceaptha ag an mBord Rialaithe	1 Lúnasa 2020 go 30 Meitheamh 2025
An tOll. C. Bean	Ceaptha ag an mBord Rialaithe	1 Lúnasa 2020 go 30 Meitheamh 2025

Tá Coiste Iniúchta agus Riosca bunaithe ag an gComhairle.

Tá ceathrar comhaltaí Boird ar an gCoiste Iniúchta agus Riosca. Is é ról an Choiste Iniúchta agus Riosca tacú leis an gComhairle i dtaca lena bhfreagrachtaí maidir le riosca, rialú agus rialachas agus dearbhú gaolmhar. Tá an Coiste Iniúchta agus Riosca neamhspleách ó bhainistiú airgeadais na heagraíochta. Go háirithe, déanann an Coiste deimhin de go ndéantar monatóireacht ghníomhach agus neamhspleách ar na córais rialaithe inmheánaigh lena n-áirítear gníomhaíochtaí iniúchta. Tuairiscíonn an Coiste Iniúchta agus Riosca don Chomhairle cúpla uair sa bhliain agus go foirmiúil i scríbhinn uair sa bhliain.

Is iad comhaltaí an Choiste Iniúchta agus Riosca: An tUas. John Boland, Cathaoirleach, An tOll. Dervilla Donnelly, An tUas. Stewart Roche agus Lesley Goulding. Sa bhliain 2020 tháinig an Coiste Iniúchta agus Riosca le chéile ceithre huair.

Sceideal Tinrimh, Táillí agus Speansais

Leagtar amach anseo thíos sceideal tinrimh ar chruinnithe de chuid na Comhairle agus an Choiste Iniúchta agus Riosca do 2020, lena n-áirítear táillí agus speansais a fuair gach comhalta.

	Comhairle	Coiste Iniúchta & Riosca	Táillí 2020* €	Speansais 2020 €
Líon Cruinnithe	2	4		
An Dr. Peter Heffernan	2		-	
A. Deeks, Uachtarán COBÁC	0		-	-
P. Prendergast, Prov., TCD	0		-	-
M. Canning, Uachtarán, ARÉ	1		-	-
An tOll. M. Fowler	2		-	-
An tOll. P. Goddard	2		-	-
An tOll. M. Ní Mhaonaigh	2		-	-
An tOll. D.Ó Connor	2		-	-
An tOll. R.Ó hUiginn	2		-	-
An tOll. C. Bean	2		-	-
An tUas. J.Boland		4	-	-
An tOll. D. Donnelly		4	-	-
An tUas. S.Roche		4	-	-
L.Goulding		4	-	-

Ráiteas Rialachais agus Tuairisc na gComhaltaí Comhairle (ar lean)

Mórathruithe Pearsanra

D'athraigh ballraíocht na Comhairle le linn 2020.

Ceapadh an Dr. P. Heffernan mar Chathaoirleach na Comhairle ón 1 Iúil 2020.

Ceapadh an tOllamh Mary Fowler, an tOllamh Peter Goddard, an tOllamh Máire Ní Mhaonaigh, an tOllamh Denjoe O 'Connor, an tOllamh Ruairí Ó hUiginn agus an tOllamh Chris Bean mar chomhaltaí den Chomhairle ón 1 Lúnasa 2020.

* Fuair an tUasal John Boland, Cathaoirleach an Choiste Iniúchta agus Riosca táille de €5,985 a bhaineann le 2019.

Nochtuithe a Éilíonn an Cód Cleachtais chun Comhlachtaí Stáit a Rialú (2016)

Tá an Chomhairle freagrach as a chinntiú gur chomhlíon an Institiúid riachtanais an Chóid Cleachtais chun Comhlachtaí Stáit a Rialú ("an Cód"), mar a d'fhoilsigh an Roinne Caiteachais Phoiblí agus Athchóirithe i mí Lúnasa 2016. Éilíonn an Cód na nochtuithe seo a leanas:

Costais Chomhairliúcháin

Airítear le costais chomhairliúcháin an costas ar chomhairliúchán seachtrach don bhainistíocht agus ní áirítear feidhmeanna seachfhoinsithe "gnó mar is gnách".

	2020 €	2019 €
Táillí Dlí	43,409	23,294
Airgeadais/achtúireach	36,340	30,197
Cumarsáid	87,058	83,574
Athbhreithniú Seachtrach	1,400	35,875
Straitéis TFC	-	22,887
Athbhreithniú ar an gCreat Feidhmíochta	4,683	23,370
Eile	124,585	118,475
Iomlán na gCostas Comhairliúcháin a gearradh leis an gcuntas Ioncaim agus Caiteachais	**297,475**	**336,672**

Caiteachas Taistil agus Cothabhála

Déantar Caiteachas Taistil agus Cothabhála a rangú mar seo a leanas:

	2020 €	2019 €
Náisiúnta		
- Comhairle	720	107
- Fostaithe	15,838	18,510
- Cuairteoirí Acadúla	3,215	6,377
- Tograí	53,457	94,525
- Obair Allamuigh	10,981	1,516
Idirnáisiúnta		
- Comhairle	-	-
- Fostaithe	20,269	60,250
- Cuairteoirí Acadúla	6,285	29,208
- Tograí	46,851	178,548
- Obair Allamuigh	1,956	1,855
Iomlán	**159,572**	**390,896**

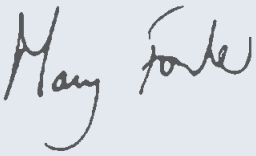
Caiteachas Fáilteachais

Áirítear sa chuntas Ioncaim agus Caiteachais an caiteachas fáilteachais seo a leanas:

	2020 €	2019 €
Fáilteachas Foirne	337	6,798
Fáilteachas Cliaint	173	12,542
Iomlán	**510**	**19,340**

Ráiteas Comhlíonta

Chomhlíon an Institiúid riachtanais an Chóid Cleachtais chun Comhlachtaí Stáit a Rialú i 2020.



An tOll. Mary Fowler
Sínitheoir ainmnithe do
Chathaoirleach Na Comhairle

Dáta 7 Iúil 2021

An Dr. Eucharia Meehan
Cláraitheoir agus POF

Dáta 7 Iúil 2021

Ráiteas Freagrachtaí na Comhairle

Éilítear ar Chomhairle Institiúid Ard-Léinn Bhaile Átha Cliath faoi alt 28(2) den Acht um Institiúid Ard-Leighinn, 1940 ráitis airgeadais a ullmhú ar shlí a cheadóidh an tAire Oideachais & Eolaíochta le comhthoiliú an Aire Airgeadais Agus an Chomhairle ag ullmhú na ráitis airgeadais sin éilítear uirthi:

- polasaithe chuntasaíochta oiriúnacha a roghnú agus iad a chur i bhfeidhm go comhleanúnach;
- breithiúnais agus meastacháin a dhéanamh atá réasúnach agus stuama;
- na ráitis airgeadais a ullmhú ar bhonn gnóthais leantach mura bhfuil sé míchuí glacadh leis go leanfaidh an Institiúid ag oibriú; agus
- aon imeacht ábhartha ó chaighdeáin chuntasaíochta infheidhme a nochtadh agus a mhíniú

Tá freagracht ar an gComhairle taifid chearta iomchuí a choinneáil a nochtaíonn ag aon am le cruinneas réasúnach staid airgeadais na hInstitiúide agus a chuireann ar a cumas a chinntiú go gcloínn na ráitis airgeadais le hAlt 28(2) den Acht. Tá freagracht ar an gComhairle sócmhainní na hInstitiúide a shlánú agus as céimeanna réasúnacha a ghlacadh le cosc a chur ar chalaois agus ar neamhrialtachtaí eile agus iad a aimsiú.

Ruairí Ó hUiginn
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Denjoe O' Connor
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Ráiteas maidir le Rialachas Inmheánach

Scóip na Freagrachta

Thar ceann na Comhairle na hInstitiúide, aithnímid an fhreagracht atá orainn a chinntiú go ndéantar córas éifeachtach rialaithe inmheánaigh a chothabháil agus a fheidhmiú. Cuirtear san áireamh leis an bhfreagracht seo na ceangaltais faoin gCód Cleachtais chun Comhlachtaí Stáit a Rialú (2016).

Cuspóir an Chórais Rialaithe Inmheánaigh

Ní féidir leis an gcóras ach a dhearbhú go réasúnta, seachas go hiomlán, go gcosnaítear sócmhainní, go n-údaraítear idirbhearta agus go gcuirtear i dtaifead iad, agus go gcoisctear earráidí nó neamhrialtachtaí ábhartha nó go mbraithfí iad ar bhealach tráthúil.

An Cumas chun an Riosca a Láimhseáil

Tá Coiste Iniúchta agus Riosca ag an gComhairle ar a bhfuil ceathrar ball seachtrach.

Leantar leis go bhfuil an Coiste Iniúchta agus Riosca ag déanamh athbhreithnithe ar chúrsaí rialaithe inmheánaigh agus ar shaincheisteanna a tharraingíonn anuas an tArd-Reachtaire Cuntas agus Ciste iad.

In 2020, tháinig an Coiste Iniúchta agus Riosca le chéile ceithre huaire.

Ina theannta sin, cuireadh tuarascáil 2020 ar na córais rialaithe inmheánaigh ar fáil do Chomhaltaí na Comhairle, de réir mar a bhí sé ullmhaithe ag an Iniúchóir Inmheánach.

Creat Riosca agus Rialaithe

Tá céimeanna glactha ag an gComhairle chun déanamh cinnte de go mbeidh timpeallacht rialaithe chuí i bhfeidhm trí

- na freagrachtaí bainistíochta a shainmhíniú go soiléir;
- glacadh le prionsabail an rialachais chorparáidigh atá le fáil i gCód Cleachtais 2016 chun Comhlachtaí Stáit a Rialú;
- nósanna imeachta foirmiúla a bhunú chun teipeanna rialaithe suntasacha a thuairisciú agus a chinntiú go ndéantar gníomh ceartaitheach cuí; agus
- nósanna imeachta foirmiúla a bhunú chun monatóireacht a dhéanamh ar ghníomhaíochtaí na heagraíochta agus chun a sócmhainní a chosaint;

Tá próisis curtha i mbun ag an gComhairle chun rioscaí gnó a aithint agus a mheas

- tríd an cineál de rioscaí atá os comhair na hInstitiúide, an méid atá i gceist leo agus na himpleachtaí airgeadais a bhaineann leo a aithint, lena n-áirítear an méid agus na catagóirí a mheasann an Institiúid a bheith inghlactha;
- trí mheasúnú a dhéanamh ar an dóchúlacht go dtarlóidh rioscaí atá aitheanta;
- trí mheasúnú a dhéanamh ar an gcumas atá ag an Institiúid chun na rioscaí sin a tharlaíonn a bhainistiú agus a mhaolú;
- trí mheasúnú a dhéanamh ar na costais a bhaineann le rialuithe áirithe a chur i bhfeidhm i gcoibhneas leis an tairbhe a bhainfear amach astu.

Monatóireacht agus Athbhreithniú Leanúnach

Tá an córas rialaithe inmheánaigh airgeadais bunaithe ar chreat faisnéisithe rialta bainistíochta, nósanna imeachta riaracháin, agus an leithdheighilt dualgas, agus córas tarmligin agus cuntasachta ina measc.

Áirítear leis, ar bhonn ar leith:

- córas cuimsitheach buiséadaithe lena ngabhann buiséad bliantúil, a dhéanann Comhairle na hInstitiúide a athbhreithniú agus a chomhaontú;
- go ndéanann an Chomhairle athbhreithnithe rialta ar thuarascálacha tréimhsiúla agus bliantúla airgeadais ina léirítear an fheidhmíocht airgeadais i gcomparáid le réamhaisnéisí;
- spriocanna a leagan síos chun an fheidhmíocht airgeadais agus cineálacha eile den fheidhmíocht a thomhas;
- go gcloítear le treoirlínte maidir leis an soláthar poiblí;
- go ndéanann an Chomhairle athbhreithnithe rialta ar thionscadail taighde sheachtaigh

An Soláthar

Deimhnímid go bhfuil nósanna imeachta i bhfeidhm ag an DIAS chun a chinntiú go gcomhlíontar na rialacha agus na treoirlínte soláthair reatha. Tarraingítear aird ar ábhair a thagann chun cinn maidir le rialuithe ar sholáthar faoi shaincheisteanna rialaithe inmheánaigh thíos.

Saincheisteanna Rialaithe Inmheánaigh

I rith 2020, tabhaíodh caiteachas €151,528 maidir le hearraí agus seirbhísí i gcás nár chloí na nósanna imeachta a úsáideadh le treoirlínte soláthair. Bhain na costais chaiteachais aitheanta ag DIAS le costais ghníomhaireachta, glantacháin agus slándála.

Costas gníomhaireachta €31,422.

Bhí sé beartaithe ag DIAS próiseas earcaíochta a reáchtáil chun post an Fháilteora a athlíonadh ach cuireadh moill air i rith 2020.

Ceapadh duine don phost post seo i mí Dheireadh Fómhair 2020.

Costas gníomhaireachta €34,547

Bhí sé beartaithe ag DIAS próiseas earcaíochta a reáchtáil chun post Oifigigh Chléireachais sa roinn Airgeadais a athlíonadh ach cuireadh moill air i rith 2020. Ceapadh duine don phost seo i í na Bealtaine 2021.

Costas glantacháin €60,126.

Bhí sé beartaithe ag DIAS S próiseas tairisceana a reáchtáil chun seirbhísí glantacháin a sholáthar in 2020 ach cuireadh moill ar an bpróiseas de bharr chur isteach mór éigeandáil Covid-19. Bronnadh an conradh seo i mí Aibreáin 2021.

Ráiteas maidir le Rialachas Inmheánach (ar lean)

Costas slándála €25,433.

Mar gheall ar Covid-19, ba ghá cur le bearta slándála ag ceann de shuíomhanna DIAS. Mar thoradh air sin, sháraigh costas na slándála an tairseach €25,000. Meastar nach mbeidh gá leis na bearta slándála sealadacha seo a luaithe is a fhillfidh an fhoireann agus na scoláirí ar obair ar an suíomh agus ceamaraí monatóireachta suiteáilte againn. Meastar go dtarlóidh sé seo faoi mhí Iúil 2021.

Tionchar Covid-19 ar an Timpeallacht Rialaithe

Rinne bainistíocht DIAS iarracht a chinntiú go gcoinneofaí an timpeallacht láidir rialaithe in ainneoin go raibh baill foirne ag obair go cianda le linn na tréimhse. Tagann oibríochtaí DIAS le beartas an rialtais agus tháinig an fhoireann bainistíochta sinsearaí le chéile go seachtainiúil d'fhonn freagairt DIAS ar Covd-19 a bhainistiú.

Cuireadh béim air go leanfaí obair thaighde agus ard-staidéir ar aghaidh mar is gnáth chun an cur isteach is lú agus ab fhéidir ar aschur a chinntiú. Leanadh le roinnt gníomhaíochtaí ríthábhachta náisiúnta allamuigh agus reáchtáil DIAS imeachtaí agus seimineáir ar líne ar fáil nuair ab fhéidir.

Rialuithe Airgeadais

Bhí na róil agus freagrachtaí céanna ann feadh an ama agus tá deighilt ann idir dualgais i gcónaí ar fud na n-oibríochtaí airgeadais go léir. Níor athraíodh aon teorainneacha údaraithe ná tairseacha íocaíochta. Déantar síniú agus fianaise cheadaithe anois trí shíniú leictreonach agus/nó trí ríomhphost i gcomparáid leis an bpróiseas réamhphaindéime nuair a dhéantaí an próiseas sínithe de láimh. Níor raibh aon athrú ar an bpróiseas maidir le leabhair chúnta a phostáil agus a cheadú mar thoradh ar na socruithe oibre nua. Leantar le himréitigh mhíosúla an chláir chomhardaithe a dhéanamh ar bhonn tráthúil. Tá rialuithe láidre fós i bhfeidhm maidir le hathrú sonraí bainc fostaithe agus soláthraithe.

Buiséadú agus Réamhaisnéisiú

Tá próiseas láidir buiséadaithe agus réamhaisnéisithe ag DIAS. Tá córas buiséadaithe bliantúil cuimsitheach i bhfeidhm agus leanann an Chomhairle leis na tuarascálacha agus na réamhaisnéisí airgeadais tréimhsiúla agus bliantúla a athbhreithniú. Déantar monatóireacht i gcónaí ar chaiteachas sna scoileanna agus sna rannóga i gcoinne an bhuiséid lena chinntiú nach mbíonn róchaiteachas suntasach ann. Déantar dianmhonatóireacht ar thionchar airgeadais Covid-19 ar an Institiúid.

Bainistíocht Riosca

Cuireadh Clár Riosca Covid-19 i bhfeidhm in 2020 chun déileáil go sonrach le rioscaí a bhaineann leis an bpaindéim. Cuireadh an Clár Riosca faoi bhráid na Comhairle i mí an Mheithimh agus i mí na Nollag 2020 agus tá Riosca ina mhír bhuan de chlár oibre an ARC. Ghlac an Chomhairle le Plean Freagartha Covid-19 i mí an Mheithimh 2020. Rinneadh athbhreithniú ar Chlár Riosca Covid -19 agus rinne an Chomhairle agus ARC príomhghnéithe thionchar Covid a mheas i mí an Mheithimh, mí na Nollag 2020 i mBealtaine, mí Mheán Fómhair agus i mí na Samhna 2020.

Teicneolaíocht Faisnéise

Cheannaigh DIAS roinnt ríomhairí glúine d'fhoireann an riaracháin lárnaigh. Rinneadh uasghrádú ar na phríomhródairí agus teipaistrithe DIAS. Maidir le slándáil TF, tá VPN slán ann atá bunaithe ar dheimhnithe SSL aonair atá cosanta ag pasfhocal atá údaraithe go sonrach chun rochtain a fhail a fhail ar fhreastalaí DIAS. Rolladh rochtain ar VPN amach do gach ball foirne agus scoláire taighde DIAS. Cuireadh nósanna imeachta ar bun chun tacaíocht TF a thabhairt dóibh siúd ata ag obair sa bhaile.

Cuireadh oiliúint agus treoir ar fáil ar Zoom agus ar Microsoft Teams d'fhonn cruinnithe a éascú agus chun teacht ar sheimineáir ar-líne.

Athbhreithniú ar an Éifeachtúlacht

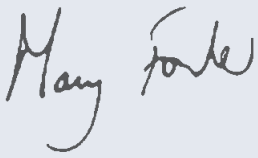
Deimhnímid go bhfuil gnásanna curtha i bhfeidhm ag an DIAS chun monatóireacht a dhéanamh ar éifeachtúlacht a cuid gnásanna bainistíochta riosca agus rialaithe.

Tá monatóireacht agus athbhreithniú na Comhairle ar éifeachtacht an chórais rialaithe inmheánaigh bunaithe ar obair an iniúchóra inmheánaigh, an Chláraitheora agus oifigigh eile san Institiúid a bhfuil freagracht orthu as creat rialaithe inmheánaigh cuí a fhorbairt agus a chothabháil chomh maith le barúlacha an Choiste Iniúchta agus Riosca agus an Ard-Reachtaire Cuntas agus Ciste a thugann sé ina litir bhainistíochta nó i dtuarascálacha eile.

Deimhnímid go bhfuil athbhreithniú déanta ag an gComhairle ar éifeachtacht rialuithe inmheánacha na hInstitiúide sa bhliain dar críoch an 31 Nollaig 2020.

Glacadh leis seo mar fhianaise go raibh an córas Rialaithe Inmheánaigh ag feidhmiú mar a bhí beartaithe do thréimhse iomlán 2020.

Deimhnímid go bhfuil córas cuí rialaithe inmheánaigh agus airgeadais i bhfeidhm ag an Institiúid.



An tOll. Mary Fowler
Sínitheoir ainmnithe do
Chathaoirleach Na Comhairle

Dáta 7 Iúil 2021

An Dr. Eucharia Meehan
Cláraitheoir agus POF

Ard-Reachtaire Cuntas agus Ciste
Tuairisc le cur i láthair Thithe an Oireachtais
Institiúid Ard-Léinn Bhaile Átha Cliath

Tuairm ar na ráitis airgeadais

Tá ráitis airgeadais Institiúid Ard-Léinn Bhaile Átha Cliath don bhliain dar críoch 31 Nollaig 2020 iniúchta agam faoin Acht Um Institiúid Ard-Léinn, 1940. Tá na ráitis airgeadais comhdhéanta de

- an ráiteas ar ioncam agus caiteachas agus cúlchistí ioncaim coinnithe,
- an ráiteas ar ioncam cuimsitheach,
- an ráiteas ar shuíomh airgeadais,
- an ráiteas ar shreabhadh airgid, agus
- na nótaí gaolmhara, lena n-áirítear achoimre ar pholasaithe cuntasaíochta suntasacha.

I mo thuairimse, maidir leis na ráitis airgeadais, tugtar leo léargas fíor agus cothrom ar shócmhainní, dliteanais agus suíomh airgeadais na hInstitiúide ag 31 Nollaig 2020 agus ar a hioncam agus ar a caiteachas don bhliain 2020 i gcomhréir leis an gCaighdeán Tuairiscithe Airgeadais (FRS) 102- *An Caighdeán Tuairiscithe Airgeadais a bhaineann leis an Ríocht Aontaithe agus Poblacht na hÉireann*.

Bunús leis an tuairim

Rinne mé m'iniúchadh ar na ráitis airgeadais i gcomhréir leis na Caighdeáin Idirnáisiúnta maidir le hIniúchóireacht (ISAnna) mar atá molta ag an Eagraíocht Idirnáisiúnta Uasfhoras Iniúchóireachta. Tugtar cur síos san aguisín ar mo fhreagrachtaí faoi na caighdeáin sin. Táim neamhspleách ar an Institiúid agus tá mo fhreagrachtaí eitice eile comhlíonta agam i gcomhréir leis na caighdeáin.

Creidim go bhfuil an fhianaise iniúchta atá faighte agam imleor agus cuí chun bunús a sholáthar do mo thuairim.

Tuairisc ar fhaisnéis eile seachas na ráitis airgeadais, agus ar nithe eile

Tá faisnéis áirithe eile curtha i láthair ag an Institiúid chomh maith leis na ráitis airgeadais. Áirítear anseo ráiteas freagrachtaí na Comhairle agus an ráiteas maidir le rialú inmheánach. San aguisín leis an tuairisc seo, tugtar cur síos ar mo fhreagrachtaí i dtaca leis an bhfaisnéis sin, agus i dtaca le nithe eile a dtugaim cur síos orthu ar bhinn eisceachta.

Níl aon rud le tuairisciú agam ina leith sin.

Peter Kinsley
Le haghaidh agus thar ceann an
Ard-Reachtaire Cuntas agus Ciste

Aguisín leis an tuairisc

Freagrachtaí chomhaltaí na Comhairle

Tá comhaltaí na Comhairle freagrach as

- na ráitis airgeadais a ullmhú san fhoirm a leagtar amach faoin den Acht Um Institiúid Ard-Léinn 1940
- a chinntiú go dtugtar leis na ráitis airgeadais léargas fíor agus cothrom i gcomhréir le FRS102
- rialtacht na n-idirbheart a chinntiú
- measúnú cé acu an bhfuil sé cuí an bonn gnóthais leantach na cuntasaíochta a úsáid, agus
- cibé rialachas inmheánach a chineann siad atá riachtanach chun ráitis airgeadais a ullmhú atá saor ó mhíráiteas ábhartha, cibé acu calaois nó neamhrialtacht is cúis leis sin.

Freagrachtaí an Ard-Reachtaire Cuntas agus Ciste

Éilítear orm faoin Acht Um Institiúid Ard-Léinn 1940 iniúchadh a dhéanamh ar ráitis airgeadais na hInstitiúide agus tuairisc a thabhairt do Thithe an Oireachtais ina leith.

Is é an aidhm atá agam agus an t-iniúchadh á dhéanamh agam dearbhú réasúnta a fháil faoi cé an bhfuil na ráitis airgeadais mar iomlán saor ó mhíráiteas ábhartha mar thoradh ar chalaois nó neamhrialtacht. Leibhéal ard dearbhaithe is ea dearbhú réasúnta, ach ní barántas é go n-aimseoidh iniúchadh a dhéantar i gcomhréir leis na ISAnna míráiteas ábhartha i gcónaí más ann dó. Féadfaidh míráitis a bheith ann mar thoradh ar chalaois nó earráid agus meastar go bhfuil siad ábhartha más rud é, iontu féin nó go carnach, go bhféadfaí a mheas go mbeadh tionchar acu ar chinntí eacnamaíochta úsáideoirí a rinneadh ar bhonn na ráiteas airgeadais seo.

Mar chuid d'iniúchadh i gcomhréir leis na ISAnna, cuirimse breithiúnas gairmiúil i bhfeidhm agus coinním sceipteachas gairmiúil le linn an iniúchta. Agus é sin á dhéanamh agam,

- Aithním agus déanaimse measúnú ar rioscaí míráitis ábhartha faoi na airgeadais cibé acu calaois nó neamhrialtacht is cúis leis; déanaimse nósanna imeachta iniúchta a dhearadh agus a chur i gcrích a fhreagraíonn do na rioscaí sin; agus faighimse fianaise atá imleor agus iomchuí chun bunús a sholáthar do mo thuairim. Tá riosca níos mó ann nach mbraithfear míráiteas ábhartha ag eascairt as calaois ná ceann ag eascairt as earráid, toisc go bhféadfaidh claonpháirtíocht, brionnú, easnaimh inteannacha, mífhaisnéisí nó sárú ar rialú inmheánach a bheith ann le calaois.
- Faighimse tuiscint ar rialú inmheánach atá ábhartha don iniúchadh d'fhonn nósanna imeachta iniúchta a dhearadh atá iomchuí do na cúinsí, ach ní chun críche tuairim a nochtadh maidir le héifeachtacht na rialuithe inmheánacha.
- Déanaimse meastóireacht ar oiriúnacht na bpolasaithe cuntasaíochta a úsáidtear agus ar réasúntacht na meastachán cuntasaíochta agus na nochtuithe gaolmhara.
- Déanaimse amach cé acu an bhfuil sé oiriúnach bonn gnóthais leantach na cuntasaíochta a úsáid agus, bunaithe ar an bhfianaise iniúchta a fhaightear, cé acu an bhfuil éiginnteacht ábhartha ann i dtaca le heachtaí nó coinníollacha a d'fhéadfadh amhras suntasach a chur ar chumas na hInstitiúide leanúint ar aghaidh mar ghnóthas leantach. Má mheasaim go bhfuil éiginnteacht ábhartha ann, tá orm aird a tharraingt i mo thuairisc ar na nochtuithe gaolmhara sna ráitis airgeadais nó, más rud é nach leor na nochtuithe sin, mo thuairim a leasú. Tá mo thuairimí bunaithe ar an bhfianaise iniúchta a fuarthas suas chomh fada le dáta mo thuairisce. D'fhéadfadh ócáidí nó coinníollacha sa todhchaí cur ar an Institiúid stopadh mar ghnóthas leantach, áfach.
- Déanaimse meastóireacht ar chur i láthair, struchtúr agus ábhar na ráiteas airgeadais ar an iomlán, lena n-áirítear na nochtuithe, agus cé acu an léiríonn na ráitis airgeadais na bun-idirbhearta agus na bun-eachtraí ar bhealach a bhaineann cur i láthair amach atá cóir.

Cuirimse in iúl dóibh siúd atá freagrach as rialachas, i measc nithe eile, an scóip agus an t-amú atá beartaithe don iniúchadh agus torthaí suntasacha an iniúchta, lena n-áirítear easnaimh shuntasacha ar bith sa rialú inmheánach a aithním le linn m'iniúchta.

Faisnéis seachas na ráitis airgeadais

Ní chlúdaíonn mo thuairim faoi na ráitis airgeadais an fhaisnéis eile a chuirtear i láthair leis na ráitis sin, agus ní léirím aon chineál de thuairim dearbhaithe ina leith sin.

I dtaca le m'iniúchadh ar na ráitis airgeadais, tá orm faoi na ISAnna an fhaisnéis eile a chuirtear i láthair a léamh agus, é sin á dhéanamh agam. a mheas cé acu an bhfuil an fhaisnéis eile neamhréireach go hábhartha leis na ráitis airgeadais nó le heolas a fuarthas le linn an iniúchta, nó más cosúil ar bhealach eile go bhfuil sé míráite go hábhartha. Más rud é, bunaithe ar an obair atá déanta agam, go ndéanaimse amach go bhfuil míráiteas ábhartha ar an fhaisnéis eile seo, tá orm an fhíric seo a thuairisciú.

Tuairisciú ar ábhair eile

Déantar m'iniúchadh le tagairt do na tosca speisialta a bhaineann le comhlachtaí Stáit i dtaca lena mbainistiú agus oibriú. Tuairiscím má tá aon nithe ábhartha a bhaineann leis an gcaoi ina bhfuil gnó poiblí déanta.

Féachaim le fianaise a fháil maidir le rialtacht na n-idirbheart airgeadais le linn iniúchta. Tuairiscím má tá aon chás ábhartha ann nár feidhmíodh airgead poiblí chun na gcríoch a bhí beartaithe nó sa chás nár lean na hidirbhearta do na húdaráis a rialaíonn iad.

Tuairiscím eisceachtaí más rud é, i mo thuairimse,

- nach bhfuair mé an fhaisnéis agus na mínithe ar fad a theastaigh uaim do m'iniúchadh, nó
- nár leor na taifid chuntasaíochta chun na ráitis airgeadais a iniúchadh go réidh agus mar ba cheart, nó
- nach bhfuil na the ráitis airgeadais ag teacht leis na taifid chuntasaíochta.

Ráiteas Ioncaim agus Caiteachais agus Cúlchistí Ioncaim Coinnithe

	Notaí	2020 €	2019 €
Ioncam	2		
Deontas Oireachtais	3	7,210,250	6,882,200
Glan-mhaoiniú iarchurtha do shochair scoir	10.d	1,043,730	1,203,040
Díolacháin Foilseachán		43,934	37,166
Ioncam Tionscadail	4	3,316,581	3,660,690
Eile	5	172,048	14,940
		11,786,543	**11,798,036**
Aistriú ó Cúlchiste Caipitil	14	223,395	(455,490)
Méid a Scaoileadh ar Dhiúscairt		324,363	-
		12,334,301	**11,342,546**
Caiteachas	2		
Scoil an Léinn Cheiltigh		1,778,585	1,821,653
Scoil na Fisice Teoiriciúla		1,690,290	1,874,735
Scoil na Fisice Cosmaí		5,752,966	5,120,898
Riaracháin		3,462,939	2,695,740
		12,684,780	**11,513,026**
Barrachas don bhliain		**(350,479)**	**(170,480)**
Iarmhéid amhail an 1 Eanáir		891,415	1,061,895
Iarmhéid amhail an 31 Nollaig		**540,936**	**891,415**

Ráiteas ar Ioncam Cuimsitheach		2020 €	2019 €
Barrachas don bhliain		(350,479)	(170,480)
Gnóthachain/(caillteanais) ó thaithí ar oibleagáidí sochair scoir		(906,000)	(2,048,000)
Athruithe i bhfoshuíomhanna atá mar bhonn le luach reatha na n-oibleagáidí sochair scoir		(4,969,000)	(7,216,000)
(Caillteanas)/Gnóthachan Achtúireach ar Oibleagáidí Sochair Scoir	10.c	**(5,875,000)**	**(9,264,000)**
Leasú ar Mhaoiniú Sochair Scoir Iarchurtha		**5,875,000**	**9,264,000**
Iomlán aitheanta don bhliain		**(350,479)**	**(170,480)**

Is cuid de na ráitis airgeadais seo iad an Ráiteas ar Shreabhadh Airgid agus nótaí 1 go 17.

Ruairí Ó hUiginn
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Denjoe O' Connor
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Ráiteas Faoi Staid Airgeadais

	Notaí	2020 €	2019 €
Sócmhainní			
Sócmhainní Seasta: Maoin, Fearas agus Treallamh	13	2,633,912	3,181,670
Sócmhainní Reatha:			
Airgead sa Lámh agus ag an mBanc		3,496,626	3,744,547
Infháltais	16	304,880	143,723
Infháltais Tionscadail	4.a	1,738,164	1,296,540
Sócmhainní Iomlána		**8,173,582**	**8,366,480**
Lúide Dliteanais			
Nithe Iníoctha - Suimeanna le híoc laistigh de bhliain amháin			
Nithe Iníoctha	15	2,594,518	1,754,181
Nithe Tionscadail Iníoctha	4.a	2,376,422	2,511,431
Creidiúnaithe - méideanna atá dlite tar éis bliana amháin	15	27,794	27,783
Dliteanais Iomlána Roimh Phinsin		**4,998,734**	**4,293,395**
Sócmhainní lúide dliteanais Roimh Phinsin		**3,174,848**	**4,073,085**
Maoiniú an Phinsin Iarchurtha	10.d	77,496,117	70,580,000
Dliteanais Phinsin	10.c	(77,496,117)	(70,580,000)
		0	**0**
Sócmhainní Glana		**3,174,848**	**4,073,085**
Maoinithe ag:			
Cuntas Ioncaim agus Caiteachais		540,936	891,415
Cúlchiste Caipitil	14	2,633,912	3,181,670
		3,174,848	**4,073,085**

Is cuid de na ráitis airgeadais seo é an Ráiteas Beartais Cuntasaíochta agus na nótaí ó 1 go dtí 17.

Ruairí Ó hUiginn
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Denjoe O' Connor
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Ráiteas Sreabhadh Airgid

	Nótaí	2020 €	2019 €
Réiteach barrachais oibríochta chuig glan-insreabhadh airgid ó ghníomhaíochtaí oibríochta			
Barrachas don bhliain		**(350,479)**	**(170,480)**
Méadú/(Laghdú) ar Nithe Iníoctha		840,348	298,378
(Méadú) ar Infháltais		(161,157)	236,445
Glan ardú i gCláir Thaighde agus Táillí		(576,633)	(180,251)
Dímheas	13	456,851	530,003
Aistriú Cúlchiste Caipitil	14	(547,758)	455,490
Méid a Scaoileadh ar Dhiúscairt		324,363	-
Glan insreabhadh Airgid tirim ó ghníomhaíochtaí oibríochta		**(14,465)**	**1,169,585**
Ráiteas Sreabhadh Airgid			
Glan insreabhadh airgid tirim ó ghníomhaíochtaí oibríochta		(14,465)	1,169,585
Aischuir ar infheistíochtaí agus seirbhísiú airgeadais			
Ús Bainc Infhaighte	5	-	-
Caiteachas Caipitiúil			
Ceannach Sócmhainní Inláimhsithe	13	(233,456)	(985,493)
Ardú ar Airgead		**(247,921)**	**184,092**
Réiteach glaninsreabhadh airgead tirim chuig gluaiseacht i nglanchistí			
Ardú ar Airgead Tirim		(247,921)	184,092
Iarmhéid faoin 1 Eanáir		3,744,547	3,560,455
Iarmhéid faoin 31 Nollaig		**3,496,626**	**3,744,547**

Anailís ar athrú i nglanchistí	Airgead infhaighte sa Bhanc €	Airgead infhaighte sa Bhanc €
I dtús na bliana	3,744,547	3,560,455
Sreabhadh Airgid	(247,921)	184,092
Ag deireadh na bliana	**3,496,626**	**3,744,547**

Is cuid de na ráitis airgeadais seo é an Ráiteas Beartais Cuntasaíochta agus na nótaí ó 1 go dtí 17.

Ruairí Ó hUiginn
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Denjoe O' Connor
Comhalta Den Chomhairle

Dáta 7 Iúil 2021

Nótaí do na Ráitis Airgeadais

1. Polasaithe Chuntasaíochta

Bunaíodh an Institiúid faoin Acht um Institiúid Ard-Leighinn, 1940.

Áirítear ar a cuid feidhmeanna saoráidí a sholáthar le hard-léinn a chur chun cinn tuilleadh agus le taighde a dhéanamhi mbrainsí speisialtachta eolais.

Tá trí Scoil inti - Scoil an Léinn Cheiltigh, Scoil na Fisice Teoiriciúla agus Scoil na Fisice Cosmaí.

a) Gnóthas Leantach

Ullmhaíodh na ráitis airgeadais ar bhonn gnóthais leantaigh. Bhreithnigh an Chomhairle tionchar Covid-19 ar oibríochtaí na hInstitiúide ag a cruinnithe a tionóladh i Meitheamh agus Nollaig 2020.

Tá measúnú ar thionchar airgeadais tuartha Covid-19 ar an Institiúid curtha i gcrích go dtí deireadh mhí na Nollag 2021 agus tá an Chomhairle sásta go bhfuil dóthain acmhainní ag an Institiúid chun leanúint ar aghaidh ag feidhmiú ar feadh 12 mhí ar a laghad ó shíniú na ráiteas airgeadais.

b) Bunús Cuntasaíochta

Seo é an chéad chnuasach de ráitis airgeadais ullmhaithe ag Institiúid Ard-Léinn Bhaile Átha Cliath i gcomhréir le caighdeáin chuntasaíochta eisithe ag an gComhairle Tuairiscithe Airgeadais, lena n-áirítear FRS 102 "An Caighdeán Tuairiscithe Airgeadais is infheidhme sa Ríocht Aointaithe agus I bPoblacht na hÉireann" ("FRS 102").

Chun ráitis airgeadais a ullmhú i gcomhréir le FRS 102 ní mór meastacháin criticiúla cuntasaíochta áirithe a úsáid. Éilítear leis freisin go ndéanfaidh an bhainistíocht breithiúnas agus beartais chuntasaíochta na hInstitiúide á gcur i bhfeidhm. (Féach Nóta 17).

Ullmhaíodh na ráitis airgeadais ar bhonn fabhraithe faoin gcoinbhinsiún costais stairiúil agus comhlíonann siad caighdeáin tuairiscithe airgeadais na Comhairle Tuairiscithe Airgeadais.

Cuireadh na beartais chuntasaíochta seo a leanas i bhfeidhm:

c) Deontais Oireachtais

Taispeántar ioncam ar bhunús airgid isteach.

d) Sócmhainní Seasta

Is éard is Sócmhainní Seasta ann ná troscán, trealamh, ríomhairí agus mótarfheithiclí na hInstitiúide agus taispeántar iad ag costas lúide dímheas carntha. Is mar seo a leanas atá na rátaí dímheasa, ríofa ar bhunús dronlíneach:-

Troscán agus Trealamh	10%
Ríomhairí	25%
Mótarfheithiclí	25%

Faightear áitribh atá i seilbh na hInstitiúide ar léas ó Oifig na nOibreacha Poiblí.

Ag gach tuairiscithe déanann an Institiúid measúnú cé acu an bhfuil aon chomhartha de bhearnúchán ann. Má tá a leithéid de chomhartha ann, déantar méid in-aisghabhála na sócmhainne a ríomh, is é sin an ceann is airde idir an luach cóir lúide costais le díol agus a luach in úsáid. Aithnítear caillteanas bearnúcháin ma sháraíonn an tsuim ghlanluacha an tsuim in-aisghabhála.

Cinntear gnóthachain agus caillteanais ar dhiúscairtí trí chomparáid a dhéanamh idir na fáltais agus an tsuim in-aisghabhála agus aithnítear iad laistigh den Chuntas Ioncaim agus Caiteachais.

Sócmhainní Oidhreachta

Tá sócmhainní oidhreachta áirithe ag an Institiúid, mar shampla leabharlanna ina bhfuil lámhscríbhinní, bailiúcháin leabhar agus paimfléad, chomh maith le hionstraimí eolaíochta seanda, agus déanann an Institiúid cothabháil orthu uile. Tá bailiúchán leabhar agus trealamh áirithe i liosta na sócmhainní, chomh maith le fearas réalteolaíocha seanda agus cloig seanda a bhfuil miondealú déanta orthu sa liosta de na hábhair faoi árachas.

Nótaí do na Ráitis Airgeadais (ar lean)

1. Polasaithe Chuntasaíochta (ar lean)

Caomhnaíonn an Institiúid na sócmhainní seo le haghaidh taighde chomh maith le idirghníomhaíocht éagsúil idir an Institiúid agus an pobal.

De réir chaighdeán cuntasaíochta FRS102, ní dhéantar sócmhainní oidhreachta a fuarthas roimh an 1 Eanáir 2007 a chaipitliú sna ráitis airgeadais ós rud é nach bhfuil meastacháin iontaofa costais nó luacha ar fáil ar chostas réasúnta ina leith.

Ní bhfuarthas aon sócmhainní oidhreachta tar éis an 1 Eanáir 2007, laistigh de na tairseacha de réir mar a shonraítear iad sa pholasaí seo. Déanfaidh an Institiúid caipitliú ar aon sócmhainní a fhaightear tar éis an dáta seo ar a gcostas (i gcás éadálacha a rinne an Institiúid), é sin nó ar a luach cóir (sa chás gur síntiús atá ann).

Déanfar sócmhainní oidhreachta bronnta a chaipitliú agus tagairt tugtha do dhíolacháin ar déanadh iad le déanaí ar rudaí dá macasamhail.

Ní dhéantar sócmhainní oidhreachta a bhfuil luach níos lú ná €10,000 orthu a chaipitliú sna ráitis airgeadais.

De réir mar a cheadaíonn cistí, agus más rud é go meastar gur gá, déantar caomhnú ar mhíreanna oidhreachta agus tuairiscítear an caiteachas a thabhaítear ina leith sna cuntais ioncaim agus caiteachais.

Ní dhiúscraíonn an Institiúid aon mhíreanna oidhreachta, bíodh siad faighte, bronnta nó fágtha le huacht.

e) Cúlchiste Caipitil

Léiríonn cúltaca caipitiúil luach neamh-amúchta ioncaim a úsáidtear le Sócmhainní Seasta a cheannach.

f) Leabharlann

Díscríobhtar caiteachas ar leabhair leabharlainne agus ábhair sa bhliain a dtabhaítear é.

g) Foilseacháin

Díscríobhtar caiteachas ar fhoilseacháin sa bhliain a dtabhaítear é.

h) Aoisliúntas

Oibríonn Institiúid Ard-Léinn Bhaile Átha Cliath scéim scoir sochair shainithe, atá cistithe go bliantúil ar bhonn 'íoc de réir a chéile' ó airgead atá ar fáil don Bhord, lena n-áirítear airgead arna sholáthar ag an Roinn Oideachais agus Scileanna agus ó ranníocaíochtaí bainte as tuarastail na mball foirne.

Tá téarmaí pinsin ag na baill foirne ar ceapadh iad roimh an 1 Eanáir 2013 faoin Scéim Aoisliúntais DIAS ábhartha mar atá leagtha amach i:

(a) Scéim Institiúid Ard-Léinn Bhaile Átha Cliath (Aoisliúntas) 1947, arna leasú

(b) Scéim Ranníocach Institiúid Ard-Léinn Bhaile Átha Cliath do Chéilí agus Leanaí, 1991

(c) Scéim d'Fhostaithe Neamhbhunaithe Institiúid Ard-Léinn Bhaile Átha Cliath (Aoisliúntas), 1983

(d) Scéim Aoisliúntais (Comhdhlúthú) d'Fhoireann Institiúid Ard-Léinn Bhaile Átha Cliath, 2008 agus Scéim Aoisliúntais Ranníocach d'Fhoireann Institiúid Ard-Léinn Bhaile Átha Cliath dá gCéilí agus Leanaí (Comhtháthú), 2008

Chomh maithe leis sin, déanann Institiúid Ard-Léinn Bhaile Átha Cliath an Scéim Pinsin Seirbhíse Poiblí Aonair (An Scéim Aonair) a fheidhmiú, gur scéim scoir sochair sainithe í do sheirbhísigh phoiblí ar ceapadh iad ar an 1 Eanáir 2013 nó i ndiaidh an dáta sin. Is leis an Roinn Caiteachais Phoiblí agus Athchóirithe a íochtar ranníocaíochtaí de chuid bhaill na Scéime Aonair.

De réir mar a éilítear faoi chiorclán 28/2016, íocann Institiúid Ard-Léinn Bhaile Átha Cliath ranníocaíochtaí fostóra na Scéime Aonair, de réir ráta gurb ionann é agus trí oiread ranníocaíocht an fhostaí, leis an Roinn Caiteachais Phoiblí agus Athchóirithe.

Sna costais sochair scoir, léirítear na sochair scoir a thuill an fostaí sa tréimhse ábhartha agus léirítear iad glan ó ranníocaíochtaí sochair scoir foirne a choinníonn Institiúid Ard-Léinn Bhaile Átha Cliath iad. Aithnítear suim atá cothrom leis an táille um shochar scoir mar ioncam sa mhéid is go bhfuil sé in-aisghabhála, agus seach-churtha ag deontais a fuarthas sa bhliain d'fhonn aistarraingt sochar scoir a scaoileadh.

1. Polasaithe Chuntasaíochta (ar lean)

h) Aoisliúntas (ar lean)

Is sa Ráiteas faoi Ioncam Cuimsitheach a léirítear gnóthachain nó caillteanais achtúireacha ar dhliteanais scéime. Aithnítear coigeartú comhfhreagrach sa tsuim is in-aisghabhála ón Roinn Oideachais agus Scileanna.

Is ionann dliteanais sochair scoir agus luach reatha íocaíochtaí sochair phinsin amach anseo a thuill an ball foirne go dtí seo. Is ionann cistiú iarchurtha sochar scoir agus an tsócmhainn chomhfhreagrach a bheidh le haisghabháil i dtréimhsí amach anseo ón Roinn Oideachais agus Scileanna.

i) Tionscadail

Faigheann Institiúid Ard-Léinn Bhaile Átha Cliath maoiniú seachtrach ón tionscal, ó chomhlachtaí rialtais agus ón gCoimisiún Eorpach. Coinnítear cairt na gcuntas in aghaidh gach uile thionscadal.

Tuairiscítear fáltais ó thionscadail mar ioncam tionscadail, ag leibhéal atá cothrom leis an gcaiteachas bliantúil a thabhaítear ar chostais dhíreacha agus ar fhorchostais ar tuilleadh iad sa tionscadal gaolmhar. Ag deireadh shaolré an tionscadail, tuairiscítear aon bharrachas nó easnamh atá fágtha ar an tionscadal sna ráitis airgeadais.

Faigheann Institiúid Ard-Léinn Bhaile Átha Cliath for-ioncam ar roinnt tionscadal a mhaoinítear go seachtrach iad. Cuirtear for-ioncam ó thionscadail chun sochair cuntais ioncaim agus caiteachais na tréimhse ina dtuilltear é. Ag brath ar an leibhéal den fhorchaiteachais a bhí i gceist leis an tionscadal laistigh den tréimhse, d'fhéadfadh barrachas nó easnamh ar an fhorioncam a bheith tuairiscithe sna ráitis airgeadais.

Tuairiscítear an forioncam de réir na socruithe atá déanta maidir leis an maoiniú.

j) Infháltais

Tomhaistear infháltais ghearrthéarma ag praghas an idirbhirt, lúide bearnú ar bith.

k) Airgead Tirim agus Coibhéisí Airgid

Léirítear airgead tirim le hairgead ar láimh agus taiscí le hinstitiúidí airgeadais iníoctha gan pionós ar fhógra nach mó ná 24 uair a' chloig. Is éard is coibhéisí airgid ann infheistíochtaí an-leachtacha a thagann in aibíocht tráth nach mó ná trí mhí ó dháta an tsealbhaithe agus atá inaistrithe go héasca chuig suimeanna aitheanta airgid le riosca neamhsuntasach d'athrú sa luach.

l) Ionstraimí Airgeadais

Ní théann an Institiúid isteach ach in idirbhearta um bhunionstraimí airgeadais a mbíonn aitheantas ar shócmhainní agus dliteanais airgeadais mar thoradh orthu amhail cuntais trádála agus cuntais infhála agus iníoctha eile. Taifeadtar bunionstraimí airgeadais ar phraghas an idirbhirt.

m) Pá Saoire

Aithnítear dliteanas go feadh mhéid teidlíochta pá saoire nár úsáideadh atá fabhraithe ar dháta an chláir chomhardaithe agus tógtha ar aghaidh chuig tréimhsí sa todhchaí. Tomhaistear é seo ag costas tuarastail neamhlascainithe na teidlíochta saoire sa todhchaí agus fabhraítear é ar dháta an chláir chomhardaithe.

n) Léasanna oibriúcháin

Gearrtar cíosanna atá iníoctha faoi léasanna oibriúcháin ar an gCuntas Ioncaim agus Caiteachais de réir mar a thabhaítear iad thar téarma an léasa.

o) Airgeadra Feidhmiúil

Is é an euro airgeadra feidhmiúil agus láithritheach na hInstitiúide.

p) Deontais Neamh-Thionscadail.

Taifeadtar deontais ó thríú páirtithe sna ráiteas airgeadais ag baint úsáide as an Modh Fabhruithe agus leithdháiltear ar ioncam iad sa chaoi is go meaitseáiltear iad leis an gcaiteachas ábhartha lena mbaineann siad.

Nótaí do na Ráitis Airgeadais (ar lean)

1. Polasaithe Chuntasaíochta (ar lean)

q) Breithiúnais nuair a a chuirtear Polasaithe Cuntasaíochta agus Príomhfhoinsí Meastacháin i bhFeidhm

Chun na ráitis airgeadais seo a ullmhú ní mór don bhainistíocht breithiúnais, meastacháin agus toimhdí a dhéanamh a théann i gcionn ar chur i bhfeidhm na bpolasaithe agus na suimeanna tuairiscithe de shócmhainní agus dliteanais, ioncam agus speansais. Déantar measúnú leanúnach ar bhreithiúnais agus ar mheastacháin agus tá siad bunaithe ar thaithí stairiúil agus ar thosca eile, lena n-áirítear ionchais d'eachtraí sa todhchaí a chreidtear a bheith réasúnta faoi na cúinsí.

Déanann an Institiúid meastacháin agus toimhdí i dtaca leis an todhchaí. Dá bhrí sin, is annamh a bheidh na meastacháin cuntasaíochta a tharlaíonn dá bharr ionann go hiomlán le torthaí ábhartha iarbhír. Maidir leis na meastacháin agus toimhdí a bhfuil riosca suntasach ina leith go mbeidh siad ina gcúis le leasú ábhartha a dhéanamh ar mhéid na sócmhainní agus na ndliteanas laistigh den bhliain airgeadais atá ag teacht, pléitear anseo thíos iad.

Saolta Úsáideacha de Shócmhainní Socair Inbhraite

Is cuid shuntasach d'iomlán na sócmhainní iad sócmhainní fadsaoil - Troscán agus Trealamh, Ríomhairí agus Mótarfheithiclí den chuid is mó. Braitheann an muirear dímheasa bliantúil go príomha ar an bhfad saoil measta atá ag gach cinéal sócmhainne agus, i gcúinsí áirithe, meastacháin ar luachanna iarmharacha. Déanann an Chomhairle athbhreithniú go rialta ar na saolta úsáideacha seo agus athraíonm siad iad más gá chun coinníollacha reatha a léiriú. Agus na saolta úsáideacha seo á gcinneadh déanann an bhainistíocht machnamh ar athrú teicneolaíoch, pátrúin tomhaltais, riocht fhisiciúil agus úsáid mheasta na sócmhainní. Féadfaigh athruithe sna saolta úsáideacha dul i bhfeidhm go suntasach ar an muirear díluachála don bhliain airgeadais.

Foshuíomhanna Achtúireacha i dTaca le Scéimeanna Sochair Scoir le Sochar Sainithe

Déantar cur i bhfeidhm na bhfoshuíomhanna achtúireacha i dtaca le scéimeanna sochair scoir le sochar sainithe a chorpú sna ráitis airgeadais I gcomhéir le FRS 102. Agus FRS 102 á chur i bhfeidhm, glactar le comhairle ó achtúirí cáilithe neamhspleácha. Sa chomhthéacs seo, déantar breithiúnas suntasach i líon réimsí, lena n-áirítear athruithe sa todhchaí ar thuarastail agus boilsciú, rátaí báis agus rátaí lascaine a roghnú. Déantar sócmhainn le sochar sainithe a thaifeadadh atá ag teacht leis an dliteanas ar an bunús go bhfuil an dliteanas maoinithe ag an stát.

Soláthairtí

Déanann an Institiúid soláthairtí d'oibleagáidí dleathacha agus cruthaitheacha, arb eol di a bheith fós le híoc ag deireadh na tréimhse. I gcoitinne, déantar na soláthairtí seo bunaithe ar fhaisnéis stairiúil nó ar fhaisnéis ábhartha eile, leasaithe do threochtaí le déanaí más cuí. Mar sin féin, is meastacháin iad ar chostais airgeadais eachtaí nach dtarlóidh le roinnt blianta, b'fhéidir. Mar thoradh air seo agus ar leibhéal na héiginnteachta a bhaineann leis na torthaí deiridh, féadfaidh difríocht shuntasach a bheith idir an toradh agus an meastachán.

2. Anailís Shonraithe d'Ioncam & Caiteachas don bhliain dár críoch 31/12/2020

IONCAM	Nótaí	Léann Cheilteach €	Fisic Theoiriciúi € l	Fisic Chosmach €	Riarachán €	2020 Iomlán €	2019 Iomlán €
Deontais Oireachtais	3	1,731,542	935,544	2,636,975	1,906,189	7,210,250	6,882,200
*Glanmhaoiniú iarchurtha do Shocahir Pinsin	10.d	316,762	69,526	535,811	121,631	1,043,730	1,203,040
Díolacháin Foilseachán		43,934	-	-	-	43,934	37,166
Ioncam Tionscadail	4.a	-	162,539	3,006,495	147,547	3,316,581	3,660,690
Ioncam Eile	4	390	-	117,358	54,300	172,048	14,940
		2,092,628	**1,167,609**	**6,296,639**	**2,229,667**	**11,786,543**	**11,798,036**
Aistriú (chuig) ó Chúlchiste Caipitil	14	-	-	-	223,395	223,395	(455,490)
Méid a Scaoileadh ar Dhiúscairt	14	-	-	-	324,363	324,363	-
		2,092,628	**1,167,609**	**6,296,639**	**2,777,425**	**12,334,301**	**11,342,546**
CAITEACHAS							
Costais Phárolla	6	1,211,542	757,447	1,582,250	1,180,082	4,731,321	4,208,278
*Costais Sochair Scoir	10.b	472,821	686,390	994,092	428,808	2,582,111	2,706,184
Costais Tionscnamh	4.a	-	157,516	2,889,581	-	3,047,097	2,569,703
Stóráil Leabharlainne agus Leabhar		30,392	62,597	10,355	-	103,344	118,538
Dímheas	13	-	-	-	456,851	456,851	530,003
Cíos, Rátaí agus Árachas		-	-	-	202,681	202,681	201,433
Costais Ghinearálta	8	9,687	289	50,474	332,179	392,629	487,517
Costais Taistil agus Seimineáir		3,734	5,908	35,357	9,365	54,364	117,824
Costais Ama na Loinge Suirbhé		-	-	115,000	-	115,000	-
Cothabháil Áitribh agus Slándáil		-	-	795	262,517	263,312	205,049
Costais ríomhairí agus Idirlín		5,218	14,811	38,686	84,727	143,442	141,986
Breosla Solas agus Cumhacht		-	-	-	130,106	130,106	126,303
Post agus Teileafón		-	-	(1)	17,012	17,011	19,763
Páipéarachas		6,515	2,738	10,594	4,597	24,444	40,026
Foilseacháin		31,802	-	2,387	2,065	36,254	17,655
Fógraíocht		621	-	1,986	18,082	20,689	12,693
Mion Trealamh Oifige		6,253	2,594	21,410	9,504	39,761	10,071
Diúscairt Sócmhainne		-	-		324,363	324,363	-
		1,778,585	**1,690,290**	**5,752,966**	**3,462,939**	**12,684,780**	**11,513,026**
EASNAMH/BARRACHAS DON BHLIAIN		**314,043**	**(522,681)**	**543,673**	**(685,514)**	**(350,479)**	**(170,480)**
Iarmhéid amhail an 1 Eanáir		**1,174,261**	**(1,734,007)**	**7,063,336**	**(5,612,175)**	**891,415**	**1,061,895**
Iarmhéid amhail an 31 Nollaig		**1,488,304**	**(2,256,688)**	**7,607,009**	**(6,297,689)**	**540,936**	**891,415**

Nóta (a) * Déantar an Maoiniú Iarchurtha Glan do Shochair Scoir a leithdháileadh ar bhonn pro rata chuig an tsuim a íocadh le pinsinéirí sa bhliain.
* Maoiniú Iarchurtha Glan do Chostais Sochair Scoir a leithdháileadh ar bhonn pro rata chuig na ranníocaíochtaí ón bhfoireann sa bhliain.
Nóta (b) Cionroinneadh costais a bhaineann go díreach le taighde (m.sh. pá, leabharlann, costais ríomhaire, taisteal) ar an scoileanna. Gearradh forchostais ar nós cíos, árachas, fóntais agus cothabháil maoine ar Riarachán.
Nóta (c) Deontais Fuarthas suim €7,210,000 (2019: €6,882,000) ón Roinn Oideachais agus Scileanna. Tugann an Roinn Oideachais agus Scileanna an deontas i gcomhair dliteanas faoi chostais pá agus neamhphá ghinearálta agus tarraingíonn an Institiúid aníos í ar bhonn bliantúil.
Nóta (d) In 2020, tabhaíodh costais loinge €476,000 tar éis trealamh seismeach a aisghabháil ó ghrinneall na farraige. Postáladh costas €361,000 mar chostais tionscadail agus postáladh €115,000 a bhí clúdaithe ag Árachas ar mhír líne ar leithligh.

Nótaí do na Ráitis Airgeadais (ar lean)

3. Deontais Oireachtas

	2020 €	2019 €
An Roinn Breisoideachais agus Ardoideachais, Taighde, Nuálaíochta agus Eolaíochta		
Deontas chun Críocha Athfhillteacha	7,091,000	6,882,200
Deontas Forlíontach Covid-19	461,250	-
	7,552,250	**6,882,200**
Lúide Deontas Forlíontach Covid-19 iarchurtha go 2021	(342,000)	-
	7,210,250	**6,882,200**

4. (a) Tionscadail

	2020 €	2019 €
Iarmhéideanna Tosaigh	1,214,891	1,395,142
Admhálacha	2,739,948	3,480,439
	3,954,839	**4,875,581**
Iarmhéideanna Deiridh (Féichiúnaithe €1,738,164 Creidiúnaithe €2,376,422)	(638,258)	(1,214,891)
Curtha i bhfeidhm mar ioncam	**3,316,581**	**3,660,690**
Leithroinnt Ioncaim		
	147,547	104,957
Scoil an Léinn Cheiltigh	-	-
Scoil na Fisice Teoiriciúla	162,539	205,772
Scoil na Fisice Cosmaí	3,006,495	3,349,961
	3,316,581	**3,660,690**
Ioncam Iomlán Thionscadal*	**3,316,581**	**3,660,690**

Nóta
* Tá an figiúr seo déanta suas don Ioncam tionscadail don Riarachán Lárnach €147,546, den ioncam tionscadail do Scoileanna €3,023,304 agus den chaiteachas caipitil ar thionscadail de €145,727.

Costais Tionscadal	Léann Cheilteach €	Fisic Theoiriciúil €	Fisic Chosmach €	2020 Total €	2019 Iomlán €
* Tuarastail/Scoláireachtaí	-	141,286	1,867,392	2,008,678	1,921,360
Taisteal					
-Intíre	-	-	46,851	46,851	44,525
-Idirnáisiúnta	-	2,659	50,798	53,457	228,548
Costais Ama na Loinge Suirbhé	-	-	361,000	361,000	50,000
Eile	-	13,571	563,540	577,111	325,270
Costas Iomlán Tionscadal	**-**	**157,516**	**2,889,581**	**3,047,097**	**2,569,703**

*** Nóta (a)** Líon na mBall Foirne Taighde agus Scoláirí Maoinithe go Seachtrach (WTE) 47 2019: 47).

4. (b) Sonraí Tionscadail

	Údarás Cistiúcháin	Iarmhéid Tosaigh €	Admhálacha €	Caiteachas Aisfhillteach €	Curtha I bhfeidhm mar Ioncam €	Curtha I bhfeidhm mar Ioncam (Caipteal san áireamh) €	Iarmhéid Deiridh €	Caipiteal €
Scoil an Leinn Cheiltigh								
Celtic Studies Summer School		-	500	-	-	-	500	-
Iomlán-Leánn Ceilteach		**-**	**500**	**-**	**-**	**-**	**500**	**-**
Scoil na Fisice Teoiriciúla								
G Kells	SFI	88,980	110,506	119,839	7,660	125,118	66,708	-
I Jubb IRC Fellowship	IRC	14,460	22,961	37,677	-	37,421	-	-
Iomlán-FisicTheoiriciúil		**103,440**	**133,467**	**157,516**	**7,660**	**162,539**	**66,708**	**-**
Scoil na Fisice Cosmaí								
NGST Project	ESA	(176,283)	178,246	104,205	-	104,205	(102,242)	-
Lindsay Scholar	Armagh Observatory	-	5,000	-	-	-	5,000	
J Mackey Royal Society Fellowship	Royal Society	24,398	99,389	106,325	5,886	96,133	21,768	-
MKID Camera IP T Ray	SFI	55,210	451,465	147,957	9,058	121,091	376,526	-
Radionet EC Project	EC	(16,723)	-	-	-	-	(16,723)	
T Ray ERC Easy	EC	400,611	556,977	413,043	22,771	432,645	502,172	19,360
Royal Society Enhancement Award	Royal Society	12,468	34,450	25,819	1,815	29,643	15,460	-
HIRES IRC -Laureate Award	IRC	175,810	132,744	75,334	4,307	81,837	222,410	-
SIRG-PIGS-Lopez	SFI	41,019	(33,626)	6,805	628	6,765	-	-
Massive Stars Conference 2020	Various	5,792	(4,300)	5,241	-	1,492	-	-
David Mckenna IRC Scholarship	IRC	1,413	24,000	22,194	-	22,194	3,219	-
Luis Alberto Canizares IRC Scholarship	IRC	2,169	24,000	22,750	-	22,750	3,419	-
C Jackman sfi SSDA	SFI	179,149	-	129,867	4,912	107,705	66,532	16,000
ARIEL- Prodex	ESA	(2,731)	-	31,406		31,406	(34,137)	-
Royal Society Engagement	Royal Society	-	11,599	7,160	-	7,160	4,439	-
John Malone Leigh IRC Scholar	IRC	-	24,000	17,750	-	17,750	6,250	-
Stellar EC CSA	EC	-	153,673	-	-	-	153,673	-
Regional Museum Exhibition Scheme 2020	Dept of Culture/ Heritage & Gaelt.	-	10,000	10,000	-	10,000	-	-
Iomlán-Réaltfhisic		**702,302**	**1,667,617**	**1,125,856**	**49,377**	**1,092,776**	**1,227,766**	**35,360**

4. (b) Sonraí Tionscadail (ar lean)

	Udarás Cistiúcháin	Iarmhéid Tosaigh €	Admhálacha €	Caiteachas Aisfhillteach €	Curtha I bhfeidhm mar Ioncam €	Curtha I bhfeidhm mar Ioncam (Caipteal san áireamh) €	Iarmhéid Deiridh €	Caipiteal €
ICRAG	SFI	(995,179)	173,357	529,861	32,668	664,793	(1,519,283)	103,808
ICRAG GeoHazard 4389	SFI	(3,246)	-	37,508	756	37,356	(41,358)	-
ERC Development iTHERC	SFI	(51,213)	51,213	-	-	-	-	-
ESA 3D Earth	ESA	(51,165)	30,000	3,256	-	3,256	(24,421)	-
SEA-SEIS	SFI	446,474	285,011	634,701	38,729	626,562	66,194	-
GSI Seimic Network Support	GSI	254,458	125,000	123,139	-	123,139	256,319	-
Eurovolc -Research and Innovation	EC	42,394	27,583	48,317	2,534	48,143	19,300	-
Geothermica EC Call-URBAN	GSI	36,237	-	3,567	89	3,835	32,313	-
Geothermica EC Call-COSEISMIQ	GSI	77,309	-	55,717	1,384	59,495	16,430	-
Geo External MT	Various	-	35,000	14,568	-	21,127	13,873	6,559
EC-PACIFIC	EC	257,577	67,513	234,268	12,871	244,543	67,676	-
Ka Lok Li Fellowship	IRC	7,700	22,961	30,739	-	30,661	-	-
SEAI -DIG	SEAI	387,803	-	26,270	1,479	28,995	357,329	-
PIPCO	PIPCO RSG	-	25,000	21,814	-	21,814	3,186	-
Geothermica 005 Deep	GSI	-	66,653	-	-	-	66,653	-
GSI Kiyan 2020-sc-049 Short Call	GSI	-	15,000	-	-	-	15,000	-
GSI Bean 2020-sc-040 Short Call	GSI	-	14,073	-	-	-	14,073	-
Iomlán-Geoifisic		**409,149**	**938,364**	**1,763,725**	**90,510**	**1,913,719**	**(656,717)**	**110,367**
Iomlán Fisic Chosmach		**1,111,451**	**2,605,981**	**2,889,581**	**139,887**	**3,006,495**	**571,050**	**145,727**
Iomlán DIAS		**1,214,891**	**2,739,948**	**3,047,097**	**147,547**	**3,169,034**	**638,258**	**145,727**

Nótaí Áirítear fáltais ó thograí mar ioncam ó thograí, ar leibhéal atá ionann agus an caiteachas bliantúil a tabhaíodh agus forchostais a tuilleadh ag an togra lena mbaineann.

Is ionann na comharduithe deiridh thuas agus forchostas a tuilleadh go dtí seo agus réamh-mhaoiniú chun ceangaltais airgeadais in 2021 a shásamh.

Léiríonn an colún caipitil an caiteachas ar shócmhainní seasta i rith 2020.

5. Ioncam Eile

	2020 €	2019 €
Árachas	115,000	-
Deontas na gCistí Stairiúla	50,000	-
Eile	7,048	14,940
Iomlán	**172,048**	**14,940**

6. Costais Phárolla

	Léann Cheilteach €	Fisic Theoiriciúil €	Chosmach €	Riar €	2020 Iomlán €	2019 Iomlán €
Poist Lárnacha Maoinithe						
* Tuarastal/Pá	1,110,876	652,778	1,426,185	1,177,082	4,366,921	3,874,753
Costais Sochair Scoir	-	-	-	-	-	-
** Scoláireachtaí	100,666	104,669	156,065	3,000	364,400	333,525
Airgead Oinigh	-	-	-	-	-	-
	1,211,542	**757,447**	**1,582,250**	**1,180,082**	**4,731,321**	**4,208,278**

Nóta
Nóta maidir le Poist Lárnacha Maoinithe
* Líon na mBall Foirne Lárnach (WTE) 51.7 (2019:52.3), Líon ECF (WTE) 61 (2019: 63).
** Scoláirí Lárnacha (WTE) 14 (2019: 12).

Nóta maidir le Poist Seachtracha Maointh
Líon na Foirne Taighde agus na Scoláirí a Mhaoinítear go Seachtach iad (Coibhéis Lánaimseartha) 47 (2019: 47).

Íocadh asbhaintí do thobhach pinsin de €207,268 (2019: €222,778) leis an Roinn Breisoideachais agus Ardoideachais, Taighde, Nuálaíochta agus Eolaíochta le linn 2020.

(a) Iomlán na Sochar Fostaithe

	Léann Cheilteach €	Fisic Theoiriciúil €	Fisic Chosmach €	Riar €.	2020 Iomlán €	2019 Iomlán €
Tuarastail/Pá	1,045,459	604,402	1,344,020	1,116,133	4,110,014	3,622,360
Ragobair	-	-	-	-	-	-
Liúntais	-	-	-	-	-	-
ÁSPC Fostóra	65,417	48,376	82,165	60,949	256,907	252,393
Costais Sochair Scoir	-	-	-	-	-	-
	1,110,876	**652,778**	**1,426,185**	**1,177,082**	**4,366,921**	**3,874,753**

(b) Príomhphearsanra Bainistíochta

I measc na bpríomhphearsanra bainistíochta in Institiúid Ard-Léinn Bhaile Átha Cliath tá an Cláraitheoir/POF, an triúr Stiúrthóir Scoile, an tOifigeach Airgeadais agus an tOifigeach Feidhmiúcháin Ardleibhéil arbh é an costas luach saothair iomlán dóibh ná €722,213 (2019 €654,287) sa bhliain.

Ní fhaigheann príomhphearsanra bainistíochta ach amháin tuarastal. Ní íoctar aon bhónas leo. Ní sháraíonn a dteidlíochtaí sochair scoir na teidlíochtaí caighdeánacha i scéim eiseamláireach aoisliúntais sochair shainithe na hearnála poiblí.

6. Costais Phárolla (ar lean)

(c) Tuarastal an Chláraitheora & POF.

Seo a leanas pacáiste luach saothair an Chláraitheora/POF don tréimhse airgeadais:	2020 Iomlán €	2019 Iomlán €
Bunphá	107,936	106,167
	107,936	**106,167**

Níl ach tuarastal amháin á fháil ag an gCláraitheoir & POF. Ní íoctar aon bhónas léi. Ní sháraíonn teidlíochtaí sochair scoir an Chláraitheora na teidlíochtaí caighdeánacha i scéim eiseamláireach aoisliúntais sochair shainithe na hearnála poiblí.

7. Líon Fostaithe le Sochair í 2020 that fall within bands of €10,000 from €60,000 onwards.

	2020	2019
€60,000 to €69,999	4	1
€70,000 to €79,999	2	2
€80,000 to €89,999	5	5
€90,000 to €99,999	1	-
€100,000 to €109,999	1	3
€110,000 to €119,999	4	2
€120,000 to €129,999	-	-
€130,000 to €139,999	-	-
€140,000 to €149,999	-	-
€150,000 to €159,999	3	3
€160,000 to €169,999	4	4

Ba é meánlíon na bhfostaithe (coibhéisí lánaimseartha) le linn na bliana gan poist a mhaoinítear go seachtrach a chur san áireamh ná 51.7 (2019:52.3).

Léiríonn an tábla thuas líon na bhfostaithe a thit a sochar iomlán fostaithe faoi na bandaí faoi seach.

8. Speansais Ghinearálta

	Léann Cheilteach €	Fisic Theoiriciúil €	Fisic Chosmach €	Riar. €	2020 Iomlán €	2019 Iomlán €
Ilghnéitheach	8,764	150	37,204	5,679	51,797	67,107
Bolscaireachtaí/Lóin	723	139	3,090	2,147	6,099	33,256
Táillí Gairmiúla/Comhairleoireacht	-	-	9,630	199,387	209,017	218,223
Oiliúint	200	-	550	3,885	4,635	8,991
Costais Bainc	-	-	-	3,461	3,461	1,612
Speansais Chruinnithe Boird	-	-	-	4,900	4,900	30,929
Athbhreithniú Seachtrach	-	-	-	1,400	1,400	34,875
Sláinte agus Sábháilteacht	-	-	-	24,262	24,262	8,950
An Chumarsáid	-	-	-	87,058	87,058	83,574
	9,687	**289**	**50,474**	**332,179**	**392,629**	**487,517**

9. Léasáil

Léasanna Oibríochta

Tá na háitribh atá i seilbh na hInstitiúide ar léas ó Oifig na nOibreacha Poiblí. Is iad na háitribh a n-airítear ná Réadlann Dhún Since, 5 Cearnóg Mhuirfean, 9-10 Bóthar Burlington agus 31Plás Mhic Liam. Tá téarma 78 bliana fágtha ar an léas do Réadlann Dhún Since agus athnuaitear na léasanna eile ar bhonn bliantúil. Is é tiomantas ar bhonn léasanna den sórt sin maidir le 2021 na €113,609.

Léasanna Oifig na nOibreacha Poiblí	Cíos Bliantúil €
Réadlann Dhún Since	330
5, Cearnóg Mhuirfean	5,022
9-10 Bóthar Burlington	50,167
31, Plás Mhic Liam.	58,090
	113,609

An 31 Nollaig 2020 bhí na híocaíochtaí léasa íosta seo a leanas ag an Institiúid faoi léasanna oibriúcháin dochealaithe do gach ceann de na tréimhsí seo a leanas:

	2020 €	2019 €
Íoctha laistigh de bhliain amháin	113,609	113,609
Idir dhá bhliain agus cúig bliana	990	990
I ndiaidh cúig bliana	24,420	24,750

Nóta

Tá comhaontú ceadúnais déanta ag an Institiúid le hOifig na nOibreacha Poiblí le haghaidh limitéar siopaí suite I sráid na bhFínínt ar chostas €1,000 in aghaidh na bliana.

10. Costais Sochair Scoir

a) Cuntas Ríalúcháin Cochar Scoir

Tá téarmaí pinsin ag na baill foirne ar ceapadh iad roimh an 1 Eanáir 2013 faoin Scéim Aoisliúntais DIAS ábhartha mar atá leagtha amach i:

(a) Scéim Institiúid Ard-Léinn Bhaile Átha Cliath (Aoisliúntas) 1947, arna leasú

(b) Scéim Ranníocach Institiúid Ard-Léinn Bhaile Átha Cliath do Chéilí agus Leanaí, 1991

(c) Scéim d'Fhostaithe Neamhbhunaithe Institiúid Ard-Léinn Bhaile Átha Cliath (Aoisliúntas), 1983

(d) Scéim Aoisliúntais (Comhdhlúthú) d'Fhoireann Institiúid Ard-Léinn Bhaile Átha Cliath, 2008 agus Scéim Aoisliúntais Ranníocach d'Fhoireann Institiúid Ard-Léinn Bhaile Átha Cliath dá gCéilí agus Leanaí (Comhtháthú), 2008

Is é atá sa scéim pinsean ná socrú aoisliúntais shochair shonraithe chríoch-thuarastail le sochair agus ranníocaíochtaí sainithe ag rialacháin reatha scéime 'eiseamláire' na hearnála poiblí. Soláthraíonn an scéim pinsean (ochtóidí in aghaidh na bliana seirbhíse), aisce nó cnapshuim (trí hochtóidí in aghaidh na bliana seirbhíse) agus pinsin do chéilí agus leanaí.

Is é an 65ú breithlá an Ghnáthaois Scoir agus tá baill a thosaigh roimh 2004 i dteideal éirí as ag aois 60 gan aon laghdú achtúireach ó aois 60. De ghnáth, méadaíonn na pinsin atá á n-íoc (agus pinsin iarchurtha) de réir bhoilsciú ginearálta na hearnála poiblí.

Bunaíodh an luacháil a úsáideadh i gcás nochtadh faisnéise faoi FRS17 ar luacháil iomlán achtúireach a rinne achtúire neamhspleách cáilithe a chuir ceanglais FRS san áireamh chun dliteanais na scéime amhail an 31 Nollaig 2020 a mheasúnú.

Is í an Scéim Pinsin Seirbhíse Poiblí Aonair (Scéinm Aonair) an scéim um shochar scoir le leas sainithe do sheirbhísí poiblí inphinsin a ceapadh an 1 Eanáir 2013 nó ina dhiaidh sin i gcomhréir leis an Acht um Pinsin na Seirbhíse Poiblí (Scéim Aonair agus Forálacha Eile) 2012. Tá foráil sa scéim do shochar scoir agus cnapshuim scoir bunaithe ar mheán gairme de phá inphinsin agus pinsin céile agus leanaí.

Is í an aois pinsin íosta 66 bliana (ag éirí i gcomhréir le hathruithe in aois pinsin an Stáit). Áirítear áis luathscoir laghdaithe go hachtúireach ó aois 55. Ardaíonn Sochair Scoir atá á n-íoc i gcomhréir leis an bpraghasinnéacs tomhaltóirí.

Is mar a leanas a bhí na príomh-thoimhdí achtúireacha a úsáideadh:

	2020	2019	2018
Ráta na nArduithe Tuarastail	2.50%	2.25%	2.75%
Ráta Ardaithe i Sochair Pinsin atá á n-Íoc	2.00%	2.00%	2.25%
Ráta Lascaine	0.70%	1.10%	2.00%
Ráta Boilscithe	1.50%	1.50%	1.75%

Leis an mbonn mortlaíochta atá á leanadh, is féidir dul chun cinn in ionchas saoil le himeacht ama a chur san áireamh; mar sin, braithfidh ionchas saoil ag dul ar scor ar an mbliain a shroichfidh ball aois scoir (65 bliana). Léiríonn an tábla thíos ionchas saoil na mball a shroichfidh aois 65 in 2020 agus in 2040.

	31/12/2020		31/12/2019	
Aois 65 sa bhliain	2020	2040	2019	2039
Ionchas saoil – fir	88.2	89.6	87.3	89.9
Ionchas saoil – mná	89.8	91.3	88.7	90.9

10. Costais Sochair Scoir (ar lean)

b) Anailís ar na costais iomlána pinsin curtha chun dochair do Chaiteachas

	2020 (€'000)	2019 (€'000)
Costas na Seirbhíse Reatha	1,966	1,669
Ús ar Dhliteanais Sochair Pinsin	768	1,186
Ranníocaíochtaí Fostaí	(434)	(440)
	2,300	**2,415**

c) Gluaiseacht i nGlan-Dliteanas Sochair Scoir i rith na bliana airgeadais

	2020 (€'000)	2019 (€'000)
Glan-Dliteanas Sochair Pinsin amhail an 1 Eanáir	(70,580)	(60,113)
Costas na Seirbhíse Reatha	(1,966)	(1,669)
Costais Úis	(768)	(1,186)
(Gnóthachan)/caillteanas achtúireach	(5,875)	(9,264)
Sochair Pinsin íoctha sa bhliain	1,693	1,652
***Glan-Dliteanas Pinsin amhail an 31 Nollaig**	**(77,496)**	**(70,580)**

*Cosnaíonn dliteanais a bhaineann leis an Scéim Aonair €2,100,000 agus don Scéim DIAS cosnaíonn sé €75,396,000

d) Cistiú Iarchurtha do Phinsin

Aithníonn DIAS na méideanna seo mar shócmhainn a chomhfhreagraíonn don dliteanas iarchurtha neamh-mhaoinithe do phinsin bunaithe ar na toimhdí thuaslaithe agus ar roinnt imeachtaí a tharla cheana. Áirítear ar na himeachtaí seo an bonn reachtúil chun sceim aoisliúntais a bhunú, agus an polasaí agus an cleachtas i ndáil le pinsin seirbhíse poiblí a mhaoiniú, lena n-áirítear ranníocaíochtaí ag fostóirí agus próiseas na meastacháin bliantúil. Cé nach bhfuil aon socrú foirmiúil maidir leis na méideanna sonracha seo déanta leis an Roinn Oideachais agus Scileanna, níl aon fhianaise ag DIAS nach leanfaidh an polasaí maoinithe seo de bheith ag freastal ar a leithéid de shuimeanna de réir an chleachtais reatha.

Sa Chuntas Ioncam agus Caitheachais, aithníodh an Glan-Mhaoiniú Iarchurtha do Phinsin sa bhliain mar seo leanas:

	2020 (€'000)	2019 (€'000)
Maoiniú inaisghabhála i ndáil le costais phinsin na bliana reatha	2,734	2,855
Deontas Stáit feidhmithe chun pinsinéirí a íoc	(1,693)	(1,652)
	1,041	**1,203**

Ba í €77.496 milliún (2019: €70.580 milliún) an tsócmhainn mhaoinithe iarchurtha do phinsin amhail an 31 Nollaig 2020.

e) Stair na nOibleagáidí faoin scéim shochair shainithe.

	2020 (€'000)	2019 (€'000)	2018 (€'000)
Oibleagáidí Shochair Shainithe.	74,496	70,580	60,113
(Gnóthachain)/caillteanais iarbhíre ar dhliteanais na scéime	906	2,048	(241)
Céatadán de Luach Dhliteanais na Scéime	1.17%	2.90%	(.40%)

Tá (gnóthachan)/caillteanas achtúireach carnach €10,356,000 (2019: €9,450,000) aitheanta sa Ráiteas d'Iomlán na nGnóthachan agus na gCaillteanas Aitheanta.

Nótaí do na Ráitis Airgeadais (ar lean)

11. Nochtadh Idirbheartaíochtaí

Glacann Comhairle na hInstitiúide le nósanna imeachta de réir threoirlínte atá eisithe ag an Roinn Airgeadais maidir le leasana a nochtaíonn Comhaltaí na Comhairle agus chloígh Comhaltaí na Comhairle leis na nósanna imeachta sin le linn na bliana. Níor léirigh aon Chomhalta de chuid na Comhairle leas.

12. Nochtadh Comhaltaí na Comhairle/Tuarastal an Chláraitheora, Táillí agus Costais 2020

	Dáta Tosaithe	Dáta Críochnaithe	Luach Saothair Iomláin 2020 €	Speansais Iomlána 2020 €	Luach Saothair Iomláin 2019 €	Speansais Iomlána 2019 €
Comhalta den Chomhairle						
Dr Vincent Cunnane	1/7/15	to 30/6/20	-	720	-	-
Dr. Peter Heffernan	1/7/20	to 30/6/25	-	-	-	-
Baill ceaptha ag Boird Rialaithe na gComhScoileanna						
An tOllamh Gerry Wrixon	1/7/15	to 30/6/20	-	-	-	288
An tOllamh Arthur Jaffe	1/7/15	to 30/6/20	-	-	-	4,222
An tOllamh A. Deeks	1/8/20	to 30/6/25	-	-	-	-
An tOllamh P. Prendergast	1/8/20	to 30/6/25	-	-	-	-
An tOllamh M. Canning	1/8/20	to 30/6/25	-	-	-	-
An tOllamh Mary Fowler	1/8/20	to 30/6/25	-	-	-	-
An tOllamh Peter Goddard	1/8/20	to 30/6/25	-	-	-	
An tOllamh Máire Ní Mhaonaigh	1/8/20	to 30/6/25	-	-	-	499
An tOllamh Denjoe O' Connor	1/8/20	to 30/6/25	-	-	-	-
An tOllamh Ruairí Ó hUiginn	1/8/20	to 30/6/25	-	-	-	-
An tOllamh Chris Bean	1/8/20	to 30/6/25	-	-	-	-
Cláraitheoir						
Dr. Eucharia Meehan *			107,936	2,506	106,167	2,952
			107,936	**3,226**	**106,167**	**7,961**

Nóta
Íoctar íocaíochtaí taistil agus cothaithe de réir rátaí arna socrú ag an Roinn Caiteachais Phoiblí agus Athchóirithe

*** Luach Saothair agus Costais an Chláraitheora agus an POF.**
Is tuarastal amháin a fhaigheann na Cláraitheoirí. Ní íoctar bónas ar bith leo. Ní sháraíonn teidlíochtaí scoir an Chláraitheora na teidlíochtaí caighdeánacha i scéim eiseamláireach aoisliúntais ar leas sainithe na hearnála poiblí.

13. Sócmhainní Seasta

Costais	Troscán & Trealamh €	Mótarfheithicilí €	Ríomhairí €	2020 Iomlán €	2019 Iomlán €
Iarmhéid Tosaigh 1/1/2020	7,017,712	15,131	2,501,952	9,534,795	8,630,394
Breiseanna *	170,682	-	62,774	233,456	985,493
Riartha	(400,556)	-	(3,163)	(403,719)	(81,092)
	6,787,838	**15,131**	**2,561,563**	**9,364,532**	**9,534,795**
Dímheas					
Iarmhéid Tosaigh 1/1/2020	4,030,967	15,131	2,307,027	6,353,125	5,904,214
Muirear	370,091	-	86,759	456,850	530,003
Riartha	(76,192)	-	(3,163)	(79,355)	(81,092)
	4,324,866	**15,131**	**2,390,623**	**6,730,620**	**6,353,125**
Luach glan de réir na leabhar 31/12/2020	**2,462,972**	**-**	**170,940**	**2,633,912**	**3,181,670**

Nota
* Caipitlítear na sócmhainní seasta de bhreis ar €3,000 I leabhair DIAS.

14. Cúlchiste Caipitil

	2020 €	2019 €
Iarmhéid amhail an 1 Eanáir	3,181,670	2,726,180
Aistriú ó/(chuig) Cuntas Ioncaim agus Caiteachais		
Ioncam leithroinnte le sócmhainní seasta a fháil (Maoinithe ag Tionascadal)	145,727	960,433
Ioncam leithroinnte le sócmhainní seasta a fháil (Maoinithe ag an Státchiste)	87,729	25,060
Amúchadh ag teacht le dímheas sócmhainní	(456,851)	(530,003)
Méid a Scaoileadh ar Dhiúscairt	(324,363)	-
	(547,758)	455,490
Iarmhéid amhail an 31 Nollaig	**2,633,912**	**3,181,670**

Nótaí do na Ráitis Airgeadais (ar lean)

15. Creidiúnaithe - Méideanna atá dlite laistigh de bhliain amháin

	2020 €	2019 €
Creidiúnaithe Trádála	186,871	204,895
Fabhruithe	698,408	370,067
CBL	32,162	16,080
Nithe Iníoctha Ioncaim	179,344	165,021
Ioncam Iarchurtha	145,800	150,000
Cuntas Ríalúcháin Sochar Scoir*	1,009,933	848,118
Deontas Forlíontach Covid-19 Iarchurtha.	342,000	-
	2,594,518	**1,754,181**

***Nóta**
Baineann an figiúr seo le Ranníocaíochtaí fostóra d'fhoireann taighde a mhaoinítear go seachtrach iad. Tá an DIAS tar eis dul I mbun cadreamh leis an ROS/RCPA maidir le híocaíocht na Ranníochtaí.

Creidiúnaithe dlite tar éis dhá mhí dhéag	2020 €	2019 €
Tá an t-airgead a bhaineann leo seo sealbhaithe mar éarlais.		
Comhdhéanta as: Vernam Hull Bequest	25,333	25,322
Carmody Fund	2,461	2,461
	27,794	**27,783**

16. Féichiúnaithe

	2020 €	2019 €
Réamhíocaíochtaí	165,294	124,733
Infháltais ó Dhíolacháin Leabhar	818	784
Ilnithe	19,912	18,206
Ioncam Fabhraithe	118,856	-
	304,880	**143,723**

17. Ceadú Cuntais

Cheadaigh an Chomhairle na Ráitis Airgeadais ar an 30 Meitheamh 2021.

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