The Lyne Starling Trimble Science Heritage Public Lectures of 2019

Read more about this year’s speakers on page 12.
This newsletter is a biannual publication of the Center for History of Physics, American Institute of Physics, 1 Physics Ellipse, College Park, MD 20740; phone: +1.301.209.3165; email: chp@aip.org or nbl@aip.org. Editor: Gregory A. Good. The newsletter reports activities of the Center for History of Physics and 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) (www.aip.org/donate). The newsletter is posted on the web at www.aip.org/history-programs/history-newsletter.

Staff Members
Gregory A. Good, Director, Center for History of Physics
Melanie Mueller, Director, Niels Bohr Library & Archives
Lance Burch, Research Assistant
Chip Calhoun, Digital Archivist
Nathan Cromer, Graphic & Web Designer
Gabriel Henderson, Associate Historian
Samantha Holland, AV/Media Archivist
K. Jae, Manuscript Archivist
Stephanie Jankowski, Senior Administrative Support
Audrey Lengel, Digital Collections Manager
Corinne Mona, Assistant Librarian
Hannah Pell, Research Assistant
Allison Rein, Associate Director of Library Collections and Services
Sarah Weirich, Metadata Specialist
David Zierler, Oral Historian

AIP Member Societies
Acoustical Society of America
American Association of Physicists in Medicine
American Association of Physics Teachers
American Astronomical Society
American Crystallographic Association
American Meteorological Society
American Physical Society
AVS: Science and Technology of Materials, Interfaces, and Processing
The Optical Society
The Society of Rheology
IN THIS ISSUE

Highlights in History at AIP

Melinda Baldwin Selected as First AIP Endowed Professor in the History of Natural Sciences at the University of Maryland

Bequest Received from the Estate of Robert H.G. Helleman

AIP Welcomes Vilhelm Bohr and the Danish Ambassador

A Life in Books: Sam Schweber’s Gift to AIP

The Lyne Starling Trimble Science Heritage Public Lectures of 2019

Spotlight on a Book Donor to the Niels Bohr Library

Preserving the Manhattan Project

The First Brazilian Meeting for the History of Physics

Kelvin, Wenner, and the Ages of the Sun and the Earth

Reconsidering Historical Studies of John Herschel

Robert W. Smith: 2020 AAS Doggett Prize Awardee

Announcing the Taylor-Wei Dissertation Fellowship

Magic Marbled Paper

Outreach and Engagement at CHP: Resources for Educators and the Public on the History of Science

Harvard Project Physics: Curriculum Reform in the Past (and Future?)

Documentation Preserved

Friends of the Center for History of Physics
HIGHLIGHTS IN HISTORY AT AIP

By Greg Good, Director, Center for History of Physics

The Center for History of Physics (CHP) and the Niels Bohr Library & Archives (NBL&A) take seriously their shared mission “to preserve and make known the history of physics and allied sciences,” or as we say today, the history of the physical sciences, to include the broad sweep of specialties and interdisciplinary groups and applications. The American Institute of Physics (AIP) is a federation of ten Member Societies, from astronomers to rheologists, from medical physicists to meteorologists, from general relativity to photonics.

Every area of our activities at CHP and NBL&A is undergoing rapid change, as the world around us is changing. Take oral histories, for example. For many years, including before I came to CHP in 2009, only the director, the post-doc associate historian, and sometimes contract or project historians funded by NSF or by a donor would be involved in programmatic oral history interviewing. Our current project on the oral history of heliophysics, funded by NASA, is in its final year and is approaching the targets we had hoped for. Likewise, an anonymous private gift has enabled us to contract with two well-qualified historians to interview a particular group of LIGO researchers with an institutional connection to a midwestern college. A first report will be made in 2020.

The vision of a more activated and effective oral history program at CHP is beginning to take shape. Thanks to the growth of our endowments, the Center is hiring its first dedicated oral historian soon. (An article will introduce the oral historian in a 2020 issue.) This growth also will support a new position of “oral history coordinator,” a person who will support the oral historian in maintaining the records and workflow from scholars, scientists, and AIP’s Member Societies. An assistant or associate oral historian will also join the core of the oral history unit in 2020. We express our sincere thanks to the foundations and donors who have helped us to increase our capacity to produce oral history interviews. We hope to expand the group of assistant and associate oral historians involved in programmatic documentation, and we also intend to explore more external support for focused oral history projects with dedicated project staff. Lastly, we anticipate the development of internships and fellowships for university students and post-docs.

AIP sponsored the History Observatory Workshop in June, funded by a grant from the Gordon and Betty Moore Foundation. The History Observatory (HO) is both a concept and a business model. The concept is to capture science history as it happens and to place it in a longer historical perspective for a broad audience. As to History Observatory as a business model, two points are essential. HO projects must fit within the scope of CHP, i.e., “physics and the allied sciences.” Second, all HO projects will add to the capacity of CHP in all relevant staff positions for the duration of the project.

The inspiration for this workshop stretches back to the fall of 2017, when Robert Kirschner (Program Officer, Moore Foundation) spoke alongside David Wenner at a celebration of Wenner’s rare book collection coming to AIP. While appreciating the riches embodied in our growing collection of rare and important books in the history of the physical sciences, we discussed the importance of documenting the science of our time, too. Would it be possible for a scientific research project to include or support project staff whose jobs were to document through archiving, data maintenance, onsite observation and interaction, and oral history interviewing? What if personnel also brought these stories before the public? Just as “open science” has brought easier access to data and faster communication with the public about developments in science, so might “open history” bring a stronger sense of the importance of historical perspective and of the immediacy of these stories in modern life. AIP will be developing proposals for History Observatory projects in 2020.

As the articles in this issue show, this is an exciting time for the Niels Bohr Library & Archives (NBL&A) and the Center for History of Physics (CHP). Plans are moving ahead to develop the “rare book vault” and archival storage area, as well as to redesign the NBL&A reading room. AIP and the University of Maryland are cooperating via the new AIP-endowed professorship in history of the natural sciences. We are building our relationships with our Danish colleagues (who will host the 2020 Early Career Conference), and with Japanese and Chinese colleagues who have projects that parallel ours. We also continue to meet yearly with our History Liaison Committee (which consists of representatives of the ten AIP Member Societies) and with our History and Archives Task Force (made up of historians, librarians, and archivists from other institutions).
The 2019 History Liaison Committee met at College Park in August to discuss areas of mutual interest. Photo credit: Liz Dart Caron.

The History Observatory Workshop brought over thirty of our colleagues from dozens of institutions to College Park in June to help us think more clearly about the challenges we will face as we implement the History Observatory with prototype projects starting in 2020. Photo credit: Babak Ashrafi.
MELINDA BALDWIN SELECTED AS FIRST AIP ENDOWED PROFESSOR IN THE HISTORY OF NATURAL SCIENCES AT THE UNIV. OF MARYLAND

By Larry Frum, Senior Press Officer, Media Services

Melinda Baldwin has been named the AIP Endowed Professor in the History of Natural Sciences at the University of Maryland (UMD) in partnership with the American Institute of Physics (AIP), effective fall 2020.

The professorship was made possible by a $1 million pledge by AIP to the University of Maryland's College of Arts and Humanities. The ongoing collaboration between the college and AIP’s Center for History of Physics will encourage deeper insight into the nature and origin of the physical sciences and their impact on society.

“This is an extraordinary opportunity to work at the University of Maryland, which is an amazing flagship institution and research university with strength in the sciences and humanities,” says Baldwin. “I’m excited to be part of the effort to connect AIP’s resources to UMD students and to contribute to both organizations.”

AIP made the pledge to the university as part of a multimillion dollar ongoing investment in developing a world-class archive and history program at its College Park headquarters. As the AIP Endowed Professor in the History of Natural Sciences at UMD, Baldwin will teach a wide range of history of science courses as well as serve as a mentor to students.

“We look forward to welcoming Melinda Baldwin to campus,” says Philip Soergel, chair of UMD’s Department of History. “The endowed professorship allows us to renew our commitment to the history of physics and the physical sciences and provides an invaluable opportunity for students to expand their research.”

Baldwin is a senior editor for Physics Today, AIP’s flagship magazine, and author of Making “Nature”: The History of a Scientific Journal. She earned a master’s and a doctoral degree in history from Princeton University, a master’s in history and philosophy of science from the University of Cambridge, and a bachelor’s degree in chemistry and history from Davidson College.

“Melinda is a tremendous colleague and contributes to our mission every day at the American Institute of Physics,” said Michael Moloney, CEO of AIP. “We are delighted Melinda was chosen by the College of Arts and Humanities for this professorship, and we know our future collaborations will be a loud statement of partnership with our neighbors here in College Park.”

Beyond her work with AIP, Baldwin has teaching experience at Harvard University and York University, having taught classes specifically on the history of science and its relationship with society. She has written several research and professional articles and is a member of the American Physical Society Forum on the History of Physics Executive Committee and on the History of Science Society’s Committee on Advocacy.

“I love bringing primary sources into the classroom that show historical actors grappling with the implications of a new scientific theory or finding, for example, poems about X-rays, or science fiction about genetic engineering,” Baldwin said. “I think those kinds of sources help students put the history of science in conversation with political and cultural history, and they usually get students excited and engaged as well.”

In addition to teaching, Baldwin will collaborate with AIP on conferences and public lectures. She will have access to the Niels Bohr Library & Archives as well as the recently acquired Wenner Collection of rare books and manuscripts that contains nearly 4,000 books and publications documenting the important discoveries in physics and physical sciences going back 500 years.
BEQUEST RECEIVED FROM THE ESTATE OF ROBERT H.G. HELLEMAN

By Mariann Salisbury, Director of Major Gifts

The American Institute of Physics received a generous bequest from the estate of Robert H.G. Helleman. Helleman was retired from the University of Houston where he was a professor in the Department of Physics. Helleman was born in Dordrecht, the Netherlands, and earned his PhD in statistical mechanics from the University of Utrecht. He earned a second doctorate in physics at Yeshiva University.

The details of the use of Dr. Helleman’s bequest are being worked out. The main purpose will be to support fellowships for dissertation writers and post-doctoral scholars. An announcement will be made in 2020.

If you are interested in remembering the Center for History of Physics at AIP in your will, please contact Mariann Salisbury at 301-209-3098 or email msalisbury@aip.org.

AIP WELCOMES VILHELM BOHR AND THE DANISH AMBASSADOR

By Mariann Salisbury, Director of Major Gifts

Ambassador Lone Dencker Wisborg (top left) welcomes the American Institute of Physics guests to a reception and presentation by Vilhelm Bohr, grandson of Niels Bohr (bottom right) at the Embassy of Denmark in Washington, DC, on June 20, 2019.

The evening marked the significance of the heritage of Niels Bohr in the history of physics and shared the rare book collection from the Niels Bohr Library & Archives at AIP with more than ninety guests. AIP board chair, David Helfand (top right), who shared the mission of AIP, and Michael Moloney, chief executive officer of AIP, with France Cordova, director of the National Science Foundation (bottom left).
A LIFE IN BOOKS: SAM SCHWEBER’S GIFT TO AIP

By Corrine Mona, Assistant Librarian

Some books live their whole lives with only one owner. Many books, however, have at least two, if not many owners, and often physically bear the evidence of the hands they have passed through. As a public school kid here in Maryland, I was issued previously used textbooks every year by my teachers in nearly every subject. Whatever condition the book was in, I was its sacred steward for the year. We were strictly forbidden from writing in the books. I never did, but I often found evidence of previous owners through answered questions in workbooks (both correct and incorrect), soda stains, creased pages, and other offences. I always hoped for a clean book, and I never imagined hoping for a book with markings.

At the Niels Bohr Library & Archives, we work with special collections and donations from physicists, historians, and physicist historians, and I now spend a good part of my day combing through hundreds of books in search of those special markings that I once hoped to avoid. Inscriptions, bookplates, plane tickets, Post-it notes, receipts, business cards, library stamps, napkins, pages of equations, requests for book reviews, and marginalia—notes in the margins—I’ve found all of them in various books that we’ve received from donors here at the Niels Bohr Library, and they all give interesting clues about the provenance—previous owners of the book—and about the personality and activities of the book owner. The scope of the book collections and the types of books collected also are major indicators of the habits, talents, and interests of the previous book owner.

For a good part of last year, I steadily probed my way through a rather special donation: the physics library of theoretical physicist-turned-historian Dr. Silvan (Sam) Schweber (1928–2017). The forty-plus boxes of books contained a treasure trove of clues that have a direct connection to his rich life and tell part of his story, and with it, part of the history of science. His oral history and his obituary are vital aids in putting the clues of the books together into the narrative of Sam Schweber’s fascinating life (see references). It is easy to develop a feeling of kinship with a person when you spend many hours sifting through their personal book collection; therefore, I will take the liberty of addressing this book collection’s owner by his given name, Sam, throughout the rest of this article.

1. In every box of books, I found books of many languages, mostly German but also French and others. I also found multilingual markings in the books. The possible connection: Sam was born in 1928 to a German-Jewish family in Strasbourg, France, and consequently, grew up speaking three languages: German to his German mother, Yiddish to his Polish father, formal French in school, and the Alsatian dialect of French when he was out and about in town. Here is a page of Quantum und Felder by H.P. Dürr from Sam’s collection:

2. Many of the books are from physics libraries in the United States. Why might that be? In 1939, while Sam and his sister and mother were on vacation in Savoie, his father went to the World Exhibition in New York, hoping to plan for his family’s eventual immigration to the United States. Unfortunately, World War II broke out. Sam and his mother and sister had to flee the country, and his father could not return to France as originally planned. Sam’s father stayed in Brooklyn with a friend, trying to find work and get legal residency, while Sam and the rest of this family traveled to Cuba by way of Spain while they waited for him to get affairs in order in New York. After six months in Havana, the Schweber family was reunited and settled in the Bronx. Sam made the United States his home for the rest of his life.
3. As I go through the collection, I’m finding multiple copies of lectures of the Brandeis University Summer Institute in Theoretical Physics from every year of its existence, from 1957–1972. Why might he have had so many copies? I found the answer in his obituary. He became a professor at Brandeis in 1955. In 1957, Brandeis began offering a graduate program in physics. Sam became involved in building up the department, and the Summer Institute was his initiative: an opportunity to bring leading physicists to the campus, along with selected postdocs and graduate students.

4. Many of the books have Bethe or Hans Bethe written inside the cover. I’m speculating that Sam was gifted them from Hans Bethe himself. Sam got the opportunity to work as a postdoctoral fellow at Cornell under Nobel prize-winning German-American nuclear physicist Dr. Hans Bethe. They developed a fruitful professional relationship. They coauthored several books together with a third physicist. In the foreword to Sam’s *An Introduction to Relativistic Quantum Field Theory*, Bethe praised Sam: “It is always astonishing to see one’s children grow up, and to find that they can do things which their parents no longer fully understand.” This signature is also in *Quanten und Felder*.

5. Some books are in Russian and/or printed in the USSR. We know that Sam’s long career spanned over the time period of the Cold War. The USSR was a major player in the world of physics during that time (Russia still is today), and the Soviet government put major emphasis on both nuclear physics and astronomy. This is reflected in the output of physics texts from this area of the world in the mid to late 20th century, and we might expect to see a representation of texts from the USSR from any physicist with international leanings working in this era.

continued on page 10
6. Speaking of Russian books, I also found *Mesons and Fields* by Sam Schweber, Hans Bethe, and Frederic de Hoffmann, translated into Russian in 1957:

![Image of Mesons and Fields book cover]

7. Also relevant to the time period of Sam’s career are references to the “war” (meaning World War II) in the publication information for the books. For example, found in one of the textbooks:

![Image of textbook page]

8. I have also come across many thoughtful inscriptions in the covers of the books of Sam’s collection, as well as loose papers with requests to review books from the publisher. We can’t always be certain that Sam was the only owner of these books and therefore are not always certain that the inscriptions were meant for him, but some of them say “to Sam,” and the number of them leads me to suspect that he received many books from well-wishers and colleagues. The requests to review books are addressed to Sam, so we know that his opinion as a reviewer was a sought-after commodity.

![Image of inscription]

*To Sam with great affection and admiration. (signature) P.S. – “It is better to be a big frog in a small pond than vice-versa” – voilà the evidence.*

*“Pour Sam Schweber, en témoignage d’admiration. – Olivier” From Olivier Darrigol’s *Electrodynamics from Ampere to Einstein.* (Translation: For Sam Schweber, in testimony of my admiration.)*

*Here is a letter I found with instructions for writing a requested book review.*
The time spent finding clues in the books, researching Sam’s life, and speculating about how they fit together was truly a joy. This kind of research is certainly a less exact science than physics, though arguably just as delightful.

Here is the man himself, conversing with former Niels Bohr Library librarian Joan Warnow-Blewett in our previous location in New York. Photo credit: Emilio Segrè Visual Archives.

References
Oral history interview transcript with Sam Schweber, available from the Niels Bohr Library & Archives
https://www.aip.org/history-programs/niels-bohr-library/oral-histories/31884

Obituary from Brandeis University

Sam Schweber photo
https://photos.aip.org/history-programs/niels-bohr-library/photos/schweber-sam-c1

ESVA Photos of the Month
Sign up to view an interesting selection of images from the Emilio Segrè Visual Archives, every month!

Visit photos.aip.org to subscribe!
THE LYNE STARLING TRIMBLE SCIENCE HERITAGE PUBLIC LECTURES OF 2019

By Greg Good, Director, Center for History of Physics

The Trimble Lecture Series of 2019 included several speakers with a long connection to the American Institute of Physics and to the Center for History of Physics (CHP). In January at CHP, a former postdoctoral fellow, Patrick McCray, discussed the transition from visual and photographic astronomy to the computerization of observation in “When the Telescope Met the Computer: Making and Sharing the Digital Universe.” Dr. McCray is a professor of history of science at the University of California at Santa Barbara.

In April, Dr. Audra Wolfe presented “Freedom’s Laboratory: The Cold War Struggle for the Soul of Science.” From the late 1940s through the late 1960s, the US foreign policy establishment saw a particular way of thinking about scientific freedom as essential to winning the global Cold War. Throughout this period, the engines of US propaganda amplified, circulated, and, in some cases, produced a vision of science, American style, that highlighted scientists’ independence from outside interference and government control. Dr. Wolfe is an independent writer, editor, and historian.

In October, twin Trimble Lectures were held back to back. One on Wednesday night, October 2, was presented at the American Center for Physics in College Park by Dr. Catherine Westfall, who portrayed the changes that occurred at the US national laboratories as research on materials science became a more important part of their research programs. These changes reshaped the character and culture of US basic research as well as the careers of physicists and other scientists.

Twenty-four hours later, another Trimble Lecture was presented at CalTech in Pasadena, California. This was a special lecture given by Dr. Virginia Trimble, who donated the endowment that started the lecture series that is named in honor of her father, Lyne Starling Trimble. Dr. Trimble discussed the impacts of World War I on science and culture. Her lecture included artifacts from the war, the playing of the call for Armistice (though on a plastic penny whistle rather than a bugle), and a priceless rendition of “Made-moiselle from Armentières” by Dr. Trimble and Dr. Kip Thorne.

Lastly, in November the fifth lecture of the year was presented by Dr. Sara Schechner, the curator of the Collection of Harvard Scientific Instruments, on the material culture of 19th-century American astronomy: instruments, observatories, and log books.

We are still lining up Trimble Lectures for 2020. An announcement will be posted on our website by the beginning of the year. You can also subscribe for email notifications about future lectures by visiting the website at www.aip.org/trimble-lectures.

Dr. Patrick McCray  
Dr. Audra Wolfe  
Dr. Catherine Westfall  
Dr. Virginia Trimble  
Dr. Sara Schechner
**SPOTLIGHT ON A BOOK DONOR TO THE NIELS BOHR LIBRARY**

David T. Kagan, PhD, Professor of Physics, Emeritus at California State University, Chico generously donated titles to us such as *Understanding Physics* (1966) by Isaac Asimov, *Forces and Fields* (1961) by M. Hesse, and *The Picture Book of Quantum Mechanics* (1985) by Brandt and Dahmen. We asked him a few questions to find out more about his life and work.

Q: What was your education like? How did you find your career?
A: I graduated from CSU Hayward (now East Bay) with a bachelor's degree in Physics in 1977. I immediately began graduate study in physics at the University of California, Berkeley where I earned perhaps the last PhD in atomic spectroscopy in 1981. I became a faculty member at California State University, Chico in the same year. I have been at CSU Chico for nearly forty years.

Q: Please describe your career. Any highlights?
A: The Department of Physics at CSU Chico is a wonderful place where student learning is the top priority. The comradery of the department not only extends through the faculty but also to the students.

**Highlight:** I was fortunate enough to be the advisor to the Society of Physics Students (SPS) for about twenty-five years. During that time our chapter earned Outstanding Chapter Awards twenty times. There was no better chance to really engage with students than working closely with them through SPS.

Q: How did your physics book collection come to be? Does it have a particular focus?
A: I really started to collect physics books back in graduate school. My office was sometimes the go-to place for others to find an old book they needed when it wasn't in the campus library. As my older colleagues retired, they usually made sure to leave their older books with me.

Q: How did you hear about the Niels Bohr Library & Archives as a potential place for your books?
A: As I began to search around the internet for places that might be interested in older physics books, something jogged my memory about the Niels Bohr Library. The staff was terrific, and soon many of my books were on their way.

Q: Do you read in your spare time? If so, what?
A: I read or write a good portion of my day. So, many resources are online which is terrific. However, so many items of significant interest are not online and likely never will be. That's why I'm honored to be part of a professional society that supports the work of places like the Niels Bohr Library.

Q: What do you like to do for fun?
A: I am a bit of a baseball nut. So, I write about physics and baseball. To keep up to speed I'm in the terrible position of being required to watch and attend many games. In addition, I attend conferences on baseball analytics, which is driving me to learn a bit about data science.
PRESERVING THE MANHATTAN PROJECT

By Cynthia C. Kelly, President, Atomic Heritage Foundation

In 1997, the last remaining Manhattan Project buildings on the Los Alamos National Laboratory’s property were slated for demolition. About fifty wooden structures where the world’s first atomic bombs were designed during World War II were abandoned in the 1950s. Few people even knew these buildings existed.

Working for the Department of Energy (DOE), I was alarmed to discover the demolition plans for the Manhattan Project properties. The Advisory Council on Historic Preservation agreed to investigate. Visiting the V Site in 1998, the council members were struck by the simplicity of the one-story wooden structures. As architect Bruce Judd commented, the properties were “monumental in their lack of monumentality.”

However, officials explained that there were no funds appropriated for preservation. Fortunately, in 1998 Congress created the Save America’s Treasures program with $30 million to commemorate the millennium. The goal was to preserve federal properties significant to our history that were in danger of being lost. Two Save America’s Treasures grants were awarded to DOE properties: $700,000 for the V Site properties at Los Alamos and $320,000 for the Experimental Breeder Reactor–I in Idaho.

The catch-22 was that the grant funds had to be matched with non-federal funds, but there was no existing organization to raise them. Seeing no alternative, I left my 25-year career with the federal government and in 2002 founded the Atomic Heritage Foundation (AHF), a 501(c)(3) nonprofit in Washington, DC.

Starting from scratch, it took a couple of years to match the grants. In 2006, the humble structures of the V Site were finally restored at Los Alamos (see photo). The V Site is now a touchstone for the Los Alamos National Laboratory. Visitors can imagine J. Robert Oppenheimer and his colleagues inspecting the “Gadget” as it hung from a huge metal hook.

From 1943 to 1945, thousands of makeshift buildings, secret laboratories, first-of-a-kind reactors, and mile-long factories were built for the Manhattan Project in sites across the United States. Which of these should be preserved? In 2002, I persuaded Congress to earmark $250,000 to identify the most significant Manhattan Project properties and the cost to preserve them. This project was the Atomic Heritage Foundation’s breakthrough opportunity.

AHF convened a series of public meetings in 2003 at Oak Ridge, TN, Los Alamos, NM, and Richland, WA, to explore the possibility of a Manhattan Project National Historical Park. In August 2004, AHF’s report recommended a park at the three major Manhattan Project sites along with properties to preserve. In the fall, Congress passed legislation directing the National Park Service to study the feasibility of such a park.

After a decade of study, the National Park Service recommended creating a Manhattan Project National Historical Park at Los Alamos, NM, Oak Ridge, TN, and Hanford, WA. AHF led a national coalition to support the legislation. Finally, Congress passed the Manhattan Project National Historical Park Act, tucked inside the mammoth National Defense Authorization Act, on December 12, 2014.

The park was officially established in November 2015, a joint responsibility of the National Park Service and the Department of
Energy. As the nation’s storyteller, the National Park Service will interpret the Manhattan Project history for the public. The Department of Energy will continue to maintain its properties and ensure visitor safety.

The park is one of the few national parks to focus on American science and technology. Visitors can learn about harnessing nuclear energy, early scientific computing, and a myriad of inventions. The Manhattan Project led to a revolution of American science and technology that continues today.

The complex story of the top-secret Manhattan Project can be intimidating. In 2007, AHF produced an anthology, The Manhattan Project, to appeal to general audiences that has sold over 60,000 copies. In addition, AHF has published a series of four guidebooks for the Manhattan Project sites and several documentary films.

In recent years, AHF has invested in creating interpretive and educational resources on the Manhattan Project and its legacy online. The main website (www.atomicheritage.org) has hundreds of articles and primary source documents on the Manhattan Project history.

The “Voices of the Manhattan Project” website, found online at www.manhattanprojectvoices.org, has over 560 oral histories, fully transcribed and searchable. The oral histories include nearly eighty taken by Stephane Grueff in 1965 of the leaders of the Manhattan Project such as J. Robert Oppenheimer and General Leslie Groves. There are dozens more taken by Pulitzer Prize-winning authors Richard Rhodes and Martin Sherwin.

Since 2002, AHF has recorded interviews with a wide spectrum of people who worked on the Manhattan Project or whose lives were impacted by it. These include Nobel laureates, members of the Special Engineer Detachment, women, African Americans, Native Americans, downwinders, and Japanese hibakusha (atomic bomb survivors). The “Voices” site is a treasure trove for journalists, scholars, TV and radio producers, museum curators, students, and the public.

AHF’s “Ranger in Your Pocket” website (RangerInYourPocket.org) has a series of hundreds of short, two-to-five minute video programs or vignettes. Each vignette addresses an aspect of work or life on the Manhattan Project using firsthand accounts. Visitors to the Manhattan Project National Historical Park can access these programs on their smartphones and tablets as they walk down Bathtub Row at Los Alamos or tour the B Reactor at Hanford, for example. Listening to these accounts is compelling.

AHF’s websites had nearly three million pageviews in 2018 and may have over five million by 2020. Over half of AHF’s visitors are under thirty-five years old, including tens of thousands of middle and high school students. Given the rapid growth in users, AHF is committed to keeping its websites online for the next decade.

The Atomic Heritage Foundation is proud of its role in establishing the Manhattan Project National Historical Park, recording oral histories, and developing online resources on the Manhattan Project and its legacy. While there will always be controversy over dropping the atomic bomb on Japan in World War II, AHF is pleased to have played a significant role in ensuring that this important history is available for future generations.
The history of physics community has grown considerably in Brazil in recent times. At the turn of the century, there were just a few researchers working in the field. Most of them had been educated abroad or in Brazil under foreign advisors. The situation has changed in the last twenty years. Several universities have opened graduate programs, dozens of students have obtained PhDs in the field, and many of them are now employed at Brazilian universