

23rd Real Time Conference



2022 Real Time Conference Going Virtual—Again! 1st-5th August 2022

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Members of the Computer Applications in Nuclear and Plasma Sciences (CANPS) technical committee have come to the very difficult decision to make this year's Real Time Conference virtual once again. After having to cancel the 2020 in-person conference in Quy Nhon, Vietnam for a fully virtual edition instead, there were high hopes in 2022 that we would be able to return to the beautiful ICISE Conference Center for the 23rd edition of Real Time. Unfortunately, there still exists a great deal of uncertainty and constantly changing restrictions associated with international travel (particularly for some of our Asian colleagues). While a hybrid solution was certainly on the table, there was a general concern that in-person attendance this year might lead to a greatly diminished conference. The committee felt that poor in-person attendance would really create a missed opportunity. So, we were able to secure an agreement with ICISE management to try one more time in Vietnam for RT2024.

Unlike in 2020, we will organize RT2022 as a fully virtual conference from the beginning. We also have the RT2020 virtual conference experience to draw from along with some interesting new tools in the virtual conference cloud to consider. At the time of this NPSS March newsletter publication, abstract submissions are still being accepted. CANPS would like to encourage members from all of the NPSS technical areas to consider contributions to the RT2022 Program. Diverse scientific fields are often represented at this conference including - nuclear and particle physics, plasma science and nuclear fusion, astrophysics, space sciences, accelerators,

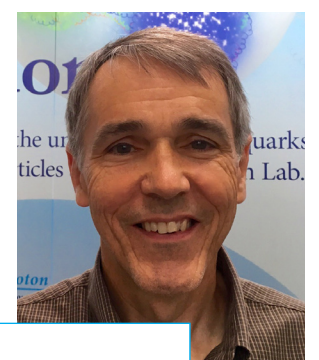
medical imaging/particle therapy and other radiation instrumentation research.

Once again, this year all accepted submissions to RT2022 will be archived on the Indico conference website as part of a Conference Record. Papers from the conference may also be optionally considered for peer-reviewed publication in a special issue of the *IEEE Transactions on Nuclear Science* (TNS). <https://iee-npss.org/publications/transactions-on-nuclear-science/> or, for medical imaging/particle therapy papers, in the *IEEE Transactions on Radiation and Plasma Medical Sciences* (TRPMS) <https://iee-npss.org/publications/transactions-on-radiation-and-plasma-medical-sciences/>

Real Time is a relatively small conference (typically 200+ participants). This allows us to create a scientific program of plenary oral sessions and poster sessions where all attendees are participating together. It is a unique opportunity for engineers, scientists and their students to share research and experiences with the latest in real-time software, firmware and hardware designs in many topics ranging from data acquisition and trigger systems, to control and monitoring, fast networks, AI and machine learning, new standards and emerging technologies. This year's virtual conference is an ideal opportunity for those who may typically present at another topical conference to join Real Time for the first time and experience what it has to offer with significantly reduced registration costs and zero travel and visa hassles.

On a final note, nominations for this year's CANPS Award are still being accepted through the end of March. The CANPS award is presented at the Real Time Conference to an individual who has demonstrated outstanding achievement in data processing and/or computing in the areas of Nuclear and Plasma Sciences. Anyone is eligible to win this \$3000 prize and plaque. More information (and a nomination form) can be found on the CANPS webpage <https://iee-npss.org/technical-committees/computer-applications-in-nuclear-and-plasma-science>. There will also be a Student Paper Award of \$500 presented at the conference. Information on eligibility requirements can be found on the conference website.

The virtual RT2022 will be held during the same week that the Vietnam in-person conference was originally scheduled (August 1st-5th, 2022).



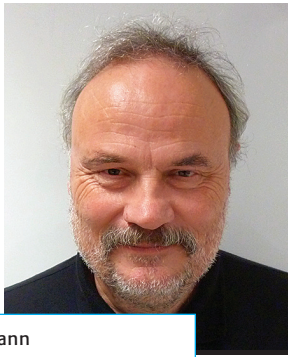
David Abbott
CANPS TC Chair

CONFERENCES Continued on PAGE 2

Real Time Conf. Cont. from PAGE 1

All of the evolving details can be found on the new conference website <https://indico.cern.ch/e/rt2022> including abstract submissions and registration instructions.

Questions about the conference can be directed to the CANPS Chair David Abbott via E-mail at abbottd@jlab.org.



Martin Grossmann
2020 Conference Cochair

YOU DON'T SAY!

Science is the organized scepticism in the reliability of expert opinion.

Richard P. Feynman

...AND SO FORTH

Everything happens for a reason; if you can't find a reason for something, there's a reason for that.

Chris Levi



Zoom Coffee Room to meet and chat.

2022 IEEE NSREC Plans for Live Event in Provo,



Tom Turflinger
2022 NSREC General Chair

NSREC 2022 will be a live event at the Utah Valley Convention Center, just 45 minutes south of Salt Lake City in historic Downtown Provo, Utah. Provo is situated in the heart of Utah Valley between the eastern shore of Utah Lake and the towering Wasatch Mountains. Mount Timpanogos dominates the northern part of the city at 11,957 feet (3,644 meters); these rugged mountains east of Provo create one of the most picturesque backdrops in Utah.

Provo is a small city with a bustling downtown area with its variety of shops and activities and is home to Brigham Young University. It is a city steeped in history, with world-class museums, galleries, performing arts, and family attractions. And Provo is the ideal starting point to visit the great American Southwest! With the Wasatch to the north, the High Uintas Wilderness to the east and Utah's five magnificent National Parks in the south (and the Grand Canyon just beyond), Provo provides endless opportunities for world-class outdoor activities. Prepare to be amazed!

The Utah Valley Convention Center is ideally located in the city center and adjacent to the Provo Marriott and Hyatt Place, offering excellent accommodations. Within minutes, you will be within a thriving district where families and business professionals alike can enjoy the colorful scenery, historic buildings, vintage boutiques and over 50 restaurants. Alternatively, one can break on the roof top garden, offering breathtaking views of the Wasatch Mountains, without leaving the venue. Come and join us for NSREC 2022 and experience it for yourself.



Teresa Farris
RE Vice Chair, Publicity,

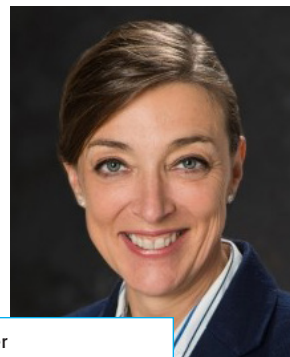
Please visit the redesigned NSREC website www.nsrec.com for 2022 conference details and travel planning tips.

It is my honor to invite you to attend NSREC2022 in the friendly small city of Provo, Utah. My Conference Committee and I are excited to host all of you live again with an excellent conference and enjoyable social opportunities. I would be remiss if I didn't remind you of the incredible outdoor opportunities that will surround you in Utah. The NSREC web site, <https://www.nsrec.com/>, has conference information. Conference dates are July 18th–22nd. The Wasatch Mountains will greet you daily, and Southern Utah proudly wears its necklace of 5 National Parks, starting less than 200 miles from Provo. Start planning your adventure now! On behalf of the many who make NSREC possible, I welcome you to NSREC 2022.

TECHNICAL PROGRAM

The Technical Program Chair, Pascale Gouker, MIT Lincoln Laboratory, and her committee will be assembling the technical agenda from abstracts received by February 4th, 2022, and from Late News abstracts due May 13th, 2022. They anticipate nine oral sessions and a Poster Session. Papers presented in the NSREC technical sessions are expected to be submitted for publication after the conference in the January 2023 issue of the *IEEE Transactions on Nuclear Science* (TNS), subject to the standard TNS peer review process.

The Poster Session Chair is Jonny Pellish, NASA GSFC. The Data Workshop Chair is Zach Fleetwood from SpaceX.



Pascale Gouker
Technical Program Chair

The Technical Program Session Chairs are:

Basic Mechanisms of Radiation Effects

Chair: Daisuke Kobayashi, ISAS/JAXA

Dosimetry

Chair: Ethan Cascio, Massachusetts General Hospital

Hardness Assurance

Chair: Christian Poivey, European Space Agency

Hardening by Design

Chair: Ethan Cannon, the Boeing Company

Radiation Effects in Devices and Integrated Circuits

Chair: Enxia Zhang, Vanderbilt University

Photonic Devices and Integrated Circuits

Chair: Cedric Vimontois, CNES

Single-Event Effects: Mechanisms and Modeling

Chair: Joel Hales, Naval Research Laboratory

Single-Event Effects: Devices and Integrated Circuits

Chair: Jeffrey Black, Sandia National Laboratories

Space and Terrestrial Environments

Chair: Gregory Ginet, MIT Lincoln Laboratory

RADIATION EFFECTS DATA WORKSHOP

The Radiation Effects Data Workshop is a forum for papers on radiation effects data on electronic devices and systems. Workshop papers are intended to provide radiation response data to scientists and engineers who use electronic devices



in a radiation environment, and for designers of radiation-hardened or radiation-tolerant systems. Papers describing new simulation facilities are also welcomed.

INDUSTRIAL EXHIBIT



Tara Luther
Industrial Exhibit Chair

An Industrial Exhibit will be included as an integral part of the conference and will be chaired by Tara Luther, SkyWater Technology. Exhibitors will include companies or agencies involved in manufacturing electronic devices or systems for applications in space or nuclear environments, modeling and analysis of radiation effects at the device and system level, and radiation testing. Exhibit sales are currently open, and information is available at www.nsrec.com.

Teresa Farris, Radiation Effects VP for Publicity, can be reached by E-mail at teresa.farris@archon-llc.com

THE LAST (AND FINAL) WORD

We are not final because we are infallible, but we are infallible only because we are final.

Robert H Jackson (U.S. Supreme Court Justice)

IT'S PRACTICE, PRACTICE

Everybody in politics lies. But they do so with such ease, it's troubling.

David Geffin

RISING EXPECTATIONS

I'd rather be a climbing ape than a fallen angel

Terry Pratchett

NUCLEAR & PLASMA SCIENCES SOCIETY NEWS

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Conference Report

Virtual ICOPS 2021 12th-16th September, 2021

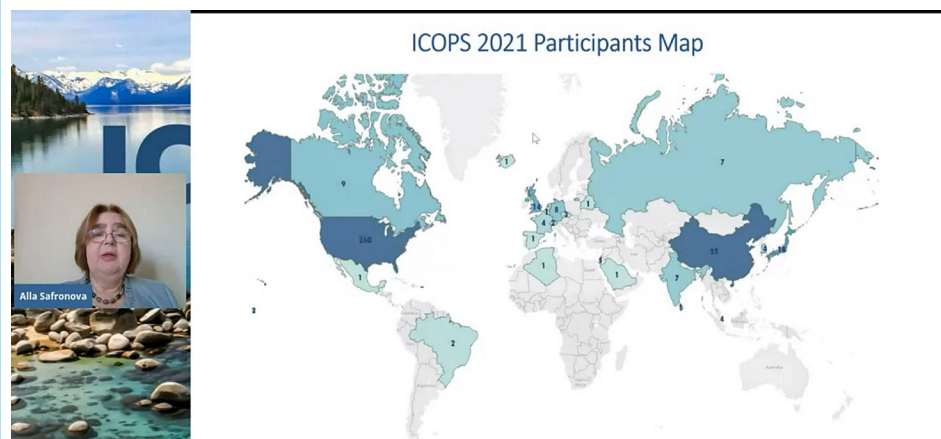
The 48th IEEE International Conference on Plasma Science (ICOPS 2021), which was originally planned to be held in Stateline, Lake Tahoe, Nevada, in June 2021, became a fully virtual conference that was held online from 12th to 16th September, 2021. Virtual ICOPS 2021 with over 425 registered participants from about 28 countries (these numbers include the minicourse), acquiring 390 abstracts submitted, was a great success in the challenging times of COVID-19 pandemic, which was achieved through the excellent teamwork of the Technical Program Co-Chairs Christine Coverdale and Arati Dasgupta, all Technical Area Coordinators and Session Organizers/Chairs, IEEE MCE Manager Lisa Boyd, minicourse Chair Mark Johnston, YP Event and Career Fair Chair Jennifer Elle, WIE Event Chair Viktoriya Golovkina, Student and YP Grants Chair Tobin Munsat, Treasurer Emil Petkov, International Committee member Rajdeep Singh Rawat, and Local Organizing Committee Richard Plotkin, Veronica Shlyaptseva, and Thomas White. Remarkable work was done by Charles Reuben as a conference webmaster and Veronica Shlyaptseva as a conference graphic designer. Underline Science Inc. provided outstanding digital platform and technical support for the conference and the minicourse. Following the conference, more than 300 abstracts, submitted and presented at the ICOPS 2021, have been published in *IEEE Transactions Nuclear Science* available in Xplore.



