
AIP

HISTORY NEWSLETTER

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Documenting String Theory's History on the AIP Helleman Graduate Research Fellowship

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ABOUT THE NEWSLETTER

This newsletter is a biannual publication of the Center for History of Physics, American Institute of Physics, 1 Physics Ellipse, College Park, MD 20740; email: chp@aip.org or nbl@aip.org. Editor: Joanna Behrman. The newsletter reports activities of the Center for History of Physics, Niels Bohr Library & Archives, and other information on work in the history of the physical sciences.

Any opinions expressed herein do not necessarily represent the views of the American Institute of Physics or its Member Societies. This newsletter is available on request without charge, but we welcome donations (tax deductible) (foundation.aip.org). The newsletter is posted on the web at www.aip.org/history-programs/history-newsletter.

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Optica (formerly OSA)
The Society of Rheology

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AIP'S EMERGING VISION FOR HISTORY PROGRAMS INFORMED BY NEW REPORT

By Michael Moloney, CEO, American Institute of Physics

AIP's mission is to advance, promote, and serve the physical sciences for the benefit of humanity, a key component of which is preserving and making known the history of physics and its allied fields—the longstanding mission of AIP's history programs at the Center for History of Physics and the Niels Bohr Library & Archives. These programs have been at the heart of AIP for 60 years, and since I became CEO five years ago, I've been proud to work with the AIP Board of Directors on investing about \$10 million in this priority effort.

Over those same five years, AIP has been engaged in a strategic transformation to position the institute to meet the future demands of delivering on our mission and empowering physical scientists. AIP has been working to optimize its entire portfolio of activities around the Strategic Framework that the Board of Directors approved in 2019.

As the vision for AIP is now being realized, one central question has been, How do we best align our history, library, and archives activity with AIP's transformation and future vision?

At the beginning of 2023 we took a significant step on the path to answering that question with the delivery of the final report of the Blue-Ribbon Panel to Envision the Future for AIP's History, Library, & Archives Programs, the membership of which was introduced to you in the Fall 2022 issue of this History Newsletter. In the summer of 2022, I and the Board of Directors tasked this illustrious panel with formulating a strategic vision for the AIP history programs. I am immensely grateful for the work and diligence of the members of the panel, the panel's chair Fred Dylla (former AIP CEO), and all the AIP staff (especially Will Thomas) who contributed to a thorough and ambitious report that is already an important resource for AIP now and will continue to be in the years ahead.

While we cannot yet predict all that will come from this effort, I'd like to share with you some of the main themes that emerged and how well the panel's vision aligns with our strategic transformation.

Readers of this *Newsletter* know very well the strength of AIP's collections and the support and encouragement our history activities offer to historians. Reinforcing the professional values behind this work, the panel highlights opportunities AIP has to coordinate efforts and more firmly establish the institute as a “knowledge center” for the history of the physical sciences. The panel notes that AIP has an opportunity to enhance our curation of materials, informational resources, and communications to more actively promote knowledge of history as well as to foster exchanges of ideas about the past and its relevance to the present and future.

In developing its vision, the panel was inspired by AIP's own history. AIP initiated our history programs because leaders of our scientific community recognized that memories and documentation were in real danger of permanent loss. In response, AIP has not only confronted that jeopardy but also cultivated communities focused on the histories of subfields such as nuclear physics, astrophysics, and geophysics, and of institutions such as the Department of Energy's national laboratory system.

Looking to the future, the panel has challenged AIP to build on this legacy as we transform the institute to meet 21st-century needs and opportunities.

In meeting this challenge, AIP could consider focusing on collecting documentation, conducting interviews and oral histories, developing information resources, and communicating about targeted themes and historical subjects. Such projects would echo work we have done before. But it is also clear that AIP's history programs will need to look different to take advantage of all the digital era has to offer nonprofit mission-oriented organizations like us. We have a present opportunity to innovate in how we communicate and expand our reach and impact. AIP has been investing significantly to this end. But there is much more work to do as we recommit ourselves to the preservation and dissemination of the physical sciences' historical context.

For instance, there are new opportunities in presenting history, as it has become easier to weave together different kinds of materials—such as documents, images, video, data, and commentary—into compelling narratives in a wider variety of media. Moreover,



those media are more accessible now than ever before. Whereas special projects might once have been driven toward the production of a final report or a published book consulted only by a few, it is now possible to communicate quickly, frequently, and to different audiences in bespoke ways, thereby encouraging broader engagement, participation, and collaboration.

This exciting vision aligns well with AIP's transformation toward communicating content through digital media in a way that drives future progress. Our investments will deliver platforms for communicating on critical historical topics that can empower our community of historians and storytellers who will, in turn, empower our community of physical scientists to be cognizant of the past while they pursue discovery, education, and technological change.

As we engage in top-to-toe change at AIP, we also know that the physical sciences have themselves changed. Our science is typified today by a community that is larger, multidisciplinary, trans-disciplinary, and expanding to be a more diverse community. Our colleagues in discovery investigate a broader array of topics and now operate daily and fluently in the digital world.

The Blue-Ribbon Panel observes that archivists and historians of science everywhere are just starting to grapple with what these changes mean for how the historical record is preserved,

organized, and presented. In their report they encourage AIP to play a leading role in finding ways to catalyze this change by actively leading the community in how we record for posterity what we do as a scientific enterprise.

For example, while AIP will continue to partner with larger institutional archives to address most archival preservation, we are asked to consider what sorts of documents and audio-visual material it might make new sense to collect and how our collections can inform and inspire other archives' work. Indeed, the digital world allows us to engage with these peer collections across the globe in ways unthought of just a few years ago.

Also, history must cover much more ground than before. We will always have Curie and Einstein. But a well-stewarded historical record should address the activities and concerns of the full diversity of the physical sciences enterprise. Success in the physical sciences today is not solely that of lone geniuses at the blackboard solving the equations of the universe; it necessitates collaboration, inputs across disciplines, and it includes the full range of careers and pursuits that our undergraduate and graduate students dream of.

This new, more diverse reality presents a challenge to how we allocate attention and design resources covering various time

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periods, geographies, individuals, communities, and subject matter—even, perhaps, industries.

The panel specifically identifies a strong opportunity in charting diversity in the physical sciences, as defined in a variety of ways. It notes that collating and expanding on the work AIP and many others have done on the subject would be of great value at a moment when there is intense interest across the sciences in promoting diversity, equity, and inclusion; and in acknowledging and addressing the injustices, discrimination, and inequities that all too often have been integral to the conduct of our science.

AIP's overarching strategy is to advance the physical sciences with a unifying voice of strength from diversity. We take this commitment seriously, and I am committed to ensuring our history programs align to this strategy in powerful ways. And when we at AIP think of our commitment to diversity, we think not only of that one word and all of its dimensions but also about the full implications of equity, inclusion, belonging, and accessibility. We have the opportunity to double down on that focus as it relates to our history programs.



Members of the Blue-Ribbon Panel look at rare books in the Niels Bohr Library & Archives in August 2022. Image credit: Will Thomas.

But we cannot do this work alone. The panel recognizes the ambition of its vision and that AIP will need to cooperate with others to pursue it. It especially encourages us to deepen our connections to the scientific, engineering, and technical communities—who are

natural stakeholders in the stewardship of their history. Part of that involves doing more to help these professionals in the physical sciences to think of themselves as historical actors who inherit practices of the past and make choices that define their fields' future. Many of these practitioners are members of AIP's ten Member Societies and our community of AIP Affiliates—making those organizations clear partners. In addition, we need to consider how to make the historical record more accessible and usable for scientists, as well as encourage them to comment on changes in their fields, thereby building on our long-running activities in oral history.

Pursuing the panel's vision will also involve substantive and significant engagement with historians. These colleagues have long been essential to our work. But the panel encourages us to build on existing support for graduate students and early-career professionals and to do more to leverage and draw attention to historians' publications. In addition, the panel highlights the prospects of using partnerships with institutions such as museums to better tailor and more impactfully convey resources to audiences AIP may not be well positioned to reach today.

In reading the report and having conversations with the panel, I was particularly pleased that they engaged with our goal of developing AIP as, in the words of our Strategic Framework's institute goal, "a center of excellence that advances the physical sciences enterprise through research and analysis aimed at improving the understanding of our heritage and promoting future progress." And the panel's observations on interacting with the community mesh well with AIP's identified priority audiences, namely, our ten Member Societies, researchers, policy influencers, early-career professionals, educators, students, and donors.

Our publication *Physics Today*—celebrating its 75th anniversary this year—our decades-long work in gathering statistics and demographics, our 35 years of reporting for FYI, the science policy news service, our curation of Member Societies' records, and the AIP-organized Society of Physics Students all result in our having large archives of content that can serve as historical resources. All of what AIP has been doing and will be doing as we forge our new future allow our history programs to connect past and present in the service of future progress in the physical sciences enterprise.

How AIP pursues this institute goal will be a major focus of my own attention in the coming year. We have an unprecedented opportunity to refresh our vision for how the history programs can best support AIP's mission while also leveraging the unique attributes and expertise we have cultivated in these programs for decades.

Some of the ideas in the panel report are already strongly influencing AIP-wide deliberations. Others will unfold over the longer term. And honoring and incorporating the carefully forged vision

provided to us by the Blue-Ribbon Panel will require that we carefully balance our resources with our ambitions.

In that regard, AIP Foundation will continue to be a critical partner in cultivating support for our work in history. AIP's history programs are already supported by a strong community of donors. Thank you!

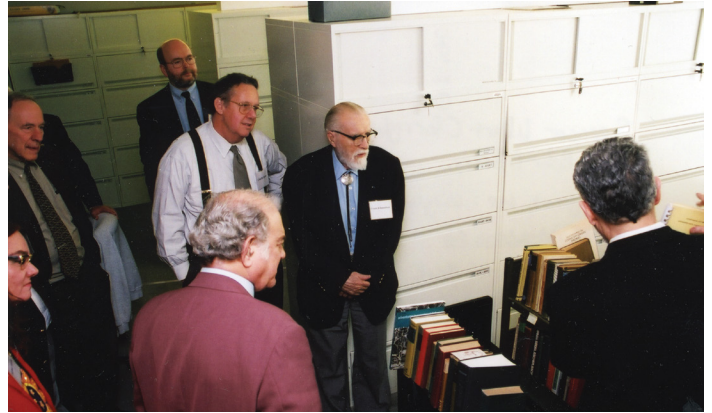
Looking forward, I know that to realize fully our future opportunities and promise, donor support will be critical to ensuring AIP is a "must-go" destination for historians, storytellers, and physical scientists interested in the historical context of our science.

Realizing our ambitions for AIP as the envisioned center of excellence will require us to have thoughtful, innovative, and inspirational leadership. We will be focused on bringing that leadership to AIP this year so we might deliver on the vision where AIP is called upon for its research and analysis expertise, incorporating all AIP has to offer in history, science, and culture.

At AIP we are building a digitally enabled future so that we will be a critical and trusted source in addressing opportunities and concerns of the multisector physical sciences community. We are determined to ensure AIP is the institute that leads the physical sciences community toward an impactful understanding of how to be more welcoming to and supportive of the full diversity of physical scientists throughout their careers. Knowing our history is key to delivering this future.

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American Institute of Physics. Mission and Strategy.
<https://www.aip.org/aip/mission-strategy>.



Spencer Weart (far right corner) gives a tour of the Niels Bohr Library & Archives on the occasion of its 40th anniversary in 2002. In the foreground are, left to right, Virginia Trimble and Robert Resnick. In the background are, left to right, Mark McDermott, Charles Duke, and Frank K. Edmondson. In the far background is Joseph Anderson. Photograph by Malcolm Tarlton, courtesy of AIP Emilio Segrè Visual Archives.

Article photo (page 5): The first Exploratory Conference on the History of Contemporary Physics. AIP cosponsored three of these conferences together with the American Academy of Arts and Sciences in the 1960s. From left to right: Erwin N. Hiebert, I. Bernard Cohen, John A. Wheeler, Robert R. Wilson, Valentine L. Telegdi, and Raymond G. Herb. Image credit: AIP Emilio Segrè Visual Archives, Physics Today Collection.

ORAL HISTORY PROGRAM UPDATE

By Jon Phillips, Oral Historian

The AIP oral history program has seen a great deal of activity over the past three years, and a great deal of change. With the onset of the pandemic in 2020, we switched to conducting remote interviews over Zoom for the first time and used the flexibility that provided to record an unprecedented number of oral histories—roughly 500 over the course of a year and a half! That burst of activity grew our collection significantly, and since then we have been working diligently with our archives staff to get these interviews processed and made available on our website, a monumental task that we completed this past

December. This wouldn't have been possible without the help of an extraordinary team of temporary staff. On behalf of the oral history program and CHP/NBL&A as a whole, a very big thank you to Ani Murray, Sara Casazza, Molly Foster, Melissa Lohrey, and Emma Whitty!

Of the interviews we've made available, a few stand out as especially notable, but one in particular is worth highlighting here: a roundtable discussion of the origins of the JASON

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scientific advisory panel, featuring Richard Garwin, Kenneth Watson, Curtis Callan, and Roy Schwitters, provides some fascinating insights into the history of science policy over the latter half of the twentieth century, covering issues from the space race, to the Vietnam war, to nuclear policy. This group interview is a fascinating read and will be an invaluable primary source for research on a wide variety of topics.

In addition to processing those 500 interviews conducted by CHP staff, the oral history program has continued to work with AIP Member Societies to collect, process, and make available oral histories *they* have conducted. We are currently working to process those interviews and are expanding our support for new interviews by offering training workshops for any interested Member Society. The first of these was held with members of the American Vacuum Society (AVS) History Committee in January. These workshops provide an overview of interviewing strategies and best practices, technology, ethical and legal considerations, resources available to interviewers, and an opportunity to discuss any specific oral history projects participants are planning or already working on. Anyone interested in arranging an oral history workshop should feel free to reach out to us at chp@aip.org or jphillips@aip.org.

As always, the oral history program welcomes donations of interviews as well as suggestions for people we should interview ourselves. We are also happy to consult on oral history projects and to offer support however we can, such as through our Grants in Aid program, which offers up to \$2500 in funding for projects in the history of the physical sciences. To learn more or to apply, visit <https://www.aip.org/history-programs/physics-history/grants>.

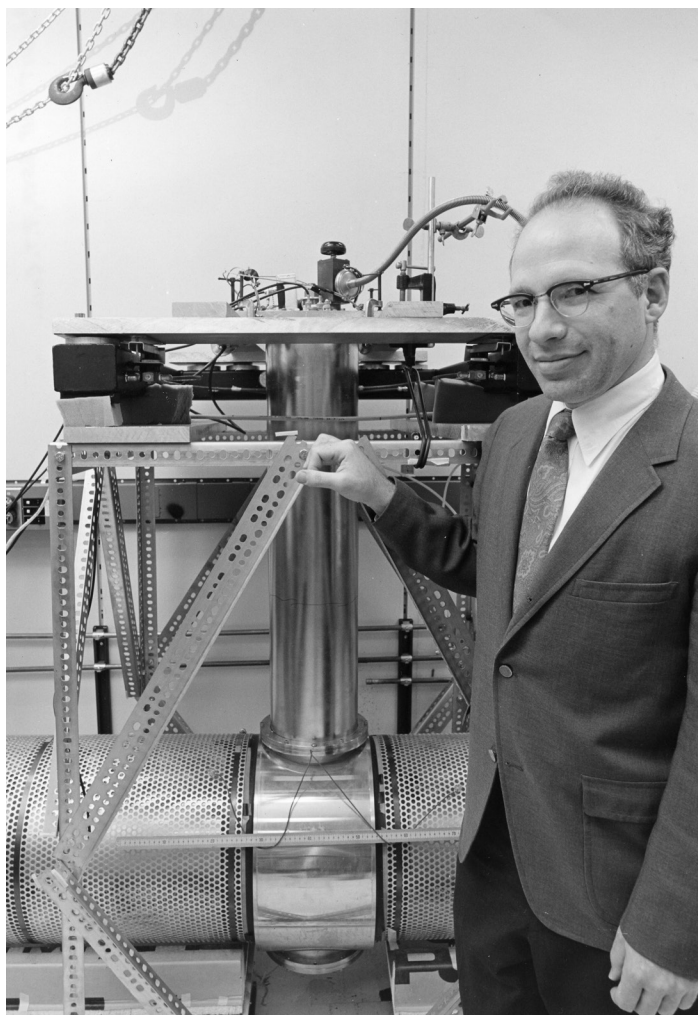
And finally, there have been staffing changes in the oral history program since our last update. David Zierler, hired as oral historian at the end of 2019, left AIP in July 2021 for a position at CalTech. Jon Phillips, formerly the assistant oral historian, has taken on the duties of oral historian since David's departure. The report from the Blue-Ribbon Panel to Envision the Future for AIP's History, Library, & Archives Programs, described elsewhere in this issue of the *AIP History Newsletter* provides recommendations that support new oral history activity in the coming months and year. Stay tuned!

References

- Interview of Richard Garwin et al. by David Zierler on January 30, February 6, 13, 20, and 27, 2021. Niels Bohr Library & Archives, American Institute of Physics, College Park, MD, USA. www.aip.org/history-programs/niels-bohr-library/oral-histories/47275.



Portrait of Roy Schwitters in his office. Image credit: AIP Emilio Segrè Visual Archives, Physics Today Collection.



Richard Garwin posing with equipment in a laboratory. Image credit: AIP Emilio Segrè Visual Archives, Physics Today Collection

HELLEMAN FELLOW MICHIEL BRON EXPLORES THE HISTORY OF ENERGY

By Joanna Behrman, Assistant Public Historian



Michiel Bron. Image courtesy of the interviewee.

In 2022 the American Institute of Physics awarded the Helleman Fellowships for the second year. These fellowships were endowed by and honor Dr. Robert Helleman, a Dutch-American physicist who specialized in nonlinear dynamics and chaos. Helleman, a professor at the University of Houston, wanted to establish an endowment to support Dutch graduate students or postdoctoral fellows in conducting research in physics and its subdisciplines (including the history of physics) in the United States.

There are three different types of Helleman Fellowships:

- The Postdoctoral Fellowship, which provides an annual stipend of \$70,000 for an initial period of one year with a possible one-year extension, with an additional one-time award of \$10,000 for research expenses.
- The Graduate Fellowship, which offers an annual stipend of \$40,000 for an initial period of four years with a possible one-year extension, with an additional one-time award of \$10,000 for research expenses.
- And the Graduate Research Fellowship, which provides a monthly stipend of \$3,000 for a two- to six-month period.

Applications for these fellowships are accepted every year, with an application deadline of March 15th. Notifications of awards are made in May. More information about the fellowships and the application process can be found at <https://www.aip.org/aip/awards/helleman-fellowships>.

Michiel Bron of Maastricht University won a Helleman Graduate Research Fellowship in the 2022 round of applications and used the funds to visit archives in the United States in September and October of last year. He is a PhD student in the history of science and technology, currently being supervised by Professor Cyrus Mody and Dr. Vincent Lagendijk. Below is an interview with Michiel about his research and his work on the Helleman Fellowship.

How have your research interests evolved over your career?

During my career I have mainly committed to studying history of science and technology, focusing on the development of public and scientific ideas on nuclear technologies. In my current PhD

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research, I focus on the influence of different oil actors on the development of nuclear energy. Since the beginning of the twentieth century, the oil industry played a big but understudied role in the development of atomic physics and the exploration for radioactive minerals. My thesis studies how this connection emerged, why the oil industry then became increasingly involved in building the nuclear industry from the Second World War onward, and why many oil companies stopped their involvement in nuclear energy in the 1980s. For this research I focus on specific oil actors involved in the nuclear industry with a background in geophysics, such as George W. Bain and Paul Darwin Foote, and nuclear scientists with connections to the oil industry, such as Merle Antony Tuve and Hans Bethe.



Paul Foote checks fluid levels in the engine of a car. Photograph by Johnston and Johnston, courtesy of AIP Emilio Segrè Visual Archives.



Hans Bethe and Robert R. Davis converse. Photo by Heka Davis, courtesy AIP Emilio Segrè Visual Archives, Physics Today Collection.

How has the Helleman Fellowship impacted your work?

To do the historical research, I wanted to study at several archival sites located at the US. East Coast. While planning my research stay, my supervisor pointed me to the existence of the Helleman Fellowship. This fellowship allowed me to visit various archives

of oil companies and scientists who had worked as consultants to the oil and nuclear industry. Working at the different archives allowed me to study the papers of scientists involved as consultants within the oil industry and the papers of oil companies such as Gulf Oil Corporation. These papers brought valuable insights to my research and will feature prominently in my final dissertation and upcoming articles. Already during my research stay, I presented my preliminary results before the Science History Research Group at Cornell University.

What archives did you visit on your trip to the United States?

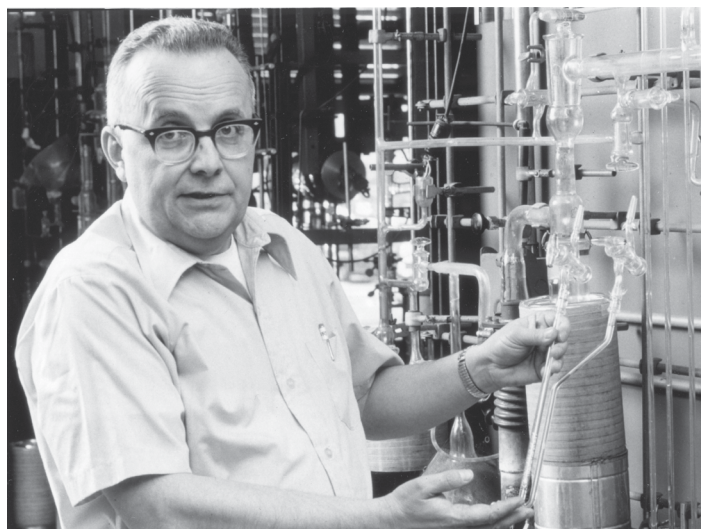
The Helleman Fellowship allowed me to conduct research at several institutions in Washington, DC, including the Smithsonian National Museum of American History, the Library of Congress, and the Carnegie Science Archives at the Earth and Planets Laboratory, and then to make archival visits to Amherst College, Cornell University, Carnegie Mellon University, and Heinz History Center in Pittsburgh.

What papers did you look at?

The first half of my stay in the United States took place in Washington, DC. I spent three weeks there doing research in the collections of the American Petroleum Institute, the Industry on Parade film collection, and the Serge A. Scherbatskoy papers, all at the National Museum of American History. At the Library of Congress I visited, over five days, the Merle Antony Tuve papers, the Benjamin S. Loeb papers, Harold Gardiner Bowen papers, Carl Eckhardt papers, I. I. Rabi papers, John and Klara Dan Von Neumann papers, the Glenn T. Seaborg papers, the Byron S. Miller papers, the Robert E. Wilson papers, and the Jack Kilby papers. I also spent several days at the Georgetown University Library and Archives researching the papers of Barbara Ward (Baroness Jackson), Joseph A. Mahon's ARAMCO History Project collection, and the collection of Bernard J. Picchi. During the latter part of my stay in Washington, DC., I conducted research at the Carnegie Science Archives at the Earth and Planets Laboratory, where I worked with Shaun Hardy, the collections archivist.

During the second half of my research stay in the United States, I traveled around through Amherst College and Cornell University, and to various archives in Pittsburgh. First, I visited the George W. Bain papers, John J. McCloy papers, Bruce B. Benson papers, and Henry Way Kendall papers in the Amherst College Archives & Special Collections. At the Division of Rare and Manuscript Collections at Cornell University, I examined the papers of oil geologist Sidney Kaufman, the papers of Robert O. Pohl, and did extensive research on the involvement of Hans Bethe in the laser uranium enrichment program of Exxon Nuclear. In Pittsburgh I visited the Thomas & Katherine Detre Library & Archives at the Senator John Heinz History Center for a period of one week. There I focused on the Gulf Oil Corporation records and the

records of the Westinghouse Electric Corporation, both companies with a long presence in the nuclear industry. At Carnegie Mellon University I visited the Clifford Glenwood Shull Collection, the Lincoln Wolfenstein papers, the Theron Wassen Collection, and the Mellon Institute of Industrial Research papers.



John Sinfelt at Exxon Research and Engineering Company, ca. 1979. Courtesy AIP Emilio Segrè Visual Archives, Sinfelt Collection.

Who was your host institution in the United States, and how was your experience working with the individuals there?

My host institution was the Smithsonian National Museum of American History under the supervision of Arthur Daemmrich. Although I traveled around a lot to visit the different archives, I found the support from the host institution very beneficial. They introduced me to their archival collections and provided the perfect place to begin my research stay. Furthermore, they also provided helpful tips for the other archival visits.

The assistance from the various archivists, with curator David Haberstick in particular, was very helpful when going through the different photograph and film collections. Also, Eric Hintz and Arthur Daemmrich really helped a lot in setting up the archival research and helping me to get the most out of my research stay.

What are some of your long-term career goals?

First of all, I hope to finish my PhD. dissertation in the summer of 2024. During this period I will also be working on several articles based on research conducted during my stay. After finishing my PhD, I would like to pursue a career working on research topics related to my current project.

WHAT'S THE LATEST NEWS?

Homer Dodge reads the newspaper while Margaret Wing Dodge looks on at home in Iowa. Credit: ESVA, Dodge Collection.

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DOCUMENTING STRING THEORY'S HISTORY ON THE AIP HELLEMAN GRADUATE RESEARCH FELLOWSHIP

By Robert van Leeuwen, Institute for Theoretical Physics and the Vossius Center for the History of Humanities and Sciences, University of Amsterdam



Robert van Leeuwen (right) with fellow 2021 Helleman Fellowship recipient Jaco de Swart in front of MIT's Great Dome in Boston. Photo courtesy of Jaco de Swart.

In the field of theoretical particle physics, string theory is a candidate for the unification of the four fundamental forces (electromagnetic, weak, strong, and gravitational) into a single overarching mathematical framework. The theory experienced its breakthrough in the mid-1980s, when a series of theoretical results promised the possibility to construct realistic particle physics models out of string theory (Rickles 2014). Ever since, the string theory program has remained highly influential in the high-energy physics community.

As a PhD candidate at the University of Amsterdam in the Netherlands who is working on the history of string theory, I was extremely excited to receive a 2021 AIP Robert H.G. Helleman Memorial Graduate Research Fellowship. The fellowship supports Dutch early-career scholars to pursue research activities in physics (and history of physics) in the United States. It allowed me to spend four months (from September to December 2022) as a visiting student research collaborator at Princeton University's Department of Physics. My primary goal was to conduct a series of oral history interviews with string theorists.

The location of Princeton was, of course, far from arbitrary: when unified string theory became established as a highly promising research program in the mid-1980s, Princeton was arguably the center of activity for string research. The community that was forged then is to a large extent still active, both in Princeton and at other institutions in the US or elsewhere. Up until today, Princeton University and the nearby Institute for Advanced Study (IAS) are strongholds for string theory. As such, the Helleman Fellowship provided a unique opportunity to document the recollections of key contributors to string theory.

During my fellowship stay I was able to explore a number of related questions on string theory's development. Why was string theory so successful in attracting researchers in the mid-1980s? How did it prove to be such a persistent research program, despite the formidable difficulties that were encountered in attempts to straightforwardly derive realistic particle physics models out of string theory? How did this relate to the theoretical work of the involved physicists?

A large chunk of the physicists I interviewed were, in fact, themselves in the early stages of their career in the mid-1980s. Their stories thus provide first-hand accounts of string theory's establishment. Many of these early string theorists were previously working on a variety of different (but related) topics. For example, Mirjam Cvetič (who finished her PhD in 1984 and is currently a professor at the University of Pennsylvania) explored the issue of the unification of particle forces through work on enhanced models of particle physics that included so-called supersymmetry and got involved in string theory from that angle. Igor Klebanov (PhD in 1986, now professor at Princeton University) was not working on unification at all before turning to string theory but was instead concerned with models of hadrons, the strongly interacting particles that make up the atomic nucleus. Andy Strominger (PhD in 1982, now professor at Harvard University) had his own particular background as well, being already interested in issues surrounding general relativity and quantum gravity in the early 1980s, before it became a widely pursued topic in theoretical particle physics. They (and many other young theorists) all started working on string theory in the mid-1980s, and their combined stories can illuminate how they established and developed the string theory program.

Although the main part of my interviews was with members of this "first generation of string theorists," this was not my sole focus. The most senior physicist I interviewed was Peter van Nieuwenhuizen (PhD in 1971, now distinguished professor at Stony Brook University), an example of the successful integration of Dutch and US high-energy physics. Van Nieuwenhuizen was a key contributor to an earlier attempt to unify the elementary particle forces and gravity called "supergravity." Supergravity was formulated in the mid-1970s and is intimately connected to string theory. As a unified theory approach, it can be viewed as a predecessor of string theory, but at the same time, supergravity is a low-energy approximation of string theory. The youngest theorist I have interviewed so far was Juan Maldacena (PhD in 1996,

now professor at the IAS). Maldacena's work, particularly his introduction of the so-called AdS/CFT correspondence, has had tremendous influence on string theory and theoretical particle physics in the past decades. The recollections of van Nieuwenhuizen and Maldacena can thus contribute to understanding how string theory grew out of particle physics from the 1960s and 1970s, and how it shapes current lines of research.

Apart from the interviews, the Helleman Fellowship provided me with the opportunity to research the archival collection of the Japanese-American physicist Yoichiro Nambu at the University of Chicago. Nambu was yet another scholar who constituted a link between string theory in the 1980s and particle physics from previous decades. I also got to consult the archives of the Institute for Advanced Study and the Niels Bohr Library & Archives.

Finally, I want to point out a less explicit type of result from my AIP fellowship. For me it has been highly inspiring to be, in a sense, immersed in the history that I am writing and to meet and see with my own eyes all these people and places that are directly linked to the development of string theory and theoretical particle physics in the last fifty years. Being able to interview physicists in real life (be it in their office, their home, or while walking across campus) felt like a huge advantage over meeting online, and definitely improved the quality of the interviews. In addition, both the theoretical high-energy physics group and the history of science group at Princeton University were extremely welcoming and provided a highly stimulating environment in the form of workshops, weekly seminars, and informal exchanges. They allowed me to grow as a researcher and to improve my skills as a historian of physics. For me, this experience of US academia, in combination with the interviews and archival results, will be of great help in bringing my historical narrative to life.

In due time the full collection of interviews I conducted will be added to the Niels Bohr Library & Archives, and I hope they will also be valuable for many other researchers to come.

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- Rickles, Dean. 2014. *A Brief History of String Theory*. The Frontiers Collection. Berlin, Heidelberg: Springer.



FEATURED OHI: MARIO AMZEL

By Corinne Mona, Assistant Librarian, and Joanna Behrman, Assistant Public Historian

We are pleased to present biophysics specialist and beloved educator Mario Amzel (1942–2021) as the subject of this featured oral history.

Mario Amzel grew up in Buenos Aires, Argentina. His Austrian parents spoke Polish to each other and Spanish to Mario and his sister. Despite protests from his father, who thought the study of math and science impractical, Amzel received his undergraduate education and PhD in physical chemistry from the University of Buenos Aires. Amzel finished his PhD with the university faculty who had fled to Venezuela following the 1966 Argentinian governmental coup d'état. After graduation, he was enticed by fellow Argentinian Robert Poljak to pursue a postdoctoral fellowship at the Johns Hopkins School of Medicine in Baltimore, Maryland, and was subsequently hired as a professor in the Department of Biophysics and Biophysical Chemistry there. He directed the department from 2006 to 2021 and also served on the Johns Hopkins Advisory Board of the medical faculty for fourteen years. He was involved in many collaborations and worked on a variety of studies in biophysics, although he kept a special interest in the structure of things throughout his life.

On his love of symmetry:

Amzel: At the time, you realize, LCDs (liquid crystal displays) have not been completely described yet, so I chose plastic crystals and not liquid crystals because, you know, I'm a person with good three-dimensional intuition. Plastic crystals are symmetry-based . . . you know, an extraordinary utilization of symmetry. And liquid crystals, although one could see where they were going, were more boring—flat molecules moving in a layered environment.

Zierler: Why is that more boring?

Amzel: No, just because I like symmetry a lot.

Zierler: (laughs)

Amzel: So, so in plastic crystal, the idea is that the symmetry of the molecule is lower than the point symmetry of the place the molecules are in the crystal. So it's very small changes in the crystallographic cell, you get the molecules to occupy symmetrical positions. And that is okay, is not that interesting, but if the molecules have almost-symmetry, quasi-symmetry, then they are going to occupy highly symmetrical positions but with multiple occupancies. And that was fun. That's sound interesting. (laughs)

On the June 1966 coup which established General Juan Carlos Onganía as de facto president of Argentina:

Amzel: 1966, there was a military coup. . . . And they did not ignore the university. . . . We had our authorities that we had chosen, voted for, and whatever. They chose another person, they gave the person a new position that didn't exist in the by-laws of the university. And was the boss of the university. And told us what to do. And we did not agree. So one day, we call for a massive meeting, and they send the National Guard and they, you know, they hammer us with clubs and they put us in jail for a few days.

Zierler: Because you would not comply with the orders?

Amzel: Well, because we were there admitting to [being seen] not to comply with their orders, yes.

Zierler: Uh-huh. Uh-huh.

Amzel: Yes, so I was in jail a few days. I have a scar to remember one of the clubs.

Zierler: Really?

Amzel: Yes, in the head. And so then we started to meet in groups outside, and there was a lot of solidarity from universities in Latin America and the United States and the Ford Foundation.

On moving to finish his PhD in Venezuela as a result of the coup in Argentina:

Amzel: So people started to go to different places. Chile was one place where many people went. Places in the United States. Those schools did not accept groups, but they accepted individuals. Uruguay was another place. And then we required x-ray equipment at the time. And the only place that even had or bought one for us was Venezuela. So a group of four people, and then a few other people, went to Venezuela. And I went there.

Zierler: Who, who was the home institution in Venezuela? Who hosted you?

Amzel: Universidad Central de Venezuela.

Zierler: Uh-huh, uh-huh. Did professors go to Venezuela as well?

Amzel: Yes, oh yeah, the professors went to Venezuela. . . . We went as a group, but they gave us . . . Because, well, there was one thing, which is in Venezuela, because they didn't have a doctorate, and they were trying establish it, a doctorate was not required to be a faculty. So the people that were doing the doctorate in Argentina were given faculty positions, and that was a very strong attraction. We had to teach, and we all liked to teach. And I could finish my thesis there . . . in the end of 1968, and I got a paper from the university that said I had completed all the requirements for a thesis.

On deciding to stop with a project:

Zierler: Right. Would you say that most of the areas of research that you've pursued are open and closed, or are they mostly ongoing? In other words, in a very long career, right? In any given time, you're working on however many projects you're working on. And over the decades, are those projects, do, do they sort of continue on, or do you usually close a given project before you start another project?

Amzel: No. I don't necessarily close all the projects, but the question I ask at every . . . very frequently, very frequently, especially when I have one result and I am thinking, What is my message here? Is there anything which is useful and important

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that I can continue starting now? And sometimes the answer is yes. And sometimes the answer is, this is the time for other people to intervene. The people that do the orange and the green stains, the people that inject the mice, and for me, the things I can contribute are not going to be as important as those, and is a good moment for me to stop.

On the distinctions among the different fields of biology, chemistry, and physics:

Zierler: Do you think that the distinctions between physics and chemistry and biology are essentially artificial? That those are really constructs of how the human mind works? And that there are, in fact, greater connections between these disciplines than the way that we tend to think about them?

Amzel: I think so, I think that yeah. In the end, for something I'm going to become philosophical (philosophy of science). And I think that at the end, they are the same thing, but the connection is . . . the scale of observation. If you look with a light microscope, you have a scale of observation and it's not that you're ignoring physics. You are using it for the lens, you are using it for the light, you are using it for the laser. You are using the physics for the fluorescent compound. But for the scale that we call "biological," we are only observing things that cannot be directly related to first principles. We try very hard.

Zierler: Why can't they be related to first principles?

Amzel: Well, in some cases they could. For example, if you are looking at the relation between cells . . . membrane deformation and membrane potential. You can write equations for everything. There are so many parameters, even if there are not too many, there are so many that are heuristic that create a difference between that and physics. The same thing I saw that on physics. About physics. For example, a liquid flow. Fluid, fluid dynamics. Fluid dynamics is not at the same level as mechanics. Or is not on the same level as thermodynamics. So the observations in biology are closer to observations and things that we do in fluid dynamics than what we consider first principles.

Zierler: Observationally, where does chemistry fit in this? You're contrasting observations of scale from biology and physics. Where is chemistry in this?

Amzel: Well, chemistry has many more places where it touches physics because there is quantum mechanics. Which is, you know, highly detailed physics and very mathematical physics. It also has the determination of compounds, analytical chemistry. It has synthetic chemistry, which in many cases is experience plus physics. And the same is that at the level that it is

used, it is overparametric, uh, and I put "parametric" in quotes, you know, the way people think. And the way people come up with solutions. It separates it very well as a field in itself, yes. But I would agree that they are all the same field, yes.

On the importance of crystallography:

Zierler: Yeah. I wonder if you could reflect on the, the, the contributions of crystallography in general in advancing science. What, you know, we're talking in the context of your membership as a distinguished member of the ACA [American Crystallographic Association]. What is it that crystallographers or crystallography . . . what is it that they contribute to human understanding of the, of the natural world?

Amzel: Well, no, crystallography was very, very impressive, no?

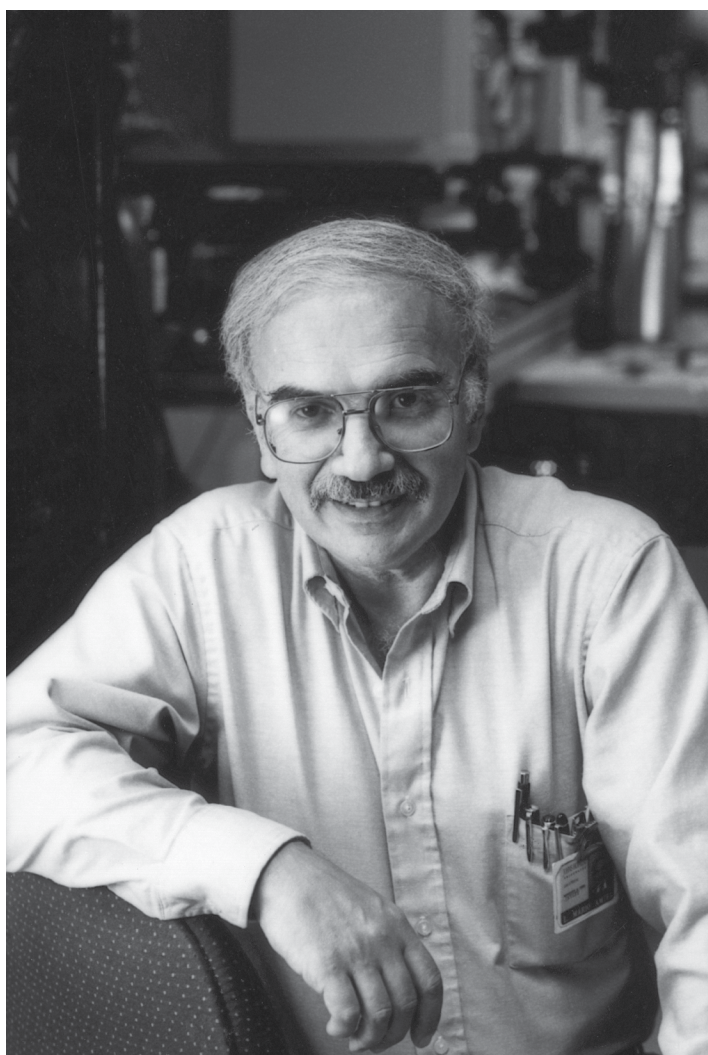
So geology, many structures of rocks you can do by first principles. That's just knowing the chemicals. Most of the structures of rocks, I mean thousands, were done crystallographically. So geology, I mean I imagine, I am not a geologist, but I imagine that they are completely grateful to crystallography to, to make their day, no?

Then it came chemistry. Compounds. And then Pasteur's observation of tartrate crystals, that the idea that there is asymmetry in compounds (chirality). I mean, and that's, and that's as fundamental to chemistry than it is to know that there are bonds, or the periodic table. Not having—it's true. And then, for I would say half a century and still now, every new compound that is done, the structure is done. So we know the structure of almost every small molecule that we are making. So chemistry owes its life to crystallography. And then we started biochemistry. And then we started to look at proteins. It started with proteins being, those amorphous substances that when they get isolated they may [inaudible] gel, to having a structure, and then with the unique technique, which is crystallography, we are determining the structure of every single protein we are interested in. All our, almost, of what we can say about them or what we expect to say about them, comes from looking at the structure.

Eventually, my impression is that many of the structures will have to be determined crystallographically and will have to be combined, combined with EM structures, and that will be where we are going to look for the answers. Some people are going to go for the broad answers, some people are going to go for the very detailed answers. All of those are needed, and the detailed answers probably will need crystallography.

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Portrait of Mario Amzel, circa 1998. Image courtesy of the Chesney Archives of Johns Hopkins Medicine, Nursing, and Public Health.

Article photo (page 14): Mario L. Amzel and Peter L. Pedersen with their three-dimensional model of the ATP synthetase molecule, circa 1980. Image courtesy of the Chesney Archives of Johns Hopkins Medicine, Nursing, and Public Health.

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ANTARCTIC RESEARCH IN THE EMILIO SEGRÈ VISUAL ARCHIVES

By Max Howell, Manuscript Archivist

Back in the heyday of LiveJournal, there was a “random” button you could select on the homepage that would take you to any blog on the site. One day when I was sixteen and bored, I clicked it, and it took me to the LiveJournal of a user named Mananath, who was working as a janitor in Antarctica at the time. This was the first time I became aware of the fact that people could visit the continent, and it spurred my love of Antarctica that carries on to this day.

The continent was once a part of the supercontinent Gondwana, but as the continents broke apart, Antarctica drifted southward and was caught in the West Wind Drift. In its isolation from the warmer oceans, ice formed over Antarctica approximately 40 million years ago. Today, though it contains a vast majority of Earth’s fresh water, less than five centimeters of rain fall in Antarctica every year, technically making it a desert. While in photographs Antarctica often appears to be a blank expanse of white dotted with the occasional mountain, it is actually a rich landscape of volcanoes, caves, subglacial lakes and rivers, and (of course) glaciers, and home to a great deal of surprising and strange wildlife. It is a harsh and beautiful terrain full of wondrous things.

Antarctica is also a site of international scientific cooperation, though this cooperation followed many years of international conflict and scrambling for control of Antarctica (Howkins 2008). On December 1, 1959, twelve countries signed the Antarctic Treaty that stated that Antarctica shall be used for peaceful purposes only, to be a site for scientific research, that no country could claim sovereignty over it, and that countries could maintain cooperative working relations with one another for scientific purposes, among other agreements. The treaty aimed to secure Antarctica as “a natural reserve, devoted to peace and science.” Today, there are over 90 active stations there dedicated to research.

In this article I’d like to take a look at some of the photos we have in the Emilio Segrè Visual Archives that document the history of human activity on this incredible continent!

These two images (Figs. 1 and 2) are of Sir Charles Seymour Wright on one of his final trips back to Antarctica in the early 1960s. Sir Charles originally traveled to Antarctica as a part of the Terra Nova Expedition from 1910 to 1913. The Terra Nova Expedition was initiated by Robert Falcon Scott to both attempt to reach the South Pole and to complete a series of studies related to magnetic and meteorological phenomena. Sir Charles was hired for the expedition as a physicist, where he studied an array of issues such as glaciers, sea ice, auroras, magnetism, and gravity on the continent. With the tragic ending of the Terra Nova Expedition, Sir Charles was also a part of the search team that sought out the remains of Scott and the party that had left for the South Pole.

In these images, Wright visits sites on Cape Evans, where he spent a great deal of time during the expedition. Cape Evans is a peninsula on Ross Island, beside Mount Erebus in the southern part of Antarctica.

In Fig. 3 (middle) we see William Nierenberg at the Eklund Biological Laboratory at McMurdo Station in 1977. Nierenberg was a theoretical physicist and oceanographer that specialized in low-energy nuclear physics and magnetism. He is well known for his work on the Manhattan Project during World War II, as well as his research on nuclear spin. In 1965 he pivoted to oceanographic work as the director of the Scripps Institution of Oceanography, where he remained for over 20 years. The Eklund Biological Laboratory was first constructed at McMurdo in 1959, and in 1977 the Scripps Institution collected there a variety of marine life from Antarctica (including a collection of giant sea spiders!). The facility was named after Carl Eklund, an ornithologist and the first scientific station leader at the Wilkes Station. The Eklund Lab was closed and replaced by the Crary Lab in 1991.

Pictured in Fig. 4 are Martin Pomerantz and Hugo Neuburg at the cosmic ray station at McMurdo. This building would be deconstructed soon after to be relocated away from the

neighboring nuclear power plant (now defunct). Pomerantz was an astrophysicist who specialized in cosmic rays, and he is credited as being the first person to discover that Antarctica weather conditions and its location relative to sun rays made it an ideal location to study the sun. He documented pressure waves inside the sun that resulted in solar oscillations, pioneering the field of helioseismology.

Pomerantz's companion in this photo, Hugo Neuburg, was a physicist and glaciologist who also worked in Antarctica on the study of cosmic rays. He was one of the first physicists to winter over in Antarctica, as well as one of the first to cut a core of ice to be studied. Neuburg served as the chief glaciologist for several years at Ellsworth Station (once located at Gould Bay in the northwest, now closed).

John A. Brown and Emmett J. Pybus are shown here (Figs. 5 and 6) conducting upper atmospheric water vapor studies in Antarctica. Brown and Pybus were two meteorologists working for the Ballistic Research Laboratories at Aberdeen Proving Ground in Maryland in the 1960s. Their studies involved flying balloons with dew-point hydrometers attached to measure the water vapor profiles at different layers of the atmosphere. As this was before satellites were available to collect data, the hydrometers provided a majority of our data about the upper atmosphere. The balloon pictured would ultimately travel more than 20 miles above ground.

Whereas meteorological studies are conducted all over the world, Antarctica is a unique environment for such studies because the upper atmosphere in the poles differs from that in the middle latitudes due to the magnetic-field differences and the different receiving angle of solar radiation. While these environments largely mirror one another at the poles, Antarctica has the advantage of being a solid continent covered in an ice shelf, while the Arctic is an ocean covered in seasonal sea ice. This makes Antarctica a much more stable place for such studies to be conducted.

Finally, no post about Antarctica would be complete without penguins! In Fig. 7 you can see dozens of Adélie penguins nesting beside Hallett Station, a now-closed station that was once shared by the United States and New Zealand. These types of penguins make their homes all over the coasts of Antarctica, but there is a consistent colony of them that still lives at this location on the Hallett Peninsula. The study of these penguins both improves our knowledge of their species and provides snapshots of how the Antarctic climate changes based on how the penguins' diets have changed.

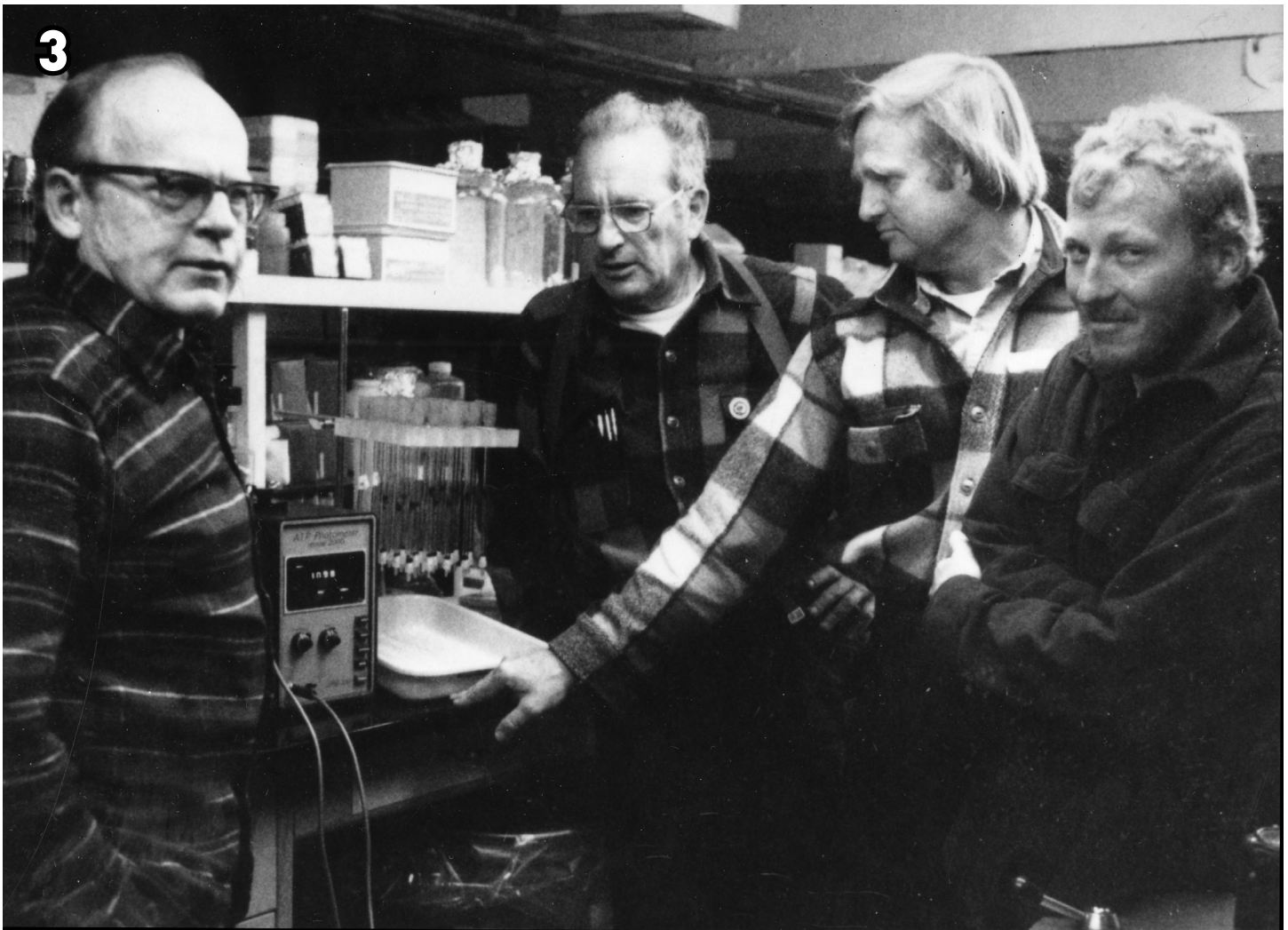
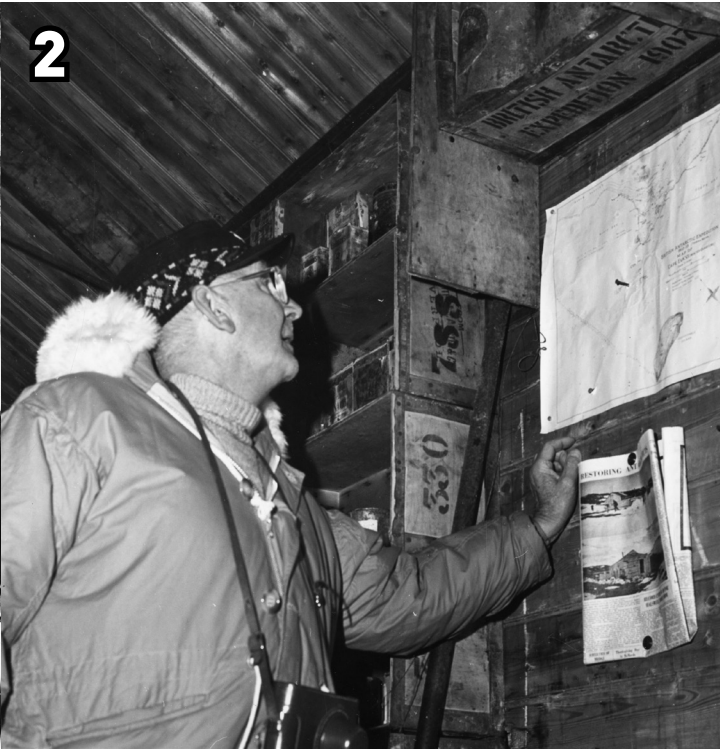
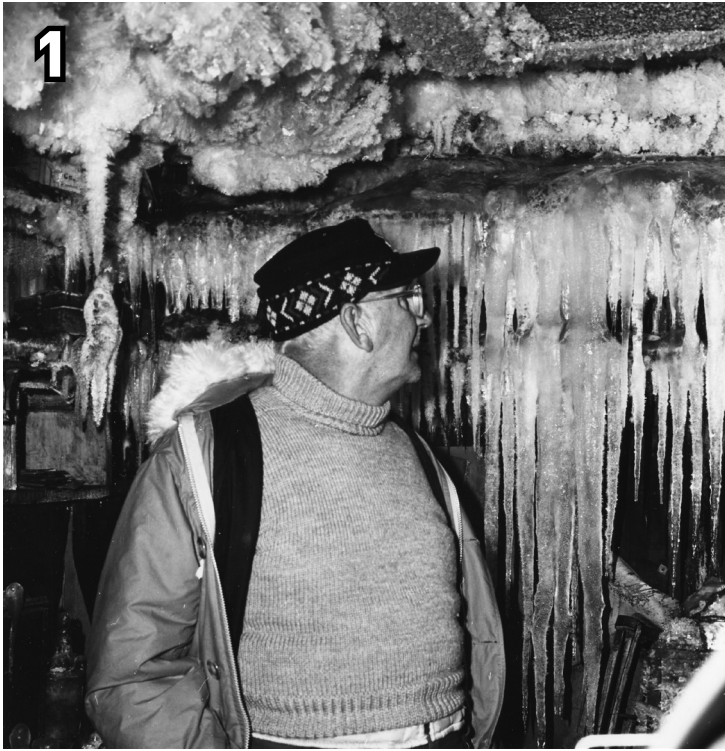
Though Antarctica can help human beings understand our world and the cosmos, I think there is something beautiful about the fact that humans are not designed to thrive there. Learning about Antarctica always reminds me of how the world is not made to cater to humans, but rather, we are a fraction of a rich and complex ecosystem. While this is just a small snapshot of the history of Antarctic research, I hope it encourages everyone to view our least populated continent with curiosity and fascination.

And if anyone working in Antarctica needs an archivist, please contact me.

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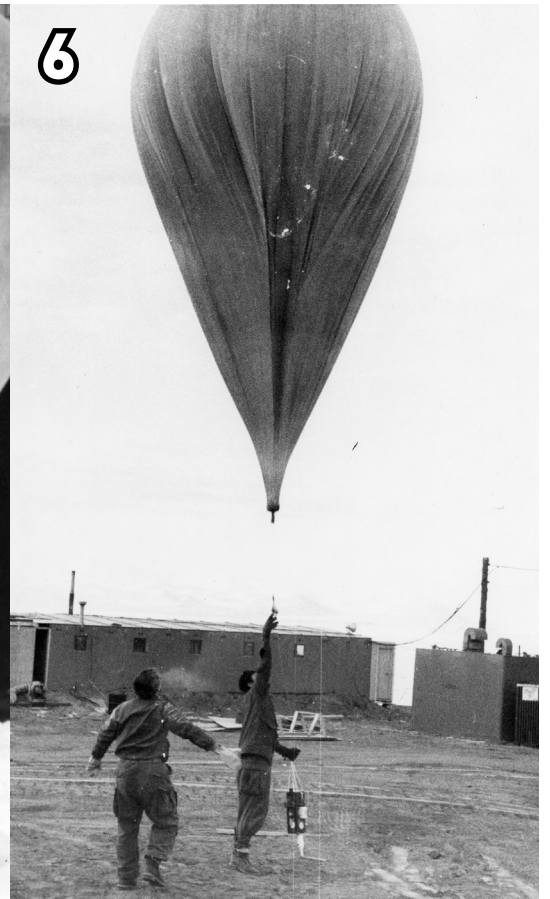
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Figure 1: Sir Charles Seymour Wright in Herbert Ponting's darkroom on Cape Evans, Antarctica, while on a mission funded by the USAP (United States Antarctic Program). National Science Foundation, courtesy of AIP Emilio Segrè Visual Archives, Physics Today Collection.

Figure 2: Sir Charles Seymour Wright was part of Robert Falcon Scott's Antarctic expedition of 1910–1913, the Terra Nova Expedition. He returned to McMurdo Station, Antarctica, in 1960 and 1965. National Science Foundation, courtesy of AIP Emilio Segrè Visual Archives, Physics Today Collection.

Figure 3: William Nierenberg is second from left, and others are unidentified, at McMurdo Sound, Antarctica, Eklund Biological Laboratory. American Geophysical Union (AGU), courtesy of AIP Emilio Segrè Visual Archives.

Figure 4: Martin Pomerantz (left) and Hugo Neuburg (right) at Bartol Cosmic Ray Station at McMurdo Sound in Antarctica. AIP Emilio Segrè Visual Archives.

Figure 5: United States Antarctic Program - A critical moment in the balloon launching is past. Getting a 22-foot fragile, balloon through a 12-foot doorway is overcome by Emmett J. Pybus, foreground, and John A. Brown, rear. The two members of Aberdeen Proving Ground, Maryland, Ballistic Research Laboratories, worked in the Antarctic under the auspices of the National Science Foundation. AIP Emilio Segrè Visual Archives, Physics Today Collection.

Figure 6: John A. Brown helps Emmett J. Pybus as they release a balloon on a calm day in the Antarctic. The two men from the Ballistic Research Laboratories at Aberdeen proving Ground, Maryland, conducted upper atmosphere water vapor studies under the sponsorship of the National Science Foundation. AIP Emilio Segrè Visual Archives, Physics Today Collection.

Figure 7: Birds in the foreground are some of the many thousand Adeli penguins that nest each year at Hallett Station, Antarctica. Tower in the center is for taking auroral observations. Dome on right is RAWIN dome, a glass fiber structure housing an upper-air meteorological tracking unit. Mt. Herschel is seen in the background. National Science Foundation, courtesy of AIP Emilio Segrè Visual Archives, Physics Today Collection.

HISTORY COMES TO PHYSCON

By Joanna Behrman, Assistant Public Historian

The 2022 Physics Congress (also known as PhysCon) was held last fall, October 6–8, in Washington DC. This conference is the largest gathering of undergraduate physics students in the United States and is hosted every few years by Sigma Pi Sigma, the physics honor society. The theme for this past PhysCon was 100 Years of Momentum, to honor the 100th anniversary of the founding of Sigma Pi Sigma back in 1921 at Davidson College in North Carolina. Naturally, the Center for History of Physics (CHP) and the Niels Bohr Library & Archives (NBL&A) were delighted to be a part of the big event—attended by over 1200 undergraduate physics students and their mentors.

For the attendees, PhysCon was a whirlwind of tours, invited speakers, workshops, and many opportunities to connect with their fellow undergraduates as well as the movers and shakers of the field. At one point or another, almost all attendees filtered through the expo hall, where the AIP History Programs hosted a bustling booth alongside our colleagues from the AIP's Statistical Research Center. We talked with attendees about history (of course), the resources offered by NBL&A and CHP, and handed out lots of swag. Pens, stickers, a limited-edition tote bag, and more were all up for grabs. Attendees could even color and address postcards featuring images from NBL&A's Emilio Segrè Visual Archives. These postcards were then collected and mailed out to the people of their choice following the conference. Some of these same images are available to be downloaded (and colored) as part of the New York Academy of Medicine's #ColorOurCollections initiative, published in February 2023.

Anyone who approached the booth was also in danger of being drawn away to be interviewed by Maura Shapiro and Justin Shapiro, the hosts of *Initial Conditions: A Physics History Podcast*. As part of a bonus episode recorded live at PhysCon, the Shapiros (no relation) asked attendees to name their favorite physicists and talk about what areas of the physical sciences they were interested in. Richard Feynman was mentioned frequently, but so was Dame Jocelyn Bell Burnell, who was in attendance at PhysCon and who many attendees were able to meet and talk with. Maura and Justin also interviewed Dame Burnell as part of that podcast episode, along with other notable speakers at the congress, including Drs. John Mather,

Julianne Pollard-Larkin, K. Renee Horton, Sarah Horst, and former US Representative Rush Holt Jr.

Appropriately for Sigma Pi Sigma's 100th anniversary, PhysCon 2022 was not only about making history; it was also about chronicling history. As part of the congress, CHP and NBL&A ran three sessions of a Wikipedia edit-a-thon, where the focus was on creating and improving pages about the diverse array of scientists on Wikipedia. No prior experience with editing Wikipedia was necessary, and for many of the attendees it was their first time ever editing Wikipedia. Camryn Bell, the Wikipedian-in-residence at NBL&A, created a special project page and dashboard for the edit-a-thon that tracked the number and impact of edits made over the course of the three sessions. In total, attendees at the edit-a-thon added over four thousand words to thirty-eight articles which were viewed almost seventy thousand times. Many of the edits used online NBL&A and AIP resources to flesh out Wikipedia pages, including oral histories, images, or articles from *Physics Today*. Other edits utilized a collection of reference books brought from NBL&A—although some attendees got captivated with reading the books!

On the final evening, PhysCon culminated with a costumed Centennial Festival (and dance party) for which everyone was encouraged to dress up as their favorite physics and astronomy equation, concept, or person. Quite a few spherical cows were spotted, along with three NBL&A and CHP staff who came as Millie Dresselhaus, SETI, and Marie Curie. These famous characters staffed a booth at the festival, which featured all the swag anyone might have missed at the expo hall, as well as lively games of Phystory, a physics history timeline game created by CHP staff and summer interns from SPS and made freely available online. In this game the goal is to build increasingly large timelines of events by correctly placing event cards at the right point in the expanding timeline. Attendees were especially intrigued (and challenged) when they tried ordering events from the Phystory expansion pack, which focuses only on events before 1500 C.E. However, it was a great learning experience and clearly a lot of fun. Some attendees kept coming back for more, and a few visiting professors even walked away with a set of cards to share with their departments.

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Physics students color and send postcards featuring ESVA images at the expo hall table run by NBL&A, CHP, and *Initial Conditions*. Photo credit: Corinne Mona.



Attendees colored these postcards at PhysCon, and NBL&A staff mailed them out at the end of the congress. Image credit: Corinne Mona.



The personification of SETI and Marie Curie (a.k.a. Corinne Mona and the author) greet attendees and play Phystory at the Centennial Festival. Image credit: Audrey Lengel.

All in all, PhysCon 2022 was a great success and a wonderful experience for everyone involved. It was great to introduce so many people to the fantastic resources of NBL&A and CHP, and to empower attendees to improve Wikipedia. We also greatly enjoyed connecting with so many students who were excited to find out about the larger community of people interested and actively working in the history of physics. Some students even asked about how they could turn an undergraduate degree in physics into a career in the history of physics! We hope to stay in touch with many of the attendees and look forward to connecting with many more at the next PhysCon in 2025.

From left to right: Maura Shapiro, Justin Shapiro, Audrey Lengel, Allison Rein, and Joanna Behrman relax over lunch after another busy morning talking history at PhysCon. Photo credit: the author.

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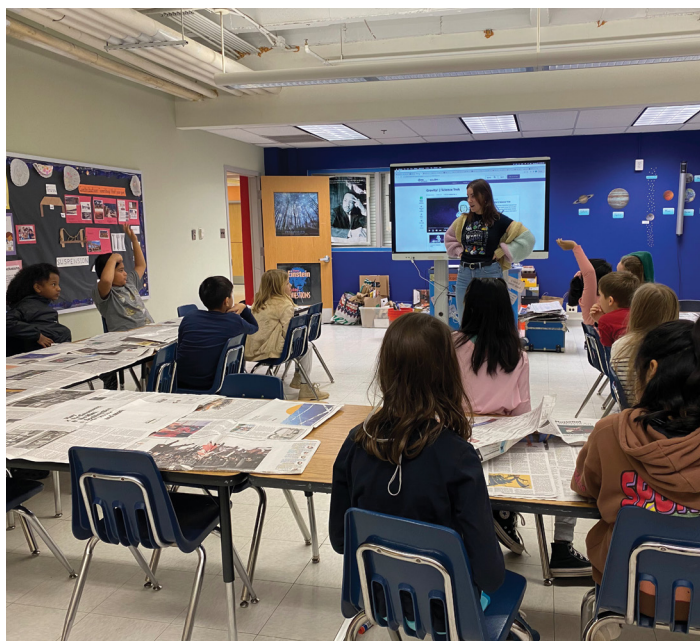
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ÉMILIE DU CHÂTELET FOR A DAY

By Maura Shapiro, AIP Science Writer and former host of *Initial Conditions: A Physics History Podcast*

One of the Center for History of Physics's most impactful outreach activities is their portfolio of teaching guides about underrepresented groups in physics. These lesson plans for students ranging from kindergarten to college use the stories of scientists from marginalized groups to teach physics concepts and moments in physics history. Representation in education is important. Exposing students to these scientists, their successes, and their struggles can help them identify with the true diversity of the physics experience. As an intern for the Center for History of Physics (CHP) and the Niels Bohr Library & Archives, I wrote a few of these guides. As podcast and outreach coordinator, I had the privilege of taking CHP's guide about the eighteenth century scientist and philosopher Émilie du Châtelet to Ms. Christine Williams's 3rd and 5th grade classes at Glebe Elementary School in Arlington, Virginia. This guide, which was compiled by another CHP intern, Emma Goulet, includes a detailed lesson plan, rich with information about du Châtelet, and a lab that replicates her experiments investigating the nature of gravity and energy. In this interactive lesson, students learned about gravity, mass, and the life of a woman scientist in the 1700s.



The author of Williams's class, leading a discussion about mass and gravity. Students patiently raise their hands to participate as they learn how gravity interacts with objects of different masses. Newspapers blanket the tables to keep the sand contained for easy clean-up. Image credit: Michael Shapiro.

Émilie du Châtelet was born on December 17, 1706, to a noble family in Paris. Her family's wealth allowed her access to tutors and society, though the exact details of her education are unknown. As an adult she befriended some of the most prominent scientists of her time, even occasionally dressing up as a man to access gender-segregated intellectual spaces. Some of her experiments she conducted in secret and published anonymously, but she still rose to acclaim in scientific circles. Among her many achievements, du Châtelet is celebrated for her translation of Isaac Newton's *Principia Mathematica* into French. Her version further explored the relationship between mass and velocity and updated the mathematics. Her 1740 book, *Institutions de Physique* (Lessons/Foundations in Physics), was an immensely popular educational text, and her work in calculus and philosophy shaped their respective fields. She was also the first woman published by the French Academy of Sciences. Her life was cut short when she passed away from pregnancy complications at just 42 years old. Despite her impressive resume, Émilie du Châtelet is most often referenced by her proximity to Voltaire, with whom she had an affair, friendship, and working relationship.

The 3rd and 5th grade students at Glebe Elementary School learned about Émilie du Châtelet and the relationship between mass, velocity, and gravity from du Châtelet's own experimental design. du Châtelet dropped objects into clay and measured the resulting depression to find the relationship between energy and velocity. From this experiment she realized that energy was proportional to mass times velocity squared (mv^2), which broke from Isaac Newton's understanding that energy was proportional to mass times velocity (mv , which is actually momentum). This teaching guide includes an elementary school classroom-appropriate version of du Châtelet's experiment in a lab where students drop objects into tins of wet sand to observe the depression left by objects released with different masses and at different heights.

When the students filed into the classroom that day, all eyes were on me, accurately observing a disruption in their science class routine. Under their curious, excited, and slightly skeptical gaze, I explained that I was visiting from the American Institute of Physics and was going to teach them about one of my favorite physicists. The lesson started with a short video

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about du Châtelet, and after we discussed what it was like to be a woman scientist in the 1700s. Many students were struck by the multiple languages she spoke and her impressively broad skill set. Still, they were most taken by the extreme methods du Châtelet had to use in order to access science: publishing her work anonymously and sometimes dressing as a man.

After du Châtelet's introduction, we watched a clip about mass and gravity. Although most were familiar with the concepts, the refresher helped students feel more comfortable answering questions and engaging in the lesson. I also think my demonstration throwing a pink pom-pom around the classroom lightened the mood. Some students had difficulty understanding that the mass of an object does not correlate with its size, which led to a fruitful discussion about density and different states of matter. To conclude the short lesson on mass and gravity I asked students what has more mass and gravity: a beach ball or a golf ball (golf ball), me or an airplane (an airplane—though there were a few snarky students!!).

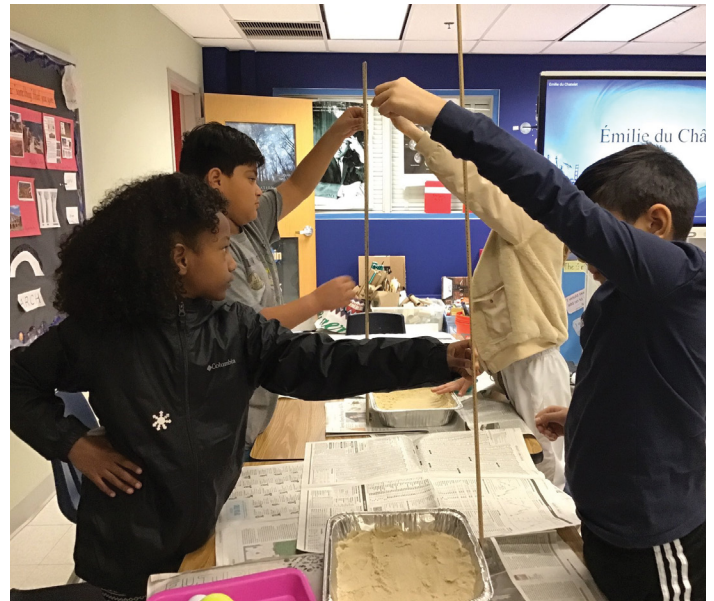
Once the students' intuition about mass and gravity was solidified, we began the experiment. Elementary schoolers love sand, and the giddy energy was palpable as we distributed the materials. Students made hypotheses for which of two objects, one lighter and one heavier, would leave a larger impression in the sand when dropped. They then released the objects into tins of wet sand and measured the resulting impression, similar to the method Émilie du Châtelet used to investigate gravity almost three centuries ago. Students compared their results to their hypotheses and noted that the objects fell at the same rate, but more massive objects left larger impressions in the sand.



Shapiro demonstrates for a group of students how to hold the differently massive objects over the tray of sand. They must start at approximately the same height when the objects are released to isolate the effect of mass on the resulting impression left in the sand. Image credit: Michael Shapiro.

We also compared the effect of releasing the same object at various heights. Students observed that when an object fell for more time, it picked up speed and created a larger impression in the sand.

When we were all slightly sandy after playing with the miniature sandboxes/experimental apparatuses, I revisited questions about mass and gravity. This time students eagerly raised their hands to answer using what they learned from the experiment. They had absorbed not only the lesson in gravity, but also information about Émilie du Châtelet.



Students use meter sticks to measure the height from which they released the marble to determine velocity's effect on the resulting sand impression. Image credit: Michael Shapiro.

Ms. Christine Williams, science lead teacher, STEM specialist, and my host for the day, found the teaching guide incredibly helpful. She was impressed by the level of detail included and the highly researched background information that was provided. She commented that the guide's designated grade levels were appropriate and was impressed by the flexibility in the lesson plan. Williams remarked, "There were choices. If [I] didn't have something, there was an alternative." But what was most important to Williams was that the lesson was about a woman. She often tries to impress upon her students that anyone can be a scientist.

Using this CHP teaching guide, I was able to bring the science and story of Émilie du Châtelet to elementary school students. They learned about mass and gravity and reinforced their practice with the scientific process. While most lessons in gravity for this age might focus on the contributions of Isaac Newton, a name these students were already familiar with, CHP's teaching guide provided an easy way to incorporate a

woman scientist who also made significant contributions to physics. In an age when women are still underrepresented and have fewer positive experiences in physics than men, Émilie du Châtelet's words remain poignant:

“If I were king, I would redress an abuse which cuts back, as it were, one half of human-kind. I would have women participate in all human rights, especially those of the mind.”

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VOYAGES OF THE R/V VEMA

A Quarter Century of Geophysical Research at Sea



This exhibit by the American Institute of Physics brings together oral history interviews, geographical mapping, and historical and scientific data to highlight some of the most memorable events and discoveries that occurred aboard the Vema.

Visit the new web exhibit at history.aip.org/exhibits/vema.

FOR A TRIBUTE AND FOR HISTORY: THE HISTORICAL ASTRONOMY DIVISION'S OBITUARY PROGRAM

By Corinne Mona, Assistant Librarian

Unquestionably, obituaries are a vital resource for historical research. While many texts and objects in research can require context and background knowledge in order to make sense, conversely, obituaries are written to be easily understood by the average reader, making them a highly accessible historical resource. They can provide colorful details about a person's life and situation, information about their careers, families, and the people they knew, as well as basic facts such as place of residence and date of birth and death that might be difficult to find elsewhere. It is easy to find obituaries of famous people, but what about lesser-known people who nonetheless contributed to a field? This is the problem that the Historical Astronomy Division (HAD) at the American Astronomical Society (AAS) set out to fix for the field of astronomy in the late 1980s to early 1990s.

"AAS members felt that, except for famous astronomers who get obituaries in [big] publications, there was no venue for regular members' astronomical and historical contributions to be recorded for the future," says Terry Oswalt, HAD chair, on the early days of the program. HAD's obituary program, which publishes obituaries of AAS members in AAS's publication *Bulletin of the American Astronomical Society* (BAAS), was proposed by Steve Dick and other AAS members in 1989. After a bureaucratic process within the AAS that involved setting up a committee, finding a home for the obituaries within the BAAS, and asking for a waiver for page charges, the first obituaries appeared in print in 1992, featuring fourteen astronomers.

Since 2010, BAAS has been an online-only and free-to-read publication, along with its obituaries section. The program has grown enormously from its initial fourteen obituaries, and today you can freely access its robust nine hundred-plus obituaries at <https://baas.aas.org/obituaries>. Whose obituaries might you find? The selection ranges from students, to amateurs, to support people, to "regular" astronomers, to "famous" astronomers. A small sampling includes Margaret Burbidge, Edgar Everhardt, John Fountain, Jose Flores-Velazquez, Ruth Freitag, Riccardo Giacconi, Roger Griffin, Arlo Landolt, Eugene Parker, Jay Pasachoff, Elizabeth Roemer, and Caroline Shoemaker.

When asked about the purpose and value of the obituary program, Terry Oswalt remarked:

"These obituaries record what the general astronomical community was doing across time; without them, only the most seminal contributions would be referenced in the literature. What the majority of the astronomical community was doing would not otherwise be represented in the records available to future historians."

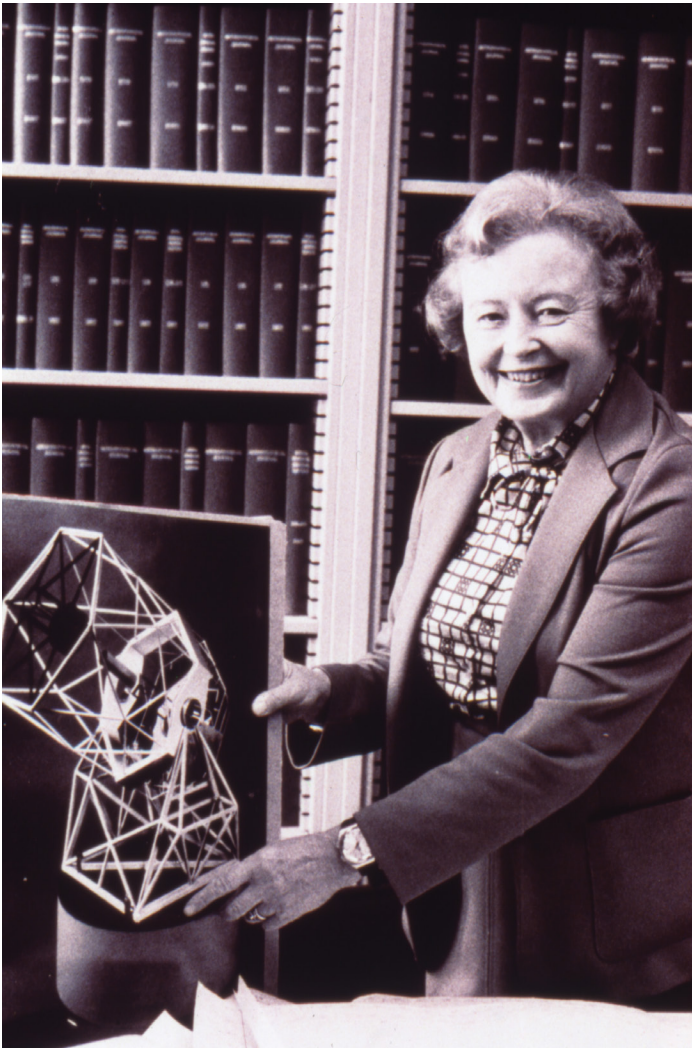
The obituary program would not exist without the ongoing efforts of people in the astronomy community. Dear reader, you can get involved with this growing historical effort!

- Read and use the obituaries in your research (and perhaps bookmark <https://baas.aas.org/obituaries>).
- Write an obituary! Find the running list of people who need obituaries written for them and contact information at <https://had.aas.org/obituaries/outstanding-obits>.
- The obituary program depends entirely on the network of astronomical colleagues, including astronomy departments and observatory administrators, for notification when an astronomer has died. Please contact current vice chair/chair-elect J. Allyn Smith at smithj@apsu.edu to announce the passing of a colleague or to volunteer to participate in the writing of an obituary.
- Spread word of the obituary program to your colleagues interested in the history of astronomy.

Many thanks to Terry Oswalt and to Steve Dick for their crucial contributions to this article.

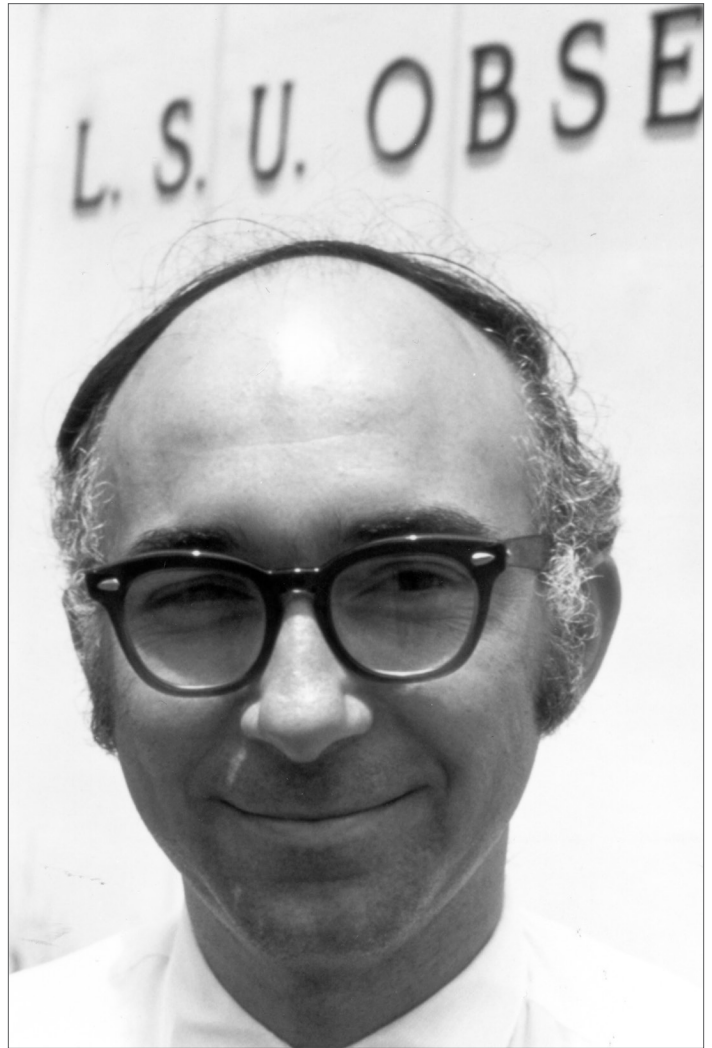
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“Elegant, wise, fair, knowledgeable, original, and fiercely determined, Eleanor Margaret Burbidge was one of the great observational astronomers of the past century.”

Quote from Eleanor Margaret Burbidge’s obituary by Jeremiah Ostriker and Kenneth Freeman. Image credit: Astronomical Society of the Pacific, courtesy AIP Emilio Segrè Visual Archives, Physics Today Collection, Catalog ID Burbidge Eleanor Margaret B2.



“On cold winter mornings his mother would send him to school with a baked potato for each pocket to help keep him warm.”

Quote from Arlo U. Landolt’s obituary by Geoffrey Clayton and Juhan Frank. An influential observational astronomer, Landolt was involved with the creation of an important set of photometric standards used in the field. Image credit: AIP Emilio Segrè Visual Archives, John Irwin Slide Collection, Catalog ID Landolt Arlo A1.

INTERVIEW WITH SCIENCE WRITER DANA D'AMICO

By Corinne Mona, Assistant Librarian



Dana D'Amico. Credit: Dana D'Amico.

Tell us a little about yourself: What do you currently do? How did your interest in the history of science come about?

I'm a professional science writer—a full-time life science marketer by day and a part-time freelance writer for various clients by night, including the Department of Energy's Lawrence Berkeley National Laboratory. I feel privileged to be able to talk openly with scientists in government and industry who are really pushing at the limits of innovation. I do my best to help convey the respect and wonder that I feel for the work they're doing through my storytelling.

I'm interested in storytelling about science, and history has so many interesting stories yet to be told. Archives like the Niels Bohr Library & Archives (NBL&A) are rich with first-person accounts, photographs, correspondence, and so many other types of documents. It's a special feeling to be able to immerse yourself in a different moment of time through primary materials, past people's belongings.

It's funny because you'd be hard-pressed to find the "I" in a scientific research publication, the field's gold standard

document—that's by design, of course. But I believe in the value of sometimes finding the "I" and bringing it back in. At the end of the day, science is done by people. There's no better place to unearth the "I" than an archive. You'll quickly find how the people and voices of science have changed, or in many cases remained the same, over time.

I'll say that there's a point of view that science is pure objectivity, and I don't totally believe that. We do our best to remove bias from experiments, but science in a vacuum doesn't really exist. Research is unwittingly colored by factors like social biases, political conflicts, cultural trends. In fact, I think there's a certain danger in forgetting context. It's how you end up with things like eGFR calculations driving organ transplant disparities or AI algorithms that reinforce system biases. The STEM field benefits from careful records of its own history.

What motivated your visit to NBL&A in 2015? What was the subject of your research, and why were you interested in it?

I was a masters of fine arts (MFA) fellow in creative writing at the University of Minnesota from 2013 to 2016, and my thesis was an essay collection about topics in astronomy. I chose astronomy because it was a field I'd always been interested in but was far enough outside of my research area of BS training (plant sciences) that it felt like an exciting challenge.

Growing up in an urban area obscured by light pollution, I felt like I had little connection to the stars. I was hoping to find more information at the NBL&A about stellar classification for one of my essays, and I pulled a box that I thought was labelled "EPA" with the hope that it had information about light pollution inside. As it turned out, I had misread and it actually said "ERA." So purely by accident I had stumbled upon an amazing box full of 1970s-era correspondence between the American Astronomical Society's first female president, Margaret Burbidge, and members discussing the issue of whether the AAS should hold meetings in states that had not ratified the Equal Rights Amendment (ERA).

In their written responses to this issue, members touched upon a huge array of social topics and detailed at surprising length the reasons that the AAS should or should not, as a scientific body,

publicly support groups like women, Black Americans, Chilean astronomers living under the rule of Pinochet, scientists from countries in conflict with the US, etc.

You don't often see scientists' voices outside of their publications, and the issue at heart of these letters was whether that's a good thing or not. This was all much more interesting to me than light pollution. I pulled more boxes related to Burbidge and early women astronomers and went from there.

What research did you do with NBL&A collections? Were there collections or items that were particularly elucidating or helpful? How did your research contribute to your overall project?

Once I pivoted to searching for information about the historic impact of women in astronomy, some items really stood out.

For example, I came across correspondence from Annie Jump Cannon creating the annual astronomy prize in her name for women in the field. There was detailed documentation down to the level of which galaxy the prize pin would depict and applications nominating the first winners. Margaret Burbidge later declined the award because she felt that it was an inferior honor reserved for the few women in the field, who were not typically considered for the prestigious prizes given to men. Tracing the thematic thread of women advocating for space in the field, from Cannon to Burbidge, was fascinating. I incorporated a lot of these ideas into an essay in my thesis.

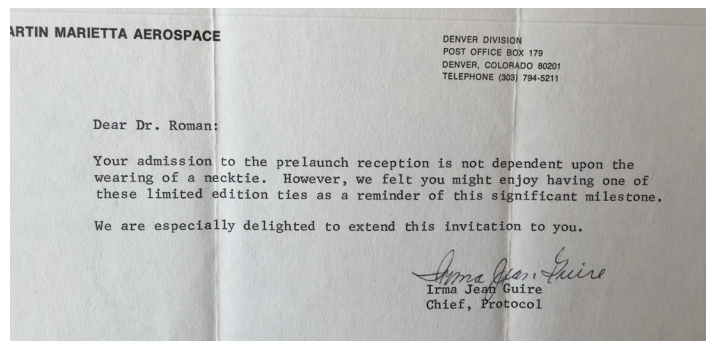
What did you find at other libraries and archives?

I didn't formally visit any other archives, though I did visit the Smithsonian National Air and Space when I was in town. I browsed Nancy Grace Roman's papers at the NBL&A, so I made sure to view the Smithsonian's exhibits related to her work and the Hubble.

My essay collection focused on various topics related to astronomy, the night sky, the moon, and periods of light and dark. When researching essays, I like to pull ideas from a wide range of materials—many of which are found outside of libraries and museums. For example, I found an old TIME-LIFE book and record set called "To The Moon" at my local used vinyl store. Some of the audio narration and space mission photographs in that set are terrific. I read scientific journal articles and pulled from my own former research (see "The moon garden" in References) about the developmental response of plants when they are first exposed to light. I interviewed people who had seen clear stars from their urban backyard for the first time during an electrical blackout. I enrolled in an introductory astronomy course at the University of Minnesota with Dr. Charles "Chick" Woodward, where I took notes on ideas that interested me and kept a moon observation journal. I incorporated sounds recorded from the *Voyager* spacecraft into



This is a ticket issued to Nancy Grace Roman for the launch of *Apollo 12* in 1969. A very cool piece of history! From the Nancy Grace Roman Papers, NBL&A. Photo by Dana D'Amico.



This is another invite issued to Dr. Roman by Martin Marietta Aerospace for a prelaunch event in which Martin Marietta gifted mens' neckties to all those who had assisted in the launch. I found this one to be interesting because there were so few women at NASA that Dr. Roman was probably the only one who couldn't wear her commemorative gift. Also attached is a 1975 group shot of a NASA Outlook Committee where Nancy is the only woman in the picture. From the Nancy Grace Roman papers, NBL&A. Photo by Dana D'Amico.

an audio essay titled "Do Stars Welcome Us into Their Realms?" Researching is the most entertaining part of writing for me. It's like a scavenger hunt, and inspiration can come from anywhere.

Did you come across anything that particularly surprised or delighted you when you were in the research stage?

To handle pieces that giants like Annie Jump Cannon and Nancy Grace Roman had written or handled is pretty incredible. I felt like I'd stumbled onto treasure—shuttle launch souvenirs from NASA, childhood notebooks, private letters. It's amazing.

Was there anything interesting that you found that didn't make it into the final product of your research?

At NBL&A, I came across a folder of hand-typed rejected submissions for the AAS journal. Some of the submissions were really out there, fringe "ideas of everything" and proposed explanations of the universe. Good entertainment value!

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What are you working on now? Do you have a new project in the works you would like to tell us about?

I have set most of my free writing time aside these days to volunteer in my community in Minneapolis. I graduated from my master's program in 2016, and one of my final memories was of that year's US presidential election cycle. It shifted my long-term priorities overnight.

So many of our neighbors are stepping up into leadership positions and running for local office in recognition of a pivotal point in our history. Scientists too!

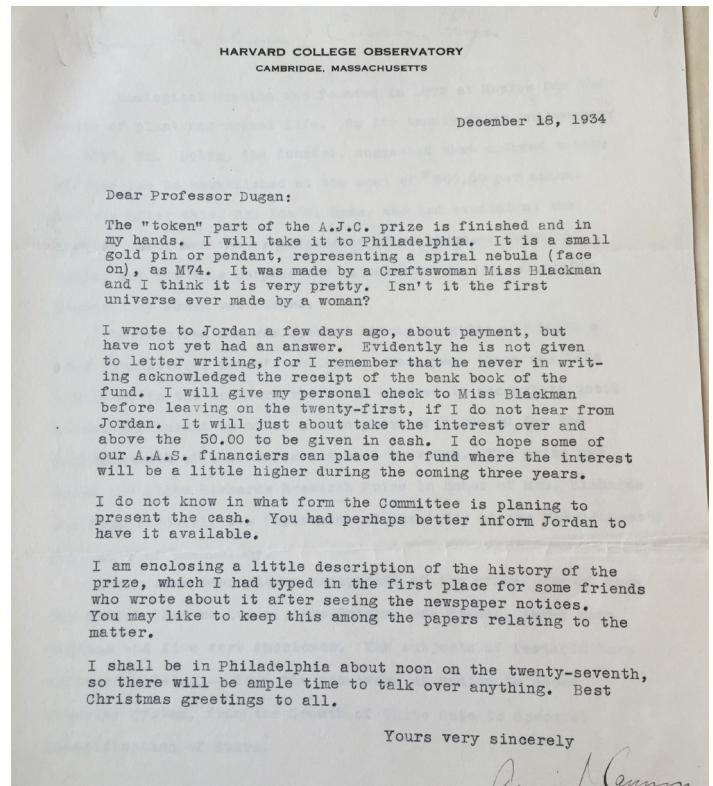
Right now I want to use my storytelling skills to elevate the voices of women who are running for local office to improve health equity, educational access, environmental justice, and the community values that will allow STEM to thrive.

If there's one thing that stuck with me from viewing the NBL&A materials I mentioned, it's that I am strongly on the side of scientists being active and visible in their communities. For better or worse, I'm convinced that visibility is how scientists can build trust. Science also has a point of view, even if the data don't. I never want to be writing a letter arguing that speaking against the mistreatment of my peers in the field is not in the field's interest. In many ways, the archive visit was transformational for me.

After the midterm season, I may step back into personal creation. I'm very intrigued by the possibilities of AI-assisted art generation and always looking for cool research to dive into. Folks can follow me at my website: damicod.com.

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A 1934 note from Annie Jump Cannon with commentary about the M74 nebula gold pendant crafted by jeweler Marjorie Blackman as a component of the prize in Cannon's name. Cannon writes, "Isn't it the first universe ever made by a woman?" Records of the American Astronomical Society, 1897–1988 (BULK 1920–1980), Box 14, Folder 15, NBL&A. Photo by Dana D'Amico.



Nancy Roman of NASA holds a model of a Struve telescope. Credit: AIP Emilio Segre Visual Archives, Roman Collection, Catalog ID Roman Nancy F1.

VELIKOVSKY, EINSTEIN, AND HARTLEY: THE SCIENTIFIC COMMUNITY'S ROLE IN LEGITIMIZING KNOWLEDGE

By Justin Shapiro, Arizona State University and University of Maryland, College Park

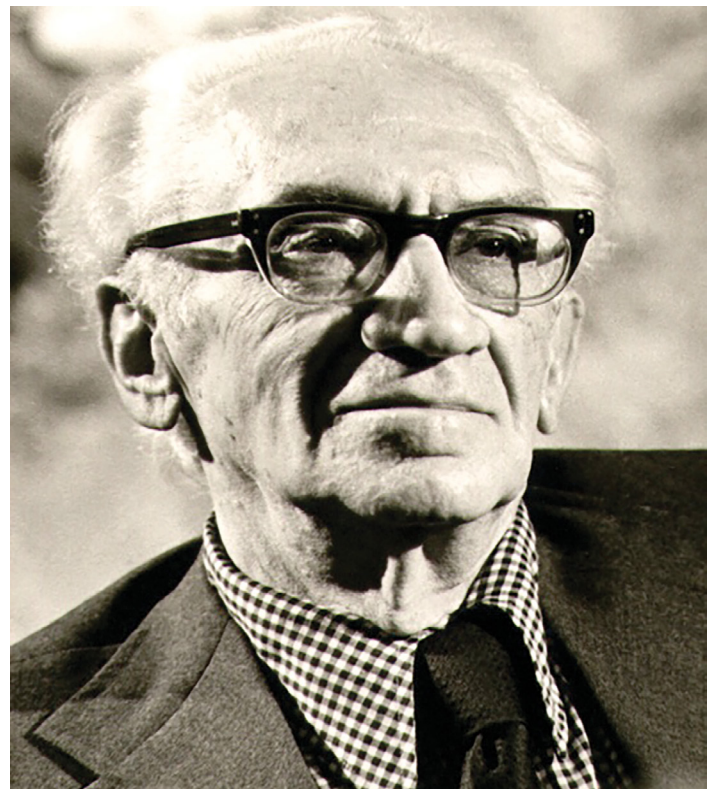
It's easy to think of science as a process that moves through the will of a handful of brilliant, driven geniuses. We're often taught about individuals and the discoveries they've made: Copernicus and heliocentrism, Newton and gravity, Einstein and relativity. Despite what this common narrative tells us, science is a social process. From education and training to publication in peer-reviewed journals, science requires its practitioners to participate in a community. It is the community of scientists that legitimizes new knowledge, not the will of a scientist alone. This article examines the role of the scientific community in separating fact from fantasy in the work of two individuals active during the mid-twentieth century: Immanuel Velikovsky and Ralph Hartley.

My insights here are borrowed from Michael Gordin, a historian of science at Princeton University. Gordin has written some excellent books on the differences between science and pseudoscience, focusing on Velikovsky in particular. In *The Pseudoscience Wars: Immanuel Velikovsky and the Birth of the Modern Fringe*, Gordin argues that pseudoscience is a negative category. It has been used by scientists at different times to discredit unorthodox or antithetical ideas outside of mainstream science.

While working for the Niels Bohr Library & Archives, I came across the Alex Harvey Collection on Crank Theories, which sparked my interest in pseudoscience. Harvey, the former chair of the Department of Physics at Queens College in New York City, collected about two dozen pseudoscientific tracts, which he later donated to the Niels Bohr Library & Archives. On some of the manuscripts Harvey attached post-it notes with instructions such as “crank theory—throw away.” For some reason he ignored his own advice, ultimately leaving NBL&A with this very unusual collection.

By seeking comments from an established physicist, the fringe thinkers who sent their manuscripts to Harvey were following in the footsteps of Immanuel Velikovsky, perhaps the leading

pseudoscientist of the mid-twentieth century. Velikovsky was once a household name; his first book *Worlds in Collision* as a bestseller when it was published in 1950. In it Velikovsky argued that the planet Venus was actually a comet that originated near Jupiter; centuries ago, it passed near Earth, reorienting our planet's axis and orbit. He would later claim that the comet also contained petroleum, which ignited as it passed through the Earth's atmosphere. According to Velikovsky, observers would have witnessed these dangerous catastrophes and attributed them to divine wrath, which provided the basis for the colorful stories of the Old Testament.



Velikovsky at the 1974 AAAS Meeting in San Francisco. Photo credit: Donna Foster Roizen. Copyright holder: Frederic Jueneman. Available in the [Wikimedia Commons](#).

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Initially, Velikovsky tried to garner interest in his catastrophism by mailing copies of his manuscript to scientists and librarians, receiving few responses. After many rejections from publishing houses, Velikovsky received an acceptance from Macmillan, a well-regarded publisher of academic textbooks. When Macmillan announced the publication details, scientists responded vociferously against the book, criticizing Velikovsky's tenuous grasp of basic astronomy and physics. Edward Thorndike, Alex Harvey's predecessor at Queens College, was one of the first reviewers. Of *Worlds in Collision* he wrote, "the physics are not good."

Although scientists were able to convince Macmillan to cancel the publication of Velikovsky's book, his contract was picked up by Doubleday, which soon had a bestseller on its hands. Velikovsky went on to capitalize on the counterculture and its rejection of establishment science, eventually creating peer-reviewed journals and courses of study for the new discipline called Velikovskianism. As Velikovsky continued to publish his ideas about cosmological catastrophes, scientists loudly denounced his research as pseudoscience, which allowed Velikovsky to present himself as a besieged crusader for truth. Things came to a head at the 1974 meeting of the American Association for the Advancement of Science, during which the conference organizers scheduled a meeting where Velikovsky discussed his work with scientists such as Carl Sagan. Neither side left the meeting convinced of the other's conclusions, but the scientists could at least argue that they gave Velikovsky a fair shake.

Like Velikovsky, the authors included in the Harvey Collection had strong personalities that show through their writing. They were, for the most part, convinced of their own brilliance in the face of the scientific consensus. Some fringe thinkers understand that legitimate scientists are the arbiters of scientific fact and pseudoscientific fiction. The force of one personality cannot sustain pseudoscientific ideas. This was true even of Velikovsky. Throughout his life he sought the company of scientists who would listen to him. In 1952 Velikovsky moved to Princeton, New Jersey, where he struck up a friendship with Albert Einstein. The two Jewish emigrés likely bonded over their shared background. At times, Velikovsky asked Einstein to look over his research. Early in his career he was genuinely interested in having scientists legitimize his arguments, but his stubborn personality blinded him to constructive criticism.

The story of Ralph Hartley (1888–1970) also shows how legitimate scientific knowledge is determined by the community rather than by lone geniuses. Hartley was an electronics researcher who laid much of the groundwork for the field that would later be known as information theory. Apart from

his work with electronics, Hartley had a lifelong interest in the theory of relativity. More specifically, Hartley thought that Einstein was wrong and that Maxwell's equations were sufficient for explaining the propagation of electromagnetic waves. To do so, Hartley argued that there was a dissipationless liquid that comprised the emptiness between objects in space. It was another term for the aether, which had been used for much of the nineteenth century. By Hartley's time, the aether theory had fallen out of favor, as the 1887 Michelson-Morley experiment and improved observations of the universe pointed to its inaccuracy.

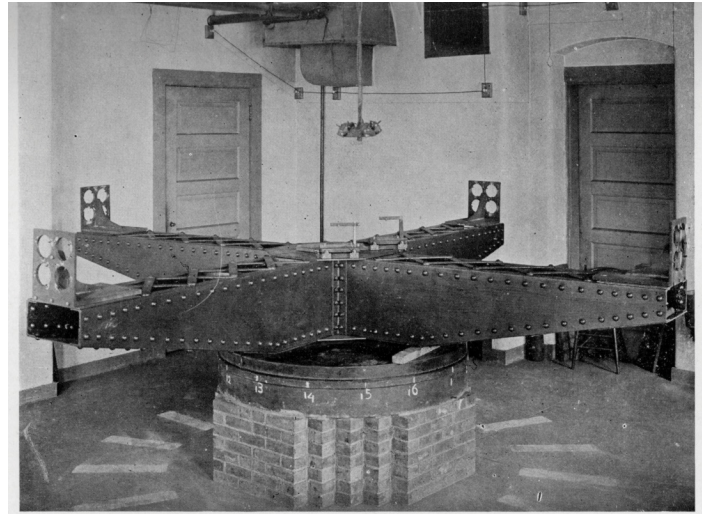


Plate 1.
Ether-Drift Interferometer, as used by Morley and Miller in 1903–1905.
The experiments made with this instrument, in Cleveland, gave negative results: no ether-drift was found. Einstein calls these experiments decisive and bases his entire theory upon the failure to measure an ether-drift by Michelson and Morley in 1887, and by Morley and Miller in 1904.

Ether-drift interferometer, as used by Morley and Miller in 1903–1905. An earlier version of this device that was used in the 1887 Michelson-Morley experiment detected no drag on the propagation of light waves from the aether, dealing a blow to the theory which had been dominant for much of the nineteenth century. Photo credit: AIP Emilio Segrè Visual Archives.

Hartley spent decades trying to publish his arguments in scientific journals. He had some allies, most notably Herbert Ives (1882–1953), but he was unsuccessful in getting his theories published in journals of distinction. Two reviewers assigned to a draft that Hartley submitted to *The Physical Review* in 1953 summed up the scientific community's response to his ideas. The first reviewer wrote: "I would not advise *The Physical Review* to reopen now a discussion on relativity, especially when the alternative theory proposed in this paper remains so vague and imprecise. The author proposes an incompressible non-linear ether. This means an infinite velocity of propagation for longitudinal waves, which has never been observed—and the non-linearity has never been observed either." The second review was even more forceful in its rejection: "These articles do not warrant publication in *The Physical Review*. The author, misunderstanding results of [Herbert] Ives's campaign against

the Lorentz transformation and the special theory of relativity, mistakenly argues we must return to classical mechanics for a relativity principle. He therefore seeks a classical system capable of propagating wave motion in accordance with Maxwell's equations. . . . That some of the properties of his solutions mimic the behavior of objects in the special theory of relativity is hence not surprising, as they follow from Maxwell's equations. Thus, based on a misunderstanding nurtured by Ives's [sic] stubborn fight against Lorentz and Einstein, the author proposes a step which would throw theoretical physics well back into the past century."



Portrait of Herbert Ives. Photo credit: Bell Laboratories / Alcatel-Lucent USA Inc., courtesy AIP Emilio Segrè Visual Archives, Physics Today Collection.

Hartley was not dissuaded by the reviewers' negative responses. He eventually had a paper describing his interpretation of the aether theory published in the October 1959 issue of *Philosophy of Science*. After his article appeared, Hartley found some supporters who were also skeptical of Einsteinian relativity. Still, he had trouble getting his subsequent research on the aether into scientific journals. Never a healthy man, Hartley suffered from what he called "nerve

exhaustion," which kept him bedridden and recuperating for months. Despite his ailment, he continued his research until his death in 1970.

The scientific community plays the decisive role in determining what is or is not science. Velikovsky was able to build some parallel institutions that resembled those of legitimate science, but after his death his followers struggled to maintain the momentum that Velikovsky himself brought to his field of study. In Hartley's case the peer review process worked as intended to make sure that his outdated aether theory did not gain traction in the scientific mainstream. Publishing Hartley's ideas would lend them credibility, which could in turn damage the reputation of legitimate science. The scientific process—its language, methodologies, and peer review—is quite appealing to pseudoscientists. Yet, by the same token, ideas that are too outlandish rarely make it very far along in mainstream scientific institutions. The purpose of focusing on pseudoscientists is not to make light of their efforts but rather to highlight the important role that the social aspects of science play in generating legitimate, verifiable, and accurate knowledge about the natural world.

The Niels Bohr Library & Archives currently holds the Ralph Hartley papers. To learn more about Hartley and see some of the materials available in his collection, visit the new digital exhibit "The Ralph V. L. Hartley Papers: Pseudoscience and Peer Review," curated by Justin Shapiro with support from the Niels Bohr Library & Archives, the Center for History of Physics, and the Sloan Foundation. Or check out episode 5 of *Initial Conditions: A Physics History Podcast*, available wherever you find your podcasts.

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LYNE STARLING TRIMBLE

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2023

August 31 – September 3

Simone Turchetti (University of Manchester)

Hybrid. In-person in Copenhagen at the 5th Early Career Conference for Historians of the Physical Sciences with virtual live stream.

September 20

Anne Lawrence-Mathers (University of Reading)

Virtual

October 25

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Virtual

November 15

Bruce Hunt (University of Texas at Austin)

Virtual

December 6

Maria Rentetzi (Friedrich-Alexander-Universität Erlangen-Nürnberg)

Virtual

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The *AIP History Newsletter* usually includes a report of new collections or new finding aids based on our regular survey of archives and other repositories. Many of the collections are new accessions, which may not be processed, and we also include in this report previously reported collections that now have an online finding aid available.

We have postponed the spring survey, and we are using the time to evaluate how to most effectively gather and present this information in the future. The survey will return in the following issue and issues thereafter.

To view and learn more about collections we have previously reported on, use the International Catalog of Sources for History of Physics and Allied Sciences at <https://libserv.aip.org>. You can search in a variety of ways, including by author or by repository.

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If there are any errors in the giving list, please accept our apologies in advance and let us know of any corrections so that we may ensure accuracy in future listings. For any corrections, questions, or concerns, please contact Lanetta Gilder in the AIP Foundation office at lgilder@aip.com.

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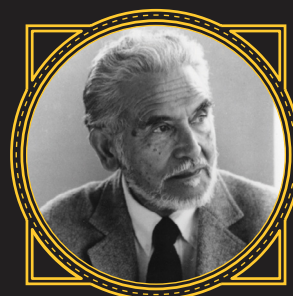
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