Alla Safronova
ICOPS 2022 General Chair

A very large number of students were attending the conference and the minicourse (~43% of the total number) and substantial number of registration fee waivers (> 100) were granted to students and young professionals. Out of which, the new NPSS Conference Credits grant helped to support the attendance of 15 postdoctoral researchers and three students.

The Virtual ICOPS 2021 started with the Welcome Address by Prof. Alla Safronova, the General Conference Chair. Each morning and late afternoon of the conference consisted of a plenary session and a maximum of six parallel sessions. Altogether, there were more than 60 sessions and events that included eight plenary sessions, 47 parallel sessions (consisting of 12 invited oral sessions and 35 contributed oral sessions), three poster sessions, three award presentation sessions, the Women in Engineering (WIE) Event, the Young Professionals (YP) Event, and the "Exploring the Universe from Nevada" Event followed by Closing Remarks. The plenary sessions included excellent talks by Prof. Farhat Beg, the 2021 NPSS PSAC Award Winner, chaired by the PSAC Chair Dr. Jason Marshall, and Prof. Michael Lieberman, the 2020 Marie Sklodowska-Curie Award Winner, chaired by Prof. John Verboncoeur, a former IEEE NPSS President. Plenary speakers Prof. Allen Garner, Dr. Daniel Gordon, Prof. Ling-Hsiao Lyu, Dr. Sabrina Nagel, Dr. Don Shiffler, and Dr. Umair Siddiqui presented outstanding overview of their research in the topical areas of expertise.



Welcome Address by Dr. Alla Safronova, the General Chair of ICOPS 2021.

The Award presentations were held virtually during three morning sessions. On Monday morning of September 13th, 2021, Prof. John Verboncoeur introduced the video from Ms. Kathy Land, the 2021 IEE President and CEO, with presentation of the 2020 Marie Sklodowska-Curie Award to Prof. Michael Lieberman. On Tuesday morning of September 14th, 2021, Dr. Jason Marshall presented the 2021 NPSS PSAC Award to Prof. Farhat Beg.

2020 IEEE Marie Sklodowska-Curie Award

For groundbreaking research and sustained intellectual leadership in the physics of low-temperature plasmas and their application.

Michael A. Lieberman

2020 IEEE Marie Sklodowska-Curie Award was presented to Prof. Michael Lieberman.

**IEEE Nuclear and Plasma Sciences Society
Plasma Science and Applications Comm**

Presents the 2021 Plasma Science and Applications Award to Farhat Beg

For outstanding contributions to both Laser- and Z-pinch-driven Plasma Physics including energetic particle production, ultra-high magnetic field generation, and the formation of well-diagnosed high energy density plasmas

2021 PSAC Award was presented to Prof. Farhat Beg by Dr. Jason Marshall (PSAC Chair).

On Wednesday morning of September 15th, Prof. Alla Safronova chaired the Award Session where Dr. Steve Gitomer, Editor-in-Chief of *IEEE Transactions on Plasma Science* (TPS), presented the 2020 TPS Best Paper Award to Prof. Chan Joshi, and Prof. Rajdeep Singh Rawat, the Chair of Student Paper Award Committee, presented certificates to the 2021 Outstanding Student Paper Award winners Emma Blanchette, Dion Lee and runners-up Aidan Klemmer and Daniel Maler.



Dr. Rajdeep Rawat presents the 2021 Outstanding Student Paper Award to Ms. Emma Blanchette

This was the first women-run ICOPS conference, with the General Chair and two Technical Program Co-Chairs all distinguished female members of the plasma science community. The ICOPS 2021 Women in Engineering (WIE) Virtual Event, which was held on the Sunday evening of the first day of the conference on September 12th, further emphasized the important role and challenges of women's careers in Plasma Science and Engineering. This session, organized and chaired by Viktoriya Golovkina, was a very popular Q&A session focused on discussions of life in science and engineering with four outstanding female plasma scientists from academia and research laboratories. The panelists Drs. Arianna Gleason-Holbrook, Chunqi Jiang, Evdokiya (Eva) Kostadinova, and Maria Pia Valdivia were answering questions and sharing their exciting experiences.



Viktoriya Golovkina (WIE Event Chair) and panelists Drs. Arianna Gleason-Holbrook, Evdokiya (Eva) Kostadinova, Maria Pia Valdivia, and Chunqi Jiang

The ICOPS 2021 YP Virtual Event, which was held during the third day of the conference on the Tuesday evening, was organized and chaired by Dr. Jennifer Elle. Conference attendees joined this session to hear about the career journeys of three outstanding professional plasma scientists Drs. Cami Collins, Emil Petkov, and William M. White, and to ask questions about how they came to their current positions and what lessons they learned along the way. In addition to the YP event, a Career Fair, also organized by Dr. Jennifer Elle started on the second day and continued until the last day of the conference to provide opportunities for job seekers to interact with potential employers.



Dr. Jennifer Elle (Young Professionals Event Chair) and panelists Drs. Emil Petkov, Will White, and Cami Collins

Conference Report Cont. from PAGE 3

"Exploring the Universe from Nevada", the Local Virtual Event, was held on the Wednesday evening of the last day of the conference on September 15th. The conference attendees had an excellent opportunity to join Paul McFarlane, the Director of the Fleischmann Planetarium at the University of Nevada, Reno (UNR) and Melodi Rodrigue, the astrophysicist from UNR, to discover how they are helping participants of all ages to explore the universe. This event included a quick tour, a preview of a planetarium show, and live connections to robotic, remotely-controlled telescopes - such as the Great Basin Observatory in Nevada - that the Planetarium uses to help guests worldwide research galaxies, double stars and extrasolar planets. This event was followed by the Closing Remarks from Alla Safronova, the General Chair of ICOPS 2021.



Dr. Melodi Rodrigue introduces the Great Basin Observatory at the "Exploring the Universe from Nevada" Event.

The conference featured a one-day minicourse entitled "Plasma Spectroscopy: The Full Spectrum from X-rays to Radio Waves." The excellent short course with ten lectures organized by Dr. Mark Johnston, the minicourse Chair, was held virtually on September 16, 2021, and attracted 83 participants from 10 different countries. The lectures spanned a broad spectrum of plasma spectroscopy: "Spectroscopy: a Chemist's Overview" by Dr. David Ball, "Plasma Spectroscopy of Magnetic Fusion Plasmas: From X-ray to Visible Light" by Dr. Oleksandr Marchuk, "Infrared Laser Spectroscopy to Characterize Low and Atmospheric Pressure Plasmas" by Dr. Jean-Pierre van Helden, "Spectroscopic Determination of Magnetic Fields in Pulsed-Power and High Energy Density Plasmas" by Dr. Yitzhak Maron, "Opening the Infrared Treasure Chest with the James Webb Space Telescope (JWST)" by Dr. John C. Mather, "Lineshape-Based Spectroscopic Diagnostics of Astrophysical Plasmas in the Visible and Radio Ranges" by Dr. Eugene Oks, "Spectroscopy of High Intensity, Ultra-Short Pulse, Laser-Plasma Interactions" by Dr. Karl Krushelnick, "Characterization of Laser Produced Plasmas Using Optical Spectroscopy" by Dr. Sivanandan (Hari) S. Harilal, "21st Century Medicine, One Spark at a Time: Biomedical Applications of Laser-Induced Breakdown Spectroscopy (LIBS)" by Dr. Steven Rehse, and "LIBS on the Red Planet: Exploration of Another World using CHEMCAM and SUPERCAM" by Dr. Roger C. Wiens.



Prof. Alla Safronova, who submitted this report, can be reached by E-mail at alla@physics.unr.edu

President's Report



Steve Meikle
IEEE NPSS President

With a new year comes new challenges but also hope for a brighter future and a little more social interaction and travel than what we have been able to experience over the past two years. Unfortunately, Omicron is having a bit to say about that. It is hard to believe that this latest variant of SARS-CoV-2, which has spread further and more rapidly than any previous variant, didn't exist when I wrote my last newsletter article a few short months ago.

The new year also brings with it renewal. On behalf of NPSS I would like to thank our outgoing AdCom members whose terms concluded at the end of 2021. Special thanks go to Alberto Del Guerra who served in the important role of Chair of the Fellow Candidate Evaluation Committee over the last two years. Chairmanship of the FEC will be taken over by Edl Schamiloglu who served on Alberto's committee over the last three years and as his Vice Chair in 2021. Our outgoing Technical Committee Chairs are Roger Fulton (NMISC 2020-21), Janet Barth (REC 2019-21), and David Wetz (PPST 2020-21), all of whom represented their communities on AdCom

with distinction. Our outgoing TC representatives are Roger Raman (FTC appointed 2021), Frank Hegeler (PPST elected member 2018-21), Chris Deeney (PSAC elected member 2018-21), Jeff Black (REC elected member 2018-21) and Craig Woody (RITC elected member 2018-21). Thank you to all for your dedication and insightful contributions. The following AdCom members have concluded their terms but have kindly agreed to take on new roles: Martin Grossman was CANPS Chair from 2018-21 and was also elected to the role of Transnational Committee Chair starting in 2021. He will continue in that role in 2022. Robert Miyaoka was one of our two liaisons to the *IEEE Transactions on Medical Imaging* from 2018-21 and will stay on as one of the two elected representatives from NMISC. David Abbott was an elected representative of CANPS (2018-21) and will stay on as the new CANPS Chair.

I would also like to extend a warm welcome to our incoming AdCom members. Andrew Goertzen takes over from Roger Fulton as the incoming NMISC Chair. Heather O'Brien takes over from David Wetz as the incoming PPST Chair, while Robert Reed takes over from Janet Barth as the incoming REC Chair. Martin Purschke and Masaharu Nomachi are the incoming CANPS representatives. David Donovan is the new FTC elected representative. Tor Raubenheimer comes to AdCom as an elected representative of PAST, while William M. White and Lorenzo Fabris are the new elected representatives for PPST and RISC, respectively. Welcome all, I look forward to working with all of you.

As a final word on changes at AdCom, I would like to make special mention of Ron Keyser who has

made the difficult decision to resign from his role as NPSS Assistant Treasurer, effective 1st of April, due to his failing health. Ron has been an IEEE member for 35 years, elevated to Fellow level in 2011 and was made a Life Fellow in 2016. He received the prestigious Richard F. Shea Distinguished Member Award in 2017 "for outstanding contributions and leadership to the Nuclear and Plasma Sciences Society and IEEE as NPSS Treasurer, and for further contributions to the Radiation Instrumentation Technical Committee and NSS/MIC conference over many years". Ron's scientific career spanned work in nuclear reactions, radiation detectors and signal processing, Positron Emission Tomography (PET), security systems, low level radiation detection, and software for analysis of HPG γ spectra. He holds a patent for his work on nuclear pulse signal processing and made important contributions to the development of PET while at ORTEC during the crucial pioneering years. Ron has held leadership roles in his (and my) home conference, the IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS-MIC) as General Chair (2010), Treasurer (2008, 2017 and 2019) and Exhibits Chair (2003 to 2007, 2009, and 2011 to 2022). He was Chair of the Radiation Instrumentation Steering Committee (RISC) in 2002 and 2003 and served NPSS as Treasurer from 2015 to 2016 and Assistant Treasurer from 2017 to the present time. I have personally benefited from Ron's advice as I navigated my own journey through IEEE and I have enjoyed our wide-ranging discussion over a porter or two. We will miss Ron's wise counsel, collegial approach and warmth, and sincerely thank him for his dedication to the radiation instrumentation community, NPSS and IEEE.

Among other items of business at our last AdCom meeting held on 23rd October 2021, a motion

was passed to approve the establishment of an Educational Committee (EduCom) as a new Functional Committee of the NPSS AdCom. I have written about EduCom in recent newsletter articles and will provide further updates in the future as this new Functional Committee commences its important work in 2022 under the leadership of Stefan Ritt. We also passed a motion to adopt the IEEE Women in Engineering (WIE) pledge to "work toward gender-diversified panels at all IEEE meetings, conferences, and events, including our own". This pledge has been passed by 19 other organisational units of IEEE, including 14 societies and councils. We also discussed and agreed on the desirability of extending the pledge in the future beyond gender to other dimensions of diversity. I would like to thank Cinzia da Via on behalf of NPSS for driving this initiative and for all she has done to promote gender equity at all levels of the technical communities we represent.

We have a busy year ahead of us consolidating important recent initiatives that we believe will serve the NPSS community well in the coming years, such as the NPSS Foundation Fund and EduCom. More about those topics in the next newsletter. In the meantime, I wish you success and good health throughout 2022.

Steve Meikle, IEEE NPSS President,

can be reached by E-mail at steven.meikle@sydney.edu.au.

Secretary's Report

AdCom held its fifth virtual meeting via Zoom on October 22nd and 23rd, 2021. It was a time to say goodbye to people whose terms were ending, as noted in Steve Meikle's report above. Some of our new members have provided their bios and photos and are introduced below. Get to know them - especially those representing your technical community and think how you, too, might be more actively involved.

Overall, NPSS is doing well. Albeit conferences have remained virtual or hybrid, they have been

successful, but of course different, and I think we all miss the casual, unexpected personal interactions that occur at in-person meetings. However, virtual meetings have allowed attendance to increase and, in particular, conferences have seen an increase in younger attendees who might not be able to attend an in-person event. However, revenues are down and this will impact the society's ability to fund worthwhile initiatives such as that discussed in an interview with one of our IEEE Smart Village entrepreneurs that appears below under Liaison Reports.

Steve also mentioned some other initiatives in his report. Here are the motions that created them, as well as other AdCom actions:

- » WIE liaison moves that AdCom adopt the WIE pledge. Passed.
- » NMISC move that AdCom approve that NPSS pay the technical co-sponsorship administrative fee for the 2022 PSMR conference. Passed.
- » AdCom approves that funding of the **Bruce H. Hasegawa Young Investigator Medical Imaging Science Award** be changed as follows:

Funding: Funded by the Nuclear Medical Imaging and Sciences Technical Committee of the IEEE Nuclear and Plasma Sciences Society's Nuclear Science Symposium (NSS) and Medical Imaging Conference (MIC) budget. Passed.

Note that this is the first electronic-only Newsletter. Let us know if there are features you would like, or other changes to make it most useful to you.

AdCom will meet virtually on March 4th and 5th, 2022. We all hope that an in-person meeting in June will be possible.

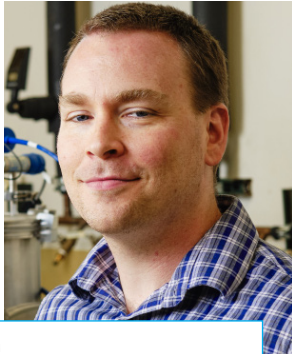


Albe Larsen
IEEE NPSS Secretary and Newsletter Editor

MEET OUR NEW ADCOM MEMBERS

Elected Members

David Donovan, Fusion Technology



David Donovan
Fusion Technology

David Donovan is an associate professor and Zinkle Faculty Fellow in the Nuclear Engineering Department at the University of Tennessee-Knoxville (UTK). He received his Ph.D. in Nuclear Engineering from the University of Wisconsin-Madison in 2011 and his B.S. in Nuclear Engineering at the University of Illinois at Urbana-Champaign. His Ph.D. work was in the area of Inertial Electrostatic Confinement (IEC) Fusion for the purpose of creating and utilizing small-scale neutron generating devices to detect explosives and other illicit materials. He was a post-doctoral researcher at Sandia National Laboratories-Livermore where he worked in the area of plasma-surface interactions in magnetically confined fusion devices. Since joining UTK in 2014, he has developed a research program in fusion energy science, plasma physics, plasma-material interactions, and near-term applications of nuclear fusion devices. He has introduced new plasma/fusion undergraduate and graduate courses including *Introduction to Plasma Physics*, *Introduction to Fusion Technology*, *Plasma Diagnostics*, and *Boundary Plasma Physics*. His group has constructed a compact electron cyclotron resonance (ECR) plasma exposure stage at UTK for low flux ion damage studies, which has been combined with material characterization tools (SEM, FIB, EBSD, GIXRD) to perform studies of He ion damage to tungsten. Prof. Donovan leads a collaborative research effort with the Boundary Science Center at the DIII-D fusion experiment in the areas of diagnostic development, boundary plasma experiments, and impurity transport studies. His research group also collaborates with the WEST experiment in France on impurity transport studies. His program has collaborated with surface chemistry studies at Princeton Plasma Physics Laboratory (PPPL) on the LTX-Beta device. Prof. Donovan was awarded a Department of Energy Early Career Award in 2018 to advance interpretive modelling tools and surface characterization techniques for the study of scrape-off layer impurity transport. He has served on the IEEE NPSS Fusion Technology Committee since 2020.

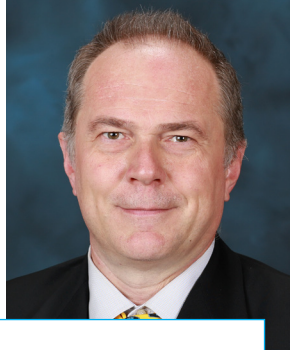
Reason for Joining the IEEE Fusion Technology Standing Committee

I have been very excited to see the rising level of importance of Fusion Technology and Plasma-Material Interactions in our community over the last decade. With the approaching completion of ITER, the rise of multiple private fusion enterprises, and renewed discussions by the Department of Energy and the fusion community on the construction of new devices, there is an immediate need for increased investment in fusion technology research

and trained personnel. IEEE can play a valuable role in bringing together researchers from national labs, private industry, and academic institutions to work towards the goal of net fusion power production.

David Donovan, Fusion Technology AdCom representative, can be reached by E-mail at ddonovan@utk.edu.

Lorenzo Fabris, Radiation Instrumentation



Lorenzo Fabris
Radiation Instrumentation

Lorenzo Fabris is Distinguished R&D Staff in the Physics Division at Oak Ridge National Laboratory. He received his master's degree in microelectronics and electronic instrumentation from the University of Pavia, Italy in 1993 and his Ph.D. from the University of Bergamo, Italy, in 2016. After working as research associate at the University of Pavia in 1992 and 1993, he joined Lawrence Berkeley National Laboratory as an engineer, focusing on the development of low-noise readout electronics for X- and gamma-ray detector systems used in beamline experiments at particle accelerators and light sources, for astrophysics missions, and environmental and nonproliferation applications. In 2002, he joined Lawrence Livermore National Laboratory as senior engineer expanding his interests to detector systems design and new detector materials and taking technical lead of radiation detection projects for the Department of Homeland Security. In 2007 Lorenzo joined Oak Ridge National Laboratory, working on nonproliferation and homeland security programs as well as nuclear physics and astrophysics collaborations. His recent work includes instrumentation for different types of gamma-ray imaging detectors, neutron detectors, high resolution, large area neutron imaging systems, and the development of innovative readout techniques for SPAD array-based light detectors. Since 2000, Lorenzo has been involved with the IEEE Nuclear and Plasma Sciences Society in a variety of roles. For several years, he was a reviewer, associate editor, and senior editor for the *IEEE Transactions on Nuclear Science*; he co-chaired and chaired the Nuclear Science Symposium in 2005, 2009 and 2017. He was General Chair of the IEEE NSS/MIC in 2020 and will reprise the role in 2024. Lorenzo was a RISC member in 2012, deputy RISC chair in 2015-16, chair in 2017-18, and past chair in 2019-2020. He is and has been a member of several subcommittees within RISC.

Lorenzo Fabris, RI AdCom representative, can be reached by E-mail at fabrisl@ornl.gov.

Masaharu Nomachi, CANPS



Masaharu Nomachi
CANPS

Masaharu Nomachi is a physicist at the Institute for Radiation Sciences at Osaka University. He received a Ph.D. in Physics from Osaka University, Japan in 1983, followed by postdoctoral work at the Max Planck Institute for Nuclear Physics and the Department of Physics at Heidelberg University. He worked on the LEAR (Low Energy Antiproton Ring)

experiment at CERN. In 1986 he joined the online data acquisition group at KEK. He leads development of the UNIX-based data acquisition system for the SDC/SSC test experiments and experiments at KEK. In 1993, he joined the ATLAS/LHC experiment. In 1995, he moved to RCNP (Research Center for Nuclear Physics) at Osaka University. He led the computer and network group at RCNP. In 1996, he organized an international workshop for a network-based data acquisition system in Osaka. From 2000, he worked in Neutrino physics as a professor in the Graduate School of Science, Osaka University.

He is a senior member of the IEEE. He has been a member of the NPSS CANPS committee. In 2014, he organized the 19th Real-Time Conference in Japan. He organized an international school of radiation measurements. The school has been held seven times in ten years inviting students from Asian countries. Mini schools were also organized several times in Asian countries. Collaborating with NPSS/IEEE, real-time schools were organized in Japan, Vietnam, and Malaysia.

He retired in March 2021. Since retiring, he has been working as a regional director of the Osaka University European Center. It covers Europe, Russia, the Middle East, and Africa. The aim of the European Center is promotion of international activities, which is one of the important roles of IEEE.

Masaharu Nomachi, AdCom representative for CANPS, can be reached by E-mail at nomachi@rcnp.osaka-u.ac.jp

William M. White, PPST



William White
PPST

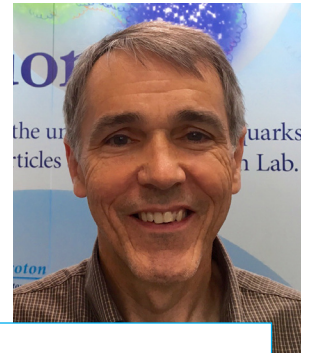
William M. White received BSEE (1998) and MSEE (2000) degrees from the University of New Mexico, and a Ph.D. (2006) in Nuclear Engineering from the University of Michigan. Dr. White was enlisted for six years in the New Mexico Air National Guard (NMANG) and has worked as a contractor and civilian at the Air Force Research Laboratories (AFRL) where he worked on high-power microwaves, pulsed power, charged particle beams, intense radiation sources, and ultra-short pulse lasers. In 2015 he joined the technical staff at Sandia National Laboratories (SNL). During his time at SNL he worked on the Z Machine in pulsed power operations before being promoted to manager of the newly formed Pulsed Power and Data Systems Operations department on Z. In July of 2019 he left SNL and moved to Verus Research in Albuquerque, NM as a Senior Experimental Physicist, and is now the Team Lead for Applied Electromagnetics. He has been a member of the IEEE for 27 years, a Senior member of the IEEE since 2016, and a member of NPSS for 24 years. Positions previously held include: elected member and Secretary of the Pulsed Power Science and Technology (PPST) Committee; elected member of the Plasma Science and Applications Committee (PSAC); guest editor for the 7th Triennial Special Issue of the IEEE TPS, *Images in Plasma Science*; Technical Area Coordinator for ICOPS (2014 and 2016); and as the Young Professionals Chair for PPS 2019. He is a registered Engineer Intern in the state of New Mexico.

Will White can be reached by E-mail at wwhite@ieee.org.

Other newly elected AdCom members who did not submit bios are Martin Purschke, BNL, for CANPS and Tor Raubenheimer, SLAC National Accelerator Lab, for Particle Accelerator Science and Technology.

NEW TECHNICAL COMMITTEE CHAIRS

David Abbott, CANPS



David Abbott
CANPS Chair

David Abbott is a staff physicist at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) in Newport News, Virginia. Jefferson Lab maintains a 12 GeV continuous electron beam accelerator and four experimental halls for the detailed study of the quark structure of nuclear matter. David is a member of the Physics Division Fast Electronics and Data Acquisition (FEDAQ) support group. For over 30 years he has been involved in the development and support of data acquisition systems used in all of the experimental programs at the Lab.

David received his B.S. in Physics in 1983 from Rhodes College and completed his Ph.D. in Experimental Nuclear Physics from The University of North Carolina—Chapel Hill in 1990. He then came directly to Jefferson Lab as a post doc. During his Post Doc he was responsible for implementing the CODA system (CEBAF Online Data Acquisition) for the very first production experiments at the Lab. Most recently he has been involved in the JLAB/BNL partner project management for the newly approved Electron Ion Collider (EIC) detector at Brookhaven National Lab - specifically for DAQ and online computing.

David has been a member of IEEE/NPSS since 2009 and a member of the CANPS technical committee since 2012. He was elected as the AdCom representative for CANPS in 2018 and was the General Chair for the 2018 Real-Time Conference held in Williamsburg, Virginia.

David Abbott, CANPS chair, can be reached by E-mail at abbottd@jlab.org.

Andrew Goertzen, NMISC



Andrew Goertzen
NMISC Chair

Andrew Goertzen is a Professor in the Departments of Radiology and Physics & Astronomy at the University of Manitoba and a clinical nuclear medicine physicist and the Acting Director of the Winnipeg Cyclotron Facility and Central Radiopharmacy at Health Sciences Centre in Winnipeg, Canada. He received his Ph.D. in Biomedical Physics from the University of California, Los Angeles in 2003, working with Simon Cherry in the area of instrumentation for multimodality small animal PET/CT imaging. He then worked with Michael Green as a Visiting Fellow at the National Institutes of Health in Bethesda, Maryland and as a Post-Doctoral Researcher with Christopher Thompson and Alan Evans at the McConnell Brain Imaging Centre at the Montreal Neurological Institute in Montréal, Québec before moving to the University of Manitoba in 2006. Dr. Goertzen is a Fellow of the Canadian College of Physicists in Medicine with certification in nuclear medicine. He has been active in NMISC including previous terms as elected

Secretary's Report Cont. from PAGE 5

member from 2013-2015 and Secretary from 2013-2016, NMISC member on the Joint Oversight Committee (JOS) from 2016-2019 and participation in the organizing committee of the 2019, 2022 and 2023 NSS/MIC meeting. His research interests are the development of detectors and technologies for multimodality PET imaging and their application to improve image quality in both clinical and preclinical PET imaging.

Andrew Goertzen, NMISC Chair, can be reached by E-mail at andrew.goertzen@umanitoba.ca

Heather O'Brien, PPST



Heather O'Brien
PPST Chair

Heather K. O'Brien is an Electronics Engineer at the U.S. Army Research Laboratory (ARL) in Maryland (USA) with over 15 years of experience in evaluation and analysis of emerging high-voltage semiconductor devices for pulsed power applications. She received

the B.S. degree in engineering from Harvey Mudd College, Claremont, CA, and the M.S. degree in electrical engineering from Johns Hopkins University, Baltimore, MD. She was thrust into the arena of pulsed power when she began her engineering career working for Berkeley Research Associates on-site at ARL. Since 2006, she has been an Electronics Engineer with the Sensors and Electron Devices Directorate (SEDD) of ARL. She is largely an experimentalist, designing and building systems to evaluate devices at high-energy pulse stresses, and analyzing the performance of novel materials and structures. She provides technical guidance for ARL's electrical safety program and manages cooperative research programs with universities and industry. Ms. O'Brien received the ARL Commander's Award for Civilian Service for dedication and technical accomplishments while serving as ARL-SEDD's lead pulsed-power-component engineer. She annually supports the Army's eCybermission STEM competition as a project judge.

Ms. O'Brien has authored more than 25 conference proceedings and journal papers and has presented her research frequently at the Pulsed Power Conference, the Power Modulator and High Voltage Conference, and the Workshop on Wide Bandgap Power Devices and Applications. She was a guest editor for the October 2018 *IEEE Transactions on Plasma Science* Special Issue on Pulsed Power Science and Technology, and served several years on the executive committee for the IEEE Baltimore Section's chapter of the Power Electronics Society.

Heather O'Brien, PPST Chair, can be reached by E-mail at heather.k.obrien.civ@army.mil

Albe Larsen, IEEE NPSS Secretary and Newsletter Editor, can be reached by E-mail at a.m.larsen@ieee.org.

Technical Committees

NUCLEAR MEDICAL AND IMAGING SCIENCES



Andrew Goertzen
NMISC Chair

January marks the start of my two-year term as Chair of NMISC. I want to thank our outgoing Chair, Roger Fulton, for all his efforts on behalf of the committee and the NMISC membership over the challenging past two years. I appreciate Roger's work in keeping the membership engaged and look forward to continuing to work with him in his role as Past Chair. I am also pleased to announce that our new NMISC Vice-Chair is Youngho Seo from the University of California, San Francisco.

I want to thank our elected members whose terms ended in 2021: Nicola Belcarì, Taiga Yamaya, Georges El Fakhri and Chuck Melcher and welcome our newly elected members whose three-year terms begin in 2022: Esther Ciarrochi, Arman Rahmim, Mitra Safavi-Naeini, Hidaki Tashima and Lany Zeng. I also want to thank Kisung Lee, whose term as NMISC representative to JOS was renewed for an additional two years.

Congratulations to the Organizing Committee of the 2021 NSS/MIC, including MIC Co-Chairs Jae Sung Lee and Taiga Yamaya, for the successful meeting held virtually this past October. We look forward to the possibility of resuming in person meetings, with the 2022 meeting scheduled to use a hybrid format in Milan, Italy this November.

The NMISC meeting was held in November after the NSS/MIC. Several new NMISC subcommittees presented their initial reports. Vesna Sossi presented on the initial recommendations of the MIC Future Directions Subcommittee, with proposals on how to keep the MIC topics current and identify emerging topics that warrant highlighting with workshops or dedicated sessions. Joyita Dutta presented on the work of the Balanced Representation Subcommittee with proposals to improve gender and geographic diversity in our committees. Robert Miyaoka presented on the work of the Initiatives Subcommittee and requested proposals for new initiatives to support the mission of IEEE, NPSS and NMISC. I encourage NMISC members to contact both myself and the subcommittee chairs with any proposals or comments for these subcommittees.

Andrew Goertzen, NMISC Chair, can be reached by E-mail at Andrew.Goertzen@umanitoba.ca.

PULSED POWER SCIENCE AND TECHNOLOGY



David Wetz
Past PPST Chair

We hope this newsletter finds everyone healthy and doing well. I am writing this as the collocated 2021 IEEE Pulsed Power Conference (PPC) and Symposium on Fusion Engineering (SOFE) is ongoing. The event was forced to transition from in-person to virtual back in September 2021 and at the time we were all very worried about how it would go and what our turnout would be. I am happy to report that our communities came through and supported the event(s) nearly identical to the way they would an in-person event. We have over 565 registrations and a FULL technical program over the usual 3.5-day period. There is no way we can ever thank our communities enough for continuing to support the events and present their work in these one-of-a-kind forums. I personally want to thank so many people for making the conference planning and execution a success. Thank you to the PPST committee for their support throughout the planning of the event which started nearly five years ago. Thank you to the PPC and SOFE conference planning committees for their hard work and dedication to making the event(s) a success. Thank you to Underline Sciences, our virtual platform provider, for making the transition so seamless. Thank you to the exhibitors and sponsors, Metglas Inc., General Atomics Electromagnetics, ITHPP, Eagle Harbor Technologies, Oak Ridge National Laboratories, Sandia National Laboratories, U.S. Office of Naval Research, and IEEE NPSS, who stuck with us and supported us. Thank you to Dr. Kevin Freudenberg, the 2021 SOFE General Chair, for his friendship, advice, and dedication to the SOFE community. We did this together and I can't imagine doing it with anyone else. Thank you to Dr. Stephen Bayne for serving as treasurer, Mr. Richard Ness for serving as our Exhibitors Chair, and Dr. Sterling Beeson for assisting as Exhibitors Co-Chair. Thank you to Hutch Neilson, the SOFE Technical Program Chair, for his friendship, hard work, and dedication to the SOFE community. Thank you to Lisa Boyd, our IEEE MCE conference planner, who was a rock through it all. Without her, the events would not be possible. Finally, I want to thank Dr. John Mankowski,

the PPC Technical Program Chair. John was my research advisor when I was in graduate school at Texas Tech University, and he has been one of my closest friends for almost 20 years. He is always there for me and I am so thankful for all he has helped me to accomplish. Without him, none of my professional achievements would be possible. Thank you again to everyone and while it was a huge success, we hope these will have been the one and only virtual PPC and SOFE meetings. PPC hopes to see everyone in person in San Antonio in June 2023 and SOFE hopes to see everyone in person in Oxford, UK in July 2023.

My term as Chair of the PPS&T Committee came to an end on December 31, 2021. Between trying to put on a great 2021 PPC-SOFE meeting and helping to lead the PPS&T Committee, it has been a very exciting and rewarding two years as Chair. By the time you are reading this, the torch has been passed on to Ms. Heather O'Brien from the U.S. Army Research Laboratory (ARL) in Adelphi, Maryland. Our new Vice Chair is Emily Schrock from Sandia National Laboratories in Albuquerque, New Mexico. The committee is in amazing hands with these two outstanding people, and we all are so grateful for their commitment and service to IEEE and PPS&T. Thank you to everyone in the NPSS community for your support of me over the past two years. I am not going anywhere but am excited for a bit of a break. Take care!

David Wetz, past chair of PPST, can be reached by E-mail at wetz@uta.edu. Heather O'Brien, the current PPST chair, can be reached by E-mail at heather.k.obrien.civ@army.mil.

RADIATION INSTRUMENTATION TECHNICAL COMMITTEE



John Valentine
RISC Chair

The purpose of the Radiation Instrumentation Technical Committee (RITC) is to promote the development and application of radiation detectors, radiation instrumentation, nuclear electronics and measurement techniques for ionizing radiation and to serve the interests of people involved in the aforementioned activities. All IEEE NPSS members who have an interest in these topics are self-identified as RITC members. More information on our Technical Committee is available at <https://ieee-npss.org/technical-committees/radiation-instrumentation/>

The RITC is managed by the Radiation Instrumentation Steering Committee (RISC), which has 15 members-at-large elected from the general membership of the RITC. Each year, five members-at-large are elected for a three-year term on RISC. The deadline for member-at-large nominations (including self-nominations) is June 1st. We are always looking to integrate new people into RITC leadership to help continue to offer outstanding technical conferences and other services to the larger RITC community. So please consider nominating one of your colleagues or yourself to serve on RISC as a Member-at-Large for the 2023-2025 term (for more information, see <https://ieee-npss.org/technical-committees/radiation-instrumentation/>).

On January 1, 2021, I began serving as RISC Chair for the 2021-2022 term, so I am now in my second year in this role and looking forward to a productive year for the committee. I continue to depend heavily on our RISC Vice Chair Srilalan Krishnamoorthy (University of Pennsylvania, USA), our Immediate Past Chair Chiara Guazzoni (Politecnico di Milano and INFN, Italy), and our Secretary Merry Keyser. Together we are initiating some new efforts to serve the RITC community. Among them, and in support of the IEEE Women in Engineering Pledge that NPSS recently adopted, is a new Diversity & Inclusion Subcommittee. Beyond working to better integrate under-represented groups in RITC leadership and conference organizing committees, this subcommittee is also charged with helping to identify the next generation of leaders in our community.

RITC member participation in the Technical Committee activities is fundamental and strongly encouraged. Several ways of serving and participating are possible, from upgrading one's membership from Standard Member status to Senior Member status, to nominating a Senior Member to be promoted to the rank of Fellow, to nominating deserving persons for the RISC Awards, to nominating/self-nominating a candidate for the Member-At-Large position, to suggesting and making scientific and educational contributions beneficial to the RITC Community. There are plenty of opportunities for all – our goal is to always strive to better serve the larger RITC Community, so please don't hesitate to help us work toward that goal.

RISC is proud to have three prestigious annual awards: the Radiation Instrumentation Early Career Award (RIECA), the Emilio Gatti Radiation Instrumentation Technical Achievement Award (RITAA) and the Glenn F. Knoll Radiation Instrumentation Outstanding Achievement Award (RIOAA) for early career, mid-career, and late-career RITC researchers, respectively. The 2022 deadline for nominating outstanding candidates for these awards is July 15th, 2022. Additional information regarding these awards and the requisite nomination packages can be found at <https://ieee-npss.org/technical-committees/radiation-instrumentation/>.

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Functional Committees

AWARDS

The Activity of the 2021 NPS Fellow Evaluation Committee

In 2021 the NPS Fellow Evaluation Committee (FEC) was composed of 13 members who represented all the technical committees (TC) of NPSS (Table 1)



Alberto Del Guerra
2020-2021 Fellow Evaluation Committee
Chair

Table 1- Roster of the 2021 NPS Fellow Evaluation Committee

NAME	TC	ROLE	TERM
1-Alberto Del Guerra	===	Chair	2 nd YEAR as Chair
2-Bruce Carlsten	PSAC	Evaluator	2 nd YEAR
3-Peter Clout	CANPS	Evaluator	1 st YEAR
4-Christine Coverdale	PSAC	Evaluator	2 nd YEAR
5-Michel Defrise	NMISC	Evaluator	1 st YEAR
6-Ahmed Hassanein	FTC	Evaluator	2 nd YEAR
7-Allan Johnston	RE	Evaluator	3 rd YEAR
8-Paul Lecoq	RITC	Evaluator	2 nd YEAR
9-Chuck Melcher	NMISC	Evaluator	1 st YEAR
10-Marek Moszynski	RITC	Evaluator	3 rd YEAR
11-Bryan Oliver	PPST	Evaluator	2 nd YEAR
12-Thomas Roser	PAST	Evaluator	2 nd YEAR
13-Edl Schamiloglu	PPST	Evaluator and Vice-Chair	3 rd YEAR

(*) Stuart Kleinfelder who had accepted to be on the committee (as RITC representative - 1st YEAR) had to decline for family reasons.

The committee is named by the NPSS President. The 2021 members can be confirmed for the next year. However, there is a maximum number of consecutive years on the committee: two years for the Chair and three years for the evaluators. This means that next year a new Chair and at least three new evaluators will be appointed. There is no limit to the number of members on the committee; however, 12 evaluators appear to be appropriate given the number of technical committees of NPS that should be covered and the typical number of Fellow nominees who are evaluated every year. It would be appropriate if the gender inequality (only one woman in the 2021 FEC) were to be ameliorated. The fellow evaluators were mostly (11 out of 12) of the researcher/scientist category. It would be add value to have higher participation from the other fellow categories, e.g. Technical Leader, Application Engineers/Practitioners and Educators.

The time for the entire evaluation procedure by the FEC of the various societies is three and a half months: from 1st March (deadline for the submission of the nominations to IEEE) to 15th June (deadline for the submission of the FEC evaluations to IEEE). Actually, the procedure cannot start before the first or second week in March because IEEE has to perform the formal and technical clearance of all the nominations. This year the evaluation procedure started a bit late, because IEEE had a delay in clearing the nominees position due to some technical/IT problems. The remaining part of March 2021 was spent by the Committee to officially accept the position and receive/download and read all the documentation. The final evaluation package was submitted to IEEE by the end of May, i.e., two weeks ahead of the deadline.

The job was done by means of four teleconferences (TCON), that were scheduled roughly every two weeks, starting 2nd April. The evaluation basically consists of assigning a numerical score to each nominee from less than 60 up to a maximum of 100. The score must be supported by a narrative motivation. The numerical scores are grouped into four evaluation categories of nominees that are so defined (from the lower to the maximum score): marginally or not qualified, qualified, highly qualified and extremely qualified for elevation to the status of Fellow.

In the first TCON the evaluators were taught the entire procedure, the proposed calendar, and their task. In the second TCON the committee, all the evaluators having read the nominations, examined all the nominees and agreed on their preliminary assignment to one of the four evaluation categories. Additionally, six evaluators were assigned to each nominee to act as official referees, the minimum number being five. In the third TCON the six referees reported back their evaluations for each nominee (score and its motivation) that were discussed within the committee to become the individual six evaluations for each nominee and were then transmitted to IEEE via the web. In the final TCON the society evaluation was thoroughly discussed and approved for each nominee, who was officially assigned an evaluation category, a score and a ranking coupled to the society narrative. The final evaluations were then transferred to IEEE via web on the 29th May.

After the 15th June, the evaluations are then examined by the IEEE committee that makes the proposal for the elevation to Fellow. Finally, the list of the proposed elevated Fellows is approved (or modified) by the IEEE Board of Directors. Usually the names of the newly elevated Fellows are released mid-November and they officially become Fellows starting 1 January.

This year the number of nominees examined by the NPS FEC committee was very low (only 8!); 1/4 of them, i.e. two nominees have been elevated to the status of IEEE Fellow Class of 2022. My sincere congratulations to them both:

-1) Lay-Kee Ang

"for contributions to electron emission and space charge effects in nanodiode and quantum materials"

-2) Dimitris Visvikis

"for contributions to image reconstruction and analysis of positron emission tomography"

Having completed my term, I take this opportunity to thank all the members of the FEC for their competence and help in the evaluation process in the last two years. I do hope that the nominations for the elevation to Fellow class of 2023 is much more numerous. There are many NPSS members who deserve the Fellow status! I invite the nominators to read carefully the submission manuals that are very precise on how to write a successful nomination. Act now: the deadline for submission is 1 March 2023.

Best wishes,
Alberto Del Guerra
2021 NPSS FEC Chair

[Alberto Del Guerra can be reached by E-mail alberto.delguerra@unipi.it](mailto:alberto.delguerra@unipi.it)

RADIATION EFFECTS AWARDS

2021 IEEE Nuclear and Space Radiation Effects Conference Awards

It is a longstanding tradition of the IEEE Nuclear and Space Radiation Effects Conference to recognize the Outstanding Conference Paper and the Outstanding Data Workshop Presentation from the previous conference. In recent years recognition has also been given to the best paper presented by an IEEE Student Member, who must also be the first author. The awards process recognizes high quality and important work and encourages authors to produce presentations and manuscripts of high technical quality, clarity of presentation, and significance to the community.

It is our pleasure to announce the award winners from the 2021 NSREC. Their awards will be presented at the NSREC 2022 Conference in Provo, Utah.

2021 Outstanding Paper Award

An SRAM SEU Cross Section Curve Physics Model

D. Kobayashi, K. Hirose, K. Sakamoto, Y. Tsuchiya, S. Okamoto, S. Baba, H. Shindou, O. Kawasaki, T. Makino, T. Ohshima

2021 Meritorious Paper Award

Using Machine Learning to Mitigate Single-Event Upsets in RF Circuits and Systems

A. Ildefonso, J. Kimball, J. Cressler, D. McMorrow

2021 Outstanding Student Paper Award

Response of Integrated Silicon RF pin Diodes to X-ray and Fast Neutron Irradiation

J. Teng, D. Nergui, H. Parameswaran, G. Tzintzarov, H. Ying, C. Cheon, S. Rao, A. Ildefonso, N. Dodds, N. Nowlin, M. Gorchichko, E. X. Zhang, D. M. Fleetwood, J. D. Cressler

2021 Outstanding Data Workshop Presentation Award

First Results on BJTs in Space: ELDRS Experiment on NASA Space Electronic Testbed

A. Benedetto, H. Barnaby, C. Cook, M. Campola, A. Tender

[Teresa Farris, Radiation Effects VP for Publicity, can be reached by E-mail at teresa.farris@archon-llc.com.](mailto:teresa.farris@archon-llc.com)



Teresa Farris
RE Vice Chair, Publicity

Technical Committees Cont. from PAGE 6

The RISC, in conjunction with the Nuclear Medical and Imaging Sciences Council (NMISC), oversees the annual Nuclear Science Symposium, Medical Imaging Conference, and Room-Temperature Semiconductor Detector conference (NSS/MIC/RTSD). As you all know, COVID-19 forced the 2020 and 2021 NSS/MIC/RTSDs to be entirely virtual. We are currently moving forward with plans for the 2022 NSS/MIC/RTSD to be a hybrid (both in-person and virtual) conference in Milan, Italy, November 5th-12th. The organizing committee is led by General Chair Chiara Guazzoni and Deputy General Chair Ralf Engels and is working hard to implement the hybrid format in a fashion that will be productive for attendees. Despite the recent worldwide omicron-variant surge of COVID-19, we are all very hopeful that by early November our community will be in a position for most of us to meet in person.

[John Valentine, RISC Chair, is with Lawrence Berkeley National Laboratory; Phone: +1\(510\)486-4920; Mobile +1\(619\)371-0016; E-mail: jdvalentine@lbl.gov](mailto:jdvalentine@lbl.gov)

Continued on PAGE 8

FEEL BETTER NOW?

Very few people do anything creative after the age of 35. The reason is that very few people do anything creative before the age of 35.

[Joel Hildebrand](#)

PAINLESS BUT PAINSTAKING

Don't cut what you can untie.

[Joseph Jubert](#)

Functional Committees Cont. from PAGE 7

CHAPTERS

NPSS Section Chapters are local units of the IEEE that are part of their Region and Section, but are affiliated with our Society, while NPSS Student Branch Chapters (SBCs) are student-run organizations with a faculty advisor that are formed within an IEEE Student Branch at a college or university. Both types of chapters support the local activities of their members by sponsoring activities such as lectures, workshops, volunteer projects, and social activities, and in addition provide opportunities for networking and leadership training. The NPSS chapters program exists to provide support to our roster of existing NPSS chapters around the world, as well as to promote the formation of new chapters and SBCs wherever there is interest. That support includes our Distinguished Lecturers program, which currently offers 76 different lectures presented by 34 lecturers representing all the technical communities of our Society, at no cost to the chapter, as well as the possibility of direct financial support for their local activities. The principal focus of our chapters is in-person local activities. As a result, the chapters have been strongly impacted by the COVID pandemic, which continues to limit in-person activities, and they have had to shift much of their focus to online virtual activities. In addition, the pandemic has negatively impacted our second goal of promoting the formation of new chapters and SBCs around the world.

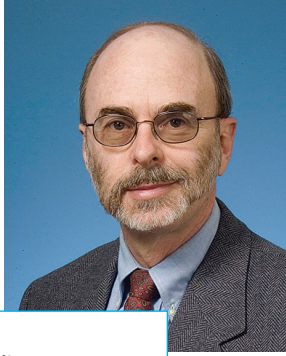
Despite this, calendar year 2021 was a year of modest growth for the NPSS chapters program and saw the formation of two new Student Branch Chapters. In April 2021, a new SBC was established at the National Institute of Science and Technology (INSAT) in Tunis, Tunisia. Its faculty advisor is Latifa Bergaoui and its founding chair is Mohamed Ali Arbaoui. Mohamed received a NPSS Chapter Founder's plaque for his efforts in establishing the new INSAT chapter. This was our second SBC in the Middle East and North Africa and our 18th worldwide. Following that, in October 2021 a new SBC was established at the Bangladesh University of Business and Technology (BUBT) in Dhaka, Bangladesh. Its founder and faculty advisor is Md. Tabil Ahammed and its founding chair is Md. Arif Hasan Masum. This was our 9th SBC in South Asia and our 19th worldwide. Both Tabil and Arif received NPSS Chapter Founder's plaques, which were jointly presented to them at the BUBT International Conference Hall on 15th December 2021 by Prof. Saifur Rahman, the 2022 IEEE President-Elect, Prof. Celia Shahnaz, the 2022 IEEE WIE Chair-Elect, and Prof. Fayyaz Khan, the University Vice Chancellor. Figures 1 and 2 show presentation of the plaques to Tabil and Arif. With these additions, the NPSS ended 2021 with 25 Section Chapters and 19 SBCs, as shown in Fig. 3. We will continue to work toward establishing new Section Chapters and SBCs in the coming year.

In addition to our Distinguished Lecturers program and the possibility of direct financial support, we also support our existing Student Branch Chapters, as well as the formation of new SBCs, by supporting student membership in the NPSS. Any IEEE student or graduate student member is eligible to receive a one-time free "try-out" membership in the NPSS using links that can be found on the NPSS students page <https://ieee-npss.org/students/>. In addition, a 2021 initiative, the NPSS Student Chapter Membership Fee subsidy program, was set up to provide up to ten free new student memberships in both the IEEE and NPSS to support new and existing SBCs in low-income countries (that is, countries eligible for IEEE e-membership). In 2021, this program provided free memberships to support our SBCs at the Vellore Institute of Technology in Tamil Nadu, India, the Bangladesh University of Business and Technology in Dhaka, Bangladesh, and the University of Moratuwa in Moratuwa, Sri Lanka. This initiative is continuing in 2022, and we hope to use it to continue to support our existing SBCs, as we did in 2021, but also to promote the establishment of new NPSS SBCs in Regions 8, 9, and 10. Any IEEE student branch at a college or university in an eligible country can apply for these free memberships to assist in the establishment of a new NPSS Student Branch Chapter, which can be formed by submitting an electronic petition signed by six student or graduate student members of the NPSS and by a faculty advisor who is also a NPSS member.

For additional information on any of the programs mentioned above, or for any assistance in the establishment of a new NPSS chapter, please contact Steve Gold, the NPSS Chapter Coordinator, at steve@ieee.org.



Figure 1. Presentation of NPSS Chapter Founder's plaque to Md. Tabil Ahammed by Prof. Saifur Rahman, 2022 IEEE President-Elect.



Steve Gold
Chapters Coordinator



Figure 2. Presentation of NPSS Chapter Founder's plaque to Md. Arif Hasan Masum Ahammed by Prof. Saifur Rahman, 2022 IEEE President-Elect.

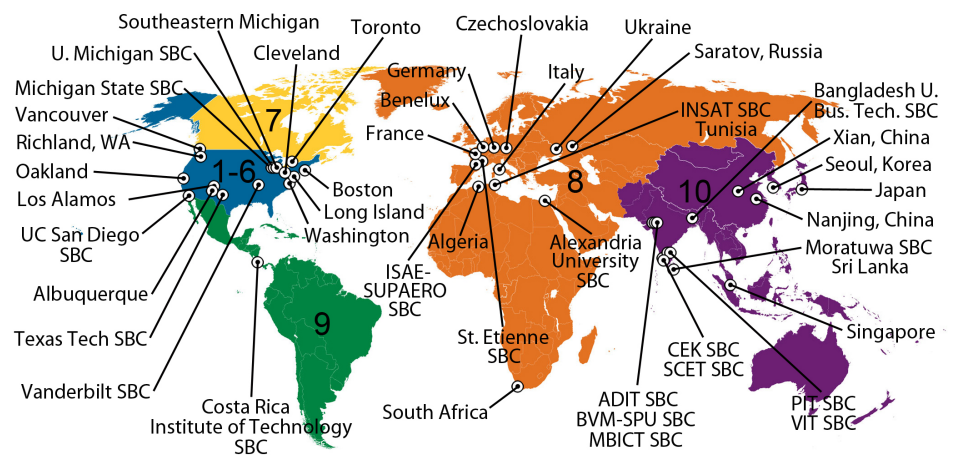


Figure 3. Map of NPSS Chapters and Student Branch Chapters around the world by Region.

FINANCE

IEEE Board Approves the Nuclear and Plasma Sciences Society Fund

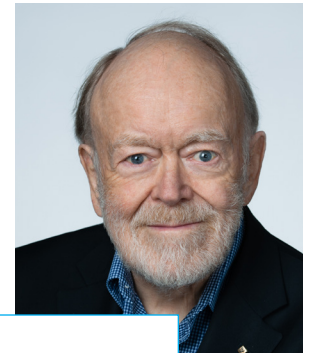
At their November meeting, the IEEE Board approved the establishment of the NPSS Fund and the initial funding by NPSS of \$25k. This development is an important step in the expansion of our educational, outreach, diversity, and humanitarian imperatives as they develop into regular activities of NPSS volunteers. This would include initiatives that need continuing funding beyond the normal three-year limit for new initiatives.

Why is this new fund so important? The rules for the budget of any IEEE society include the funding of new initiatives based on the reserves attributed to that society and the operational surplus from the previous year. The availability of these funds depends on the financial performance of the IEEE, the annual approval of the IEEE Board, the level of the society's reserves compared to the annual expenditures, and the approval by outside bodies of each initiative. As a result, the funds available each year to fund initiatives can fluctuate significantly from year to year so that any one initiative can not be assured of funding for the second and third year as an initiative and it certainly can not use initiative funds for year four and later.

One example of a successful initiative that is hitting this three-year limit is the Instrumentation Summer Schools which have been held in several developing countries in recent years. These summer schools are developed and taught by NPSS volunteers with practical work as well as lectures. While quite a bit of the cost is covered by the host institution, NPSS has been providing volunteer teachers and about \$20k/school for our expenses using initiative funding. After three years, another source of funding for this educational outreach needs to be defined and while one option is society operational money, our operational budget is pretty tight, precluding most added expenses. The new NPSS Fund provides another funding option. These Instrumentation Schools have been too successful and well received for NPSS to allow them to drop for lack of funds.

A requirement for NPSS to transfer money to this NPSS Fund is that it has to be matched with external donations to the Fund through the IEEE Foundation. The result is that every dollar donated gets doubled by NPSS money transfers. Please look out for the announcement of further details as they become available.

Peter Clout, the IEEE NPSS Communications Chair, can be reached by E-mail at p.clout@ieee.org. Harold Flescher the IEEE NPSS Finance Committee Chair, can be reached by E-mail at halflescher@cloud.com. John Verboncoeur, the Finance Committee Vice Chair, can be reached by E-mail at johnv@msu.edu. John is also TAB VP-Elect in 2022 and TAB VP in 2023.



Peter Clout
IEEE NPSS Communications
Committee Chair

NOMINATIONS

Four NPSS AdCom positions open for nomination

The NPSS Administrative Committee (AdCom) consists of various members including elected members from our eight Technical Committees (TC) and the Transnational Committee. Four TCs have open positions starting in 2023 for a term of four years.



Ron Schrimph
Nominations Chair

TAKE A DEEP BREATH THEN...

I didn't think it was physically possible, but this both sucks and blows.

Bart Simpson

AND WE SUFFER IN FRUSTRATION

You campaign in poetry, you govern in prose.

Mario Cuomo

SO, THE ONES WE HAVE ARE OK?

The weapons paradox: Invent a weapon that is more terrible, and it's obviously immoral. Invent a weapon that is less terrible and it, too, is immoral – because it is more likely to be used.

Richard A. Muller

- » Nuclear Medical and Imaging Sciences (NMISC)
- » Particle Accelerator Science and Technology (PAST)
- » Radiation Effects (REC)
- » Radiation Instrumentation (RITC)

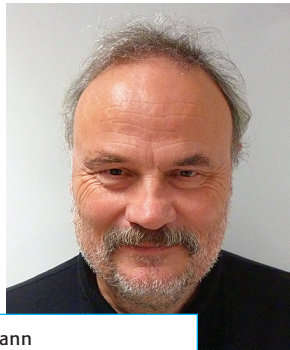
Candidates must be members in good standing of the NPSS and the IEEE. Each nomination must contain a statement of the willingness and ability of the nominee to serve if elected, the membership status and number of the nominee, a short biography, and a statement of topics that the candidate wishes to address as an AdCom member. Nominations must be sent to the Nominations Chair before June 1, 2022.

If you are interested in one of these positions or want to nominate somebody, please contact our Nominations Chair, Ron Schrimpf, at ron.schrimpf@vanderbilt.edu.

TRANSNATIONAL COMMITTEE

International School Joint Numerical Simulation School on GATE

An International School on OpenGATE was organized jointly by Vietnam National University Ho Chi Minh City – University of Science, the OpenGATE collaboration and IEEE NPSS from Dec 15th–17th, 2021. OpenGATE is an advanced opensource software developed by the international OpenGATE collaboration and dedicated to numerical simulations in medical imaging and radiotherapy. GATE is based on the Geant4 toolkit.



Martin Grossmann
Chair, Transnational Committee

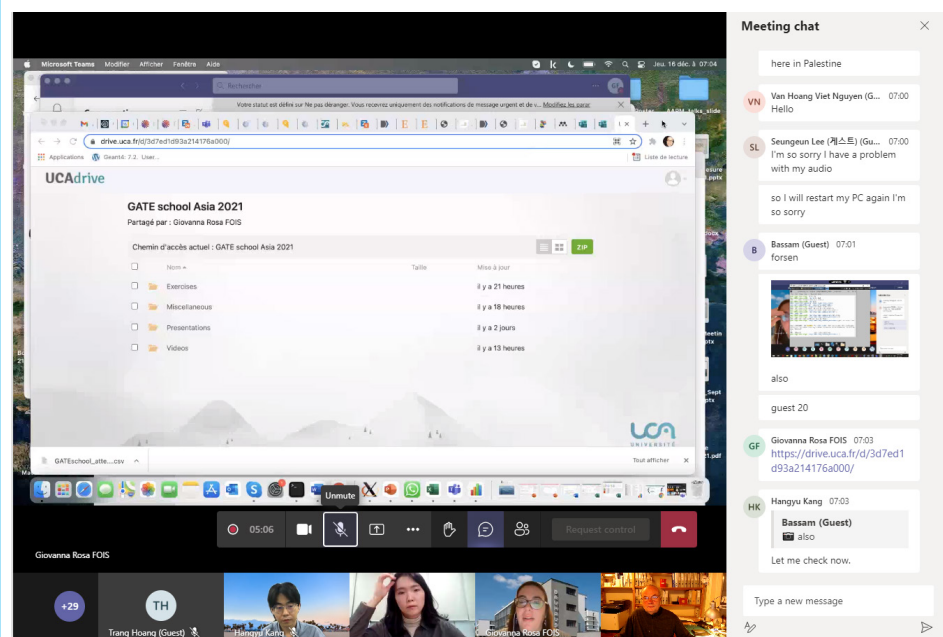
The school was a combination of lectures on various topics in imaging and radiotherapy and a series of hands-on exercises to learn how to use GATE under the supervision of tutors. Although originally planned as an in-person event in Ho Chi Minh City, the school was held completely virtually.

Lecturers were Lydia Maigne and Giovanna Fois (Université Clermont Auvergne, France), Han Gyu Kang (QST, Japan), Min Sun Lee (KAERI, South Korea) and Seungeun Lee (Seoul National University, South Korea). A small team of tutors was led by Hong Thi Kieu Trang (VNU-HCM, Vietnam). Forty-one students attended the school as participants. Most came from Vietnam and Korea, but there were also participants from Indonesia, Japan, Malaysia, Nigeria, Palestine, Senegal and Turkey.

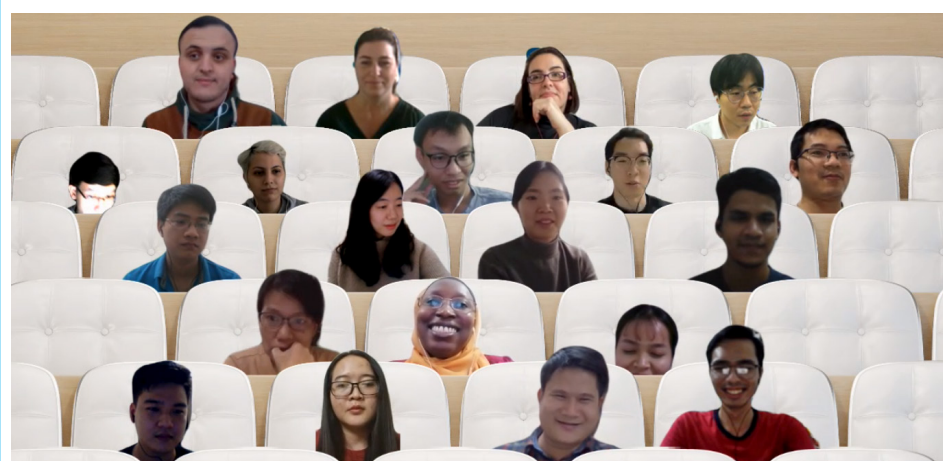
The exercises were conducted on a dedicated server hosted in France. Each participant received a personal account and connected to the graphical desktop using the X2Go client which works well even over a low bandwidth connection. In this way issues with different local GATE installations during the workshop could be avoided. The GUI worked well even with the users scattered across different continents. The server was kept online for one month after the school, allowing students to continue working on the examples.

NPSS support was provided by the Transnational Committee. From 2022 onwards, schools and other educational activities will be organized under the umbrella of NPSS' new Functional Committee EduCom.

Martin Grossmann, Chair, Transnational Committee, can be reached by E-mail at martin.grossmann@psi.ch.



Lecturers and Students from three continents join in for the GATE school.



Lecturers and Students from three continents join in for the GATE school.

Liaison Report

IEEE SMART VILLAGE INTRODUCTION

IEEE Smart Village is a unique IEEE humanitarian program in which seed money is provided to potential entrepreneurs to develop a profitable company to bring renewable energy, typically photovoltaic electricity, to off-grid villages around the world. Each potential project requires a business plan which is reviewed by the IEEE Smart Village Project Development Committee. The plan must show profitability and a growth plan, and include the three IEEE Smart Village Pillars which are electricity, education and entrepreneurship. To empower off-grid communities, IEEE Smart Village has learned that educational and entrepreneurial opportunities must also be included which, when combined with electricity, will greatly empower the community with opportunities which would not exist with only the provision of electricity.

IEEE Smart Village saw the need to decentralize its activities to meet and understand local conditions using local volunteers. To accomplish this, IEEE Smart Village set up five regional working groups which include:

- » AWG - Africa Working Group
- » CWG - China Working Group
- » LAWG - Latin America Working Group
- » NAWG - North America Working Group
- » SAWG - South Asia Working Group

One of the many successful IEEE Smart Village Entrepreneurs is Jude Numfor, located in Cameroon, Central Africa. He is the Chief Executive Officer of Renewable Energy Innovators—Cameroon (REIC). I had the pleasure to interview Mr. Numfor for this article.

JOHN: Good day, Jude. I would like to start this interview by allowing the readers to know a little bit about you. You are a young entrepreneur who has taken on a large challenge in electrifying villages in Cameroon. Can you provide the readers with a summary of your background? Since the readers may know little or nothing about you, please do not be bashful and provide as much detail on yourself as possible.

JUDE: I was born in the remote village of Mbem in the Northwest Region of Cameroon. Mbem is a village that remained without access to electricity until 2013. So, I was born in darkness, grew up in darkness and studied with the bush-lamp and candle. It was not easy. Imagine waking up every morning with swollen eyes strained by the smoke and dim lights from a kerosene lamp. At the time, I knew no alternatives.



Jude Numfor

The only other alternative was a petrol generator which I can remember was owned by only two people in my entire village. I remember we would go to these people in the day to find out whether they were planning to turn on their generator at night so that we could come and watch television. Most often, we would carry out some kind of chore for the generator owner so that by evening when they turn on the TV we would be allowed to come and watch. In most cases when the generator came on, the entire village would gather and young kids like us would be pushed to the back. My friends and I would look for a crack in the wall or in the window as a peeping hole to the TV. Only grownups had seating space. It is also disrespectful to sit while your elders are standing. So, the best chance was usually through the windows.



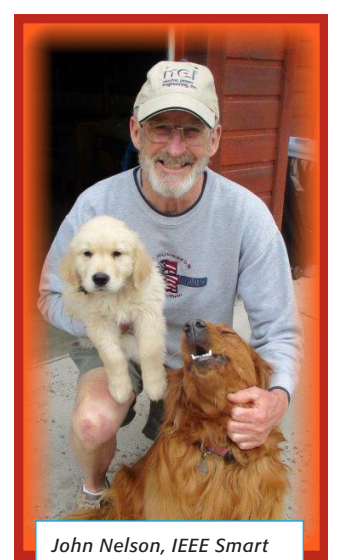
No access to electricity.

In Sept 2000, I lost my father whom I loved very much. Life became very painful for me in my village. To cheer me up, one of my brothers decided to take me to another village, about 400 km away where he was working as a nurse. While there, I met this missionary family who were friends with my brother. The family took some interest in me and decided to take me in as part of them. That is when my whole life changed.

In this new home, there was solar power. I learned how to turn on the lights and I showered instead of having a bucket bath. I saw the fridge, I had ice cream and the best gift was that I could watch the TV. I watched Dora the Explorer, Lion King and many more as many times as I wanted. I saw and was able to use a computer, the magical machine, for the first time. It was truly a new life. While enjoying this, I could not stop thinking about my friends back in my village who would love to experience these things. This thought created in me a passion to bring this opportunity to my friends in Mbem.

My new family, being westerners, understood this passion and supported it but unfortunately, there was no school in Cameroon teaching solar energy. They decided to set up a library for me full of books on electricity, management, engineering and so forth. They also allowed me to learn from my attempted repairs on the solar system in the house whenever there was a problem.

Continued on PAGE 10



John Nelson, IEEE Smart Village President

Liaison Report Continued from PAGE 9

In 2006, we started an NGO called Wireless Light and Power (WL&P). WL&P was an initiative with a mission to replace all bush-lamps with a locally fabricated, rechargeable lantern called the "light pack". WL&P operated between 2006 and 2010, then pivoted to a commercial entity called Renewable Energy Innovators (REI). With REI, we provided rechargeable lamps and started developing minigrids. Minigrids provided full power beyond just lights which the rechargeable lamps were providing. The first minigrid was tested in 2010 and has since then been expanded to eight villages in Cameroon, REIc plans to electrify 760 villages in Cameroon during the next eight years. In 2017, REIc got its first external seed support from IEEE Smart Village (ISV) and ISV has continued to provide support to the initiative through various additional funding. With this traction, REIc just secured \$1 million of support from the USTDA to sponsor feasibility studies toward the electrification of the 760 villages. So, I was born in darkness, grew up in darkness but now I bring lights!

JOHN: Jude, that is quite an amazing story. I would like to start out by asking you what was your motivation for setting up Renewable Energy Innovators—Cameroon (REIc)? I am sure that you could have done many other things.

JUDE: It was the passion to give the same newfound opportunity to my brothers and friends in my village, opportunity to watch TV whenever I wanted, opportunity to turn on a light bulb and read whenever I wanted and so forth.

Now for REIc, we aspire to expand our initiative across Africa because I realized lately that there are many other brothers and friends in other countries in Africa with the same challenges like the people in my village. "REIc" for Cameroon, "REIK" for Kenya and so forth. We have plans to be Pan-African.

JOHN: Let's concentrate on REIc. Please describe what REIc does including its past, present, and future plans:

JUDE: REIc is a solar engineering firm delivering reliable solar solutions to villages, homes, businesses, and institutions. REIc has created strategic partnerships with original equipment manufacturers (OEM) such as SimpliPHI Power, Schneider Electric, Solark, Steamaco, Sparkmeter, and others to deliver quality hardware and services with significant honorable warranties - a thing which is lacking in the solar sector in Africa. In 2019, REIc qualified and was certified by IEEE Smart Village as a manufacturer of the IEEE iconic SunBlazer. This allows REIc to commercialize the modular technology across Africa and beyond.



REIc SUNBLAZER FRANCHISE

In addition to these engineering services, REIc has developed and is executing its own solar PV with storage minigrids for rural electrification across villages in Cameroon. REIc plans to electrify 760 villages in the next few years, starting with 134 villages in 2022 to 2023. These minigrids provide access to electricity as well as connectivity and digital education services. REIc is also positioning itself as the go-to solar engineering expert for anyone wanting to venture into the electricity business in Africa.



REIc MINIGRID POWER SUPPLY

JOHN: Your REIc goals are commendable. Africa has roughly 1.2 billion people and roughly 500 million people have little or no access to electricity. What is the situation like in Cameroon?

JUDE: Official statistics show that there are more than 10,000 villages without access to electricity in Cameroon. REIc is looking to support 760 which is less than 10% of this need but it is huge.

JOHN: You are correct that bringing electricity to 760 villages in Cameroon is a worthy and remarkable goal. Let's change topics a little. I understand that REIc has a strong education program using an REIc developed software called EdEasy. Can you describe the software App, why you developed it and the purpose of the EdEasy App?

JUDE: EdEasy is a server-based digital education platform which we deploy using Wi-Fi hotspots across villages that have been electrified with our minigrids. This platform hosts content for basic literacy, numeracy and ICT and it is used by youths and adults in the villages who have missed formal education or have chosen vocational trade programs over formal schools. The curriculum is tailored toward enhancing critical thinking and good business communication and analytical skills in those that sign up. EdEasy does not replace formal education or classroom work; rather it enhances learning and excelling in a practical skill with or without formal education.

JOHN: The EdEasy App appears to be quite interesting. However, it appears that Wi-Fi is required. Having connectivity to the outside world is essential for a good education program. I understand that you have developed a method of connectivity and use that connection for a local intranet system. Can you please describe how this system works including connectivity, communications and so forth? Is this a profitable venture?

JUDE: Thank you for this question. First, we developed this mainly as a medium needed for the delivery of EdEasy content. But then we realized that access to the Internet was a major need as well. So, then we added internet as a service to the network.

It is a simple radio network on the free 5.0 GHz and 2.4 GHz bandwidth. We use Ubiquity Omni stations and access points to create Wi-Fi mesh networks in the villages. With this, network, villages can connect to a server that hosts the education content. This internet also has an internet management infrastructure called SAIS which assigns IP address and allows us to charge a fee per connection for the Internet time and/or data volume. This is where income is generated from the Internet; SAIS itself is connected to an Internet Service Provider (ISP), most often Satellite ISP for Internet and then redistributes it in the village, controlling speed, volume, and time.

Yes, it is a profitable venture, and it increases productive use of electricity on the minigrid as a whole.

JOHN: What do you see as the greatest challenge for REIc?

JUDE: Our greatest challenge is poor regulation. While the investors are wondering how we can possibly make money, the regulators (governments) think that we have a lot of money. They look just at the amount of assets that are mobilized per minigrid and conclude that the entrepreneur is already rich and should not be allowed to make money. We wish they could see the huge investment in assets compared to the market and see that it would take forever for any developer to make a return on investment, if at all. This is our biggest challenge we need to educate the regulator about the minigrid business, and they don't listen.

In my opinion, off-grid electrification should be deregulated, made a free market, and if the villagers cannot pay for the electricity service from minigrid developers, they will simply stop buying the power.

JOHN: Jude, it sounds like you are a free-market advocate and I understand what you are saying. The off-grid systems need to stand on their own and not be regulated like a large metropolitan electric utility.

Next, what do you see as the greatest accomplishment to date for REIc?

JUDE: The greatest accomplishment for us is the lesson learned from our extensive research and development in the off-grid sector. We know our villages, what they want and how they want it. 90% of the REIc team are people who have lived the village life without electricity. This is why we believe that we stand a chance to succeed as a pan-African initiative serving off-grid communities. It has been 17+ years since we started.

REIc TEAM



JOHN: Providing electricity and educational opportunities to the community empowers the people to develop businesses. What has been the impact of bringing electricity to the communities you serve and what kind of businesses have been developed?

JUDE: That is right. We have seen new businesses pop up after electrification while others have been enhanced. Businesses like barbering, cold stores, documentation offices, welding and so forth have been created and are highly successful.

JOHN: REIc has been active in supporting other IEEE Smart Village entrepreneurs. For example, you have worked closely with the team at the Maa Trust in Kenya and the possibility of providing training for RDO in Tanzania. Please describe what you have done and how this may impact REIc.

JUDE: Thank you. As I just mentioned, we recently realized that the problems we have in off-grid Cameroon are the same in other African countries where people remain without access to electricity. Also, we are in Cameroon and know the contest (context?) in Cameroon better than Kenya. But in order to provide the same level of service in Kenya or Tanzania, we have created technical relationships with electricity entrepreneurs in those countries. REIC's approach, therefore, is to train other electricity entrepreneurs to provide the level of quality and reliability in their respective countries that REIC provides in Cameroon. ISV is supporting many energy entrepreneurs who want to venture into electricity businesses across the continent and REIC, being an ISV-supported enterprise, wants to share the know-how and create footprints across Africa. To create sustainability, REIC's training goes with life-time business support in a franchise-type relationship with the trained entrepreneur.

JOHN: REIC has received a grant from USTDA to determine the feasibility of expanding REIC to roughly 130 villages and ultimately to roughly 760 villages within Cameroon. Can you discuss the significance of the grant, who is involved and what is the planned outcome of the grant?

JUDE: Thank you. This grant is our launching pad! We have extensive experience, we have piloted several minigrids, we have built and are expanding our team, we are building partnerships with OEMs and we have built trust in villages and with the government. With all these it is time to scale. This grant is the first step towards scaling our minigrad program to several villages. The grant is to support feasibility studies in 134 villages in Cameroon. In addition to the USTDA grant, we secured \$200K from ISV to implement a minigrad whose operational data will be used to feed the studies.

The study is being conducted by three US firms including the National Renewable Energy Laboratory (NREL), Morua Power and SimpliPower, as well as a local survey firm, GROUCONSER. The deliverable product of the grant is a detailed report on the feasibility of electrifying 134 qualified villages in Cameroon using the REIC business model and the SunBlazer technology. With the report, REIC will have the necessary details (credentials?) to attract the needed financing for the implementation of the minigrads.

JOHN: You have been a long-standing entrepreneur with IEEE Smart Village. How has IEEE Smart Village impacted REIC?

JUDE: A lot! The first time I got introduced to IEEE smart village was in 2012 by the Torch Bearers Foundation. Since then, it has been a very beneficial relationship. We have gotten invaluable pro-bono support in various domains of business and technology and we have been exposed and introduced to great partners. One great support is the seed financing from ISV which we have gotten. This made the difference. It allowed us to test our business in dimensions that we would never have been possible without it. Thank you IEEE Smart Village!

JOHN: We have set up this interview knowing that the time difference between Evergreen, Colorado and Yaounde, Cameroon is eight hours. An 8 AM meeting in Colorado equates to a 4 PM meeting in Cameroon. As a result, you are required to attend IEEE Smart Village meetings that can be later afternoon or into the evening

hours. What has been the impact of the time difference between Cameroon and the US in attending meetings and conducting business?

JUDE: Well, this is an interesting question. Most of the time while my other team members are going home, I have to stay back to attend these meetings, or sometimes in the car while leaving the office. Also, at 4 pm, as you know, one is looking forward to retiring for the day but for me, since I have several of these kinds of meetings with external supporters and partners, I tend to work until 8 pm. Zoom actually makes it better in that I can be taking dinner while listening in, I can be driving while attending the meeting and so forth. So, it is not a big challenge.

JOHN: We have covered a lot of ground during this interview. Could you please provide some closing remarks including topics we may not have covered?

JUDE: Thank you for taking the time to carry out this interview. I would love to do more of them. I believe there are many youths like me who may read this interview and be inspired or motivated to follow their passion and do impactful things in their communities.

CONCLUSION

I hope that you enjoyed this discussion between Jude Numfor and me. IEEE Smart Village is very proud of the accomplishments made by Jude and are encouraged by his passion to provide electricity to off-grid communities.

As you noticed, Jude is making a difference in Cameroon and expects to impact close to 10% of the off-grid villages. However, for Jude, tis is just the beginning in addressing a much larger population in need.

Jude is helping support Patrick Ryan's vision in a strong IEEE Smart Village Program where he was instrumental in getting projects like Jude's funded. Please feel free to help support IEEE Smart Village through a fund developed in the Memory of Patrick Ryan, past executive director of PES and mentor of IEEE Smart Village. Please check out the website and consider a donation.



Patrick Ryan

<https://www.ieeefoundation.org/PatrickRyan>

Article

Combining Deep Learning and FPGAs for Real-Time Neutron/Gamma Discrimination

In the context of research on magnetic confinement fusion, and indeed in the field of nuclear safeguards, the problem of neutron/gamma classification has been extensively researched [1]. The fusion yield, which is an essential quantity in tokamaks, is measured through neutrons generated by nuclear reactions. However, in fusion environments, both gammas and neutrons are present in the reactor. Thus, liquid scintillators with the capability of discriminating between gammas and neutrons are usually employed.



Miguel Astrain
2020 Real Time Student Paper
Award Recipient

The I2A2 research group at Universidad Politécnica de Madrid (UPM), develops tools to help integrate complex algorithms in FPGAs [3]. For complex systems, the FPGA is often employed for front-end electronics. This is the case of diagnostic systems used in fusion devices. Many approaches apply new machine learning techniques to these complex problems [2]. However, all the previous examples of these studies did not implement complete systems running on FPGAs. In this work, a collaboration was established with the purpose of creating a complete working prototype that would also use real tokamak data to train the Neural Networks (NN). The results presented here were obtained using a database generated from the KM13 Compact Neutron Spectrometer (vertical view) in JET [4].

To simplify the development of these complex neural network systems on the FPGA the OpenCL language was used. OpenCL is a heterogeneous programming language that enables implementing algorithms on the FPGA with extensively used high-level programming languages like C or C++. The OpenCL model contemplates a host system coordinating the computation made by kernels that are implemented in the device, in this case the FPGA. As can be seen in Figure 1, the neural network is implemented as kernels, using OpenCL and connected to other data-acquisition kernels to complete the system [3]. In Big Science facilities such as tokamaks, the thousands of instruments that control operation are coordinated using a control system. Many facilities in the world use the EPICS control system, but the integration of each system still needs to be done ad hoc. To mitigate this, ITER is using standardization tools such as Nominal Device Support v3 (NDS). The OpenCL host-device model, is integrated into a standard driver using NDS; the model and its connection with EPICS can be seen in Figure 2.

The implementation of the NN in hardware has been done using IntelFPGA OpenCL SDK. The host computer (running Red Hat Enterprise Linux 7 with ITER CODAC Core System) and the target device is an Advanced

Mezzanine Card (AMC) data acquisition device with an ARRIA10 FPGA hosted by a MTCA.4 chassis. The prototype achieved around 80 kEvents/s of throughput using half of the FPGA resources with a latency estimate of 50 μs, while the typical scintillator detector used for these applications goes up to 25 kEvents/s. With these results, our study concludes that it is possible to implement Neural Network systems using OpenCL applied to complex neutronics. Additionally, the proposed new architecture is capable of real-time classification of neutron/gamma waveforms, with accuracies better than 1%.

Miguel Astrain is a student at the Universidad Politecnica de Madrid and can be reached by E-mail at miguel.astrain@i2a2.upm.es

Figure 1. Simplified scheme of the neural network architecture, implemented as kernels in the FPGA and the connection with the data-acquisition system [3].

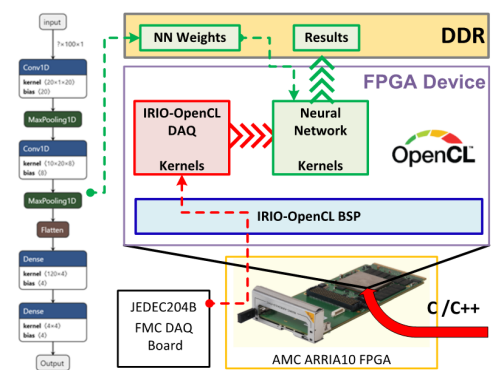
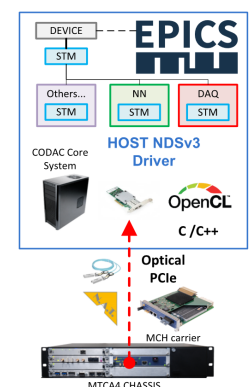


Figure 2. Simplified scheme of the system host connection, and the integration with the control system using NDS [3].



[1] R. Wurtz et al., "Methodology and performance comparison of statistical learning pulse shape classifiers as demonstrated with organic liquid scintillator," *Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 901, 2018, doi: 10.1016/j.nima.2018.06.001.

[2] M. Gelfusa et al., "Advanced pulse shape discrimination via machine learning for applications in thermonuclear fusion," *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 974, p. 164198, Sep. 2020, doi: 10.1016/j.nima.2020.164198.

[3] M. Astrain, M. Ruiz, A. Carpeño, S. Esquembrí, E. Barrera, and J. Vega, "A methodology to standardize the development of FPGA-based high-performance DAQ and processing systems using OpenCL," *Fusion Engineering and Design*, vol. 155, p. 111561, Jun. 2020, doi: 10.1016/j.fusengdes.2020.111561.

[4] F. Belli et al., "Conceptual Design, Development and Preliminary Tests of a Compact Neutron Spectrometer for the JET Experiment," *IEEE Transactions on Nuclear Science*, vol. 59, no. 5, pp. 2512–2519, Oct. 2012, doi: 10.1109/TNS.2012.2208763.

W. Kenneth Dawson October 26, 1927—January 17, 2022

Dr. Wilfred Kenneth Dawson (Ken) was born in Quebec City, educated at McGill, Laval and Queens Universities, became professor at the University of Alberta and member of its nuclear physics group. In the late 1960s, when the University of Alberta joined the TRIUMF collaboration, Ken became co-leader of the TRIUMF controls group, working from Edmonton. Following a two-year sabbatical at Los Alamos National Laboratory, working with the LAMPF controls group, he was seconded to TRIUMF where he held several important managerial positions as head of the controls group, head of the electronics and computing groups, and division head for administration. In the 1970s he was a leader in the international development team establishing the CAMAC modular instrument standard and making TRIUMF the first accelerator laboratory to adopt it for controls, followed in the 1980s by the next generation FASTBUS standard. Active in the 430,000 member IEEE from his early career, Ken was elected President of the Nuclear and Plasma Sciences Society (1986–7), after which he served as an IEEE Division IV Director (1993–94) with distinction, especially in the critical area of IEEE publications as VP Publication Services and Products (1993–1996), bringing management and technological expertise and updating. He also served many years as the second editor of the NPSS newsletter and was recognized by IEEE as the 2003 recipient of the IEEE Richard M. Emberson Award for distinguished service to the development, viability, advancement, and pursuit of the technical objectives of the IEEE. He was elected as an IEEE Fellow (2006) and received further awards including the NPSS Richard F. Shea award and election to the IEEE Technical Activities Board (TAB) Hall of Honor.



W. Kenneth Dawson

Ken is survived by his wife of 67 years, Louise, and their children Denise, Michelle and Rémy.

Comments from others who remember Ken:

From colleagues at TRIUMF via David Gurd:

It is with great sadness that we report the recent passing of a TRIUMF pioneer, Dr. Kenneth Dawson, in his way was instrumental in shaping the laboratory as a world class science facility. Ken was a team player and made a strong imprint on the laboratory's reputation of excellence. He will be remembered as well for his sharp wit, elegant writing and precise editing (with a jade ink fountain pen), as well as for curating the most extensive list of quotes from the famous (and not so famous), which were liberally sprinkled throughout the IEEE NPSS Newsletter. He was a team player and made a strong imprint on the laboratory reputation for excellence.

Prof. Emeritus Randy Brill, MD, Vanderbilt University:

Ken, while at TRIUMF, led in the development and dissemination of CAMAC as an important international standard used widely in the different National Labs (e.g. Daresbury, UK used it almost exclusively). A number of us in the medical field used CAMAC extensively in building and testing novel medical imaging systems. The

ability to have spare modules made it possible to keep systems with optimal use in routine operations. Ken's work on developing and disseminating CAMAC hardware and software has been of great importance in support of research at many levels in many countries and industries.

Peter Staecker, IEEE President 2013:

I was one of the youngsters of IEEE Volunteers who came to know Ken, his wisdom, and availability to help sort through problems of IEEE, including its committees and broad collection of personalities for those of us stumbling around the halls of our meeting venues looking for solutions to help our Societies (mine was Microwave Theory & Techniques), or our committee assignments, whether at the Society, TAB, MGA, Division, or BoD level. Ken was fluent in all the arcana of IEEE volunteer activities, but more than that was easily approachable, and always part of a solution process for those of us trying to leave IEEE a better place than we found it. We will miss him greatly, and Susan and I send our deepest condolences and gratitude to you, Louise and Family, for sharing your husband with us.

Peter Clout, NPSS President 1995-6:

It was the work on the Subroutines for CAMAC standard in the late '70s that introduced me to Ken. I was the Chair of the European committee and Ken was the Chair of the American end. It was Ken who picked up and did the hard work of making the ideas into a real standard. Ken was always looking for positive progress and had little time, to put it mildly, for those who only saw reasons not to do something. He tackled the tough issues that others shied away from.

Ray Larsen, NPSS President 1989-90, SLAC Stanford:

Ken and I shared a common heritage in being born in Canada, being avid readers and Defenders of the Queen's English. Ken also was a Professor at University of Alberta in Edmonton close to where I was born, and I graduated from UBC which became the home of TRIUMF. I first met Ken when CAMAC was starting up and we were both recruited by the legendary Louis Costrell to help with design and marketing to our respective Laboratories and globally. Meanwhile a new person from MIT named Alberta Dawson was elected to the NPSS AdCom from the Fusion community and eventually took over from Ken as Editor of the NPSS Newsletter in 2009, and as NPSS AdCom Secretary since 1995. The relationships with Ken and family have been close for over four decades due to the amazing people in IEEE and the global NPSS AdCom family. Ken helped set many new standards throughout IEEE, both modular and management systems, to benefit a global community.

Albe Larsen:

Ken has been a mentor and generous friend since I started on AdCom, and Louise has been generous in putting me up, feeding me many meals at the kitchen table, and supporting Ken in encouraging me to take on the editorship of the NPSS Newsletter. We also shared a love for mystery stories, good literature, good food of endless ethnic varieties, and enjoyed the continuation of the wrangling over commas started between Ken and Louis Costrell many decades ago. Ken will be hugely missed by me and by many others whose lives he influenced.

This article was written by Ray Larsen with input from many others and especially those whose comments have been included. Ray Larsen can be reached by E-mail at larsen@slac.stanford.edu.

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Advice on possible authors or offers of such articles are invited by the editor.

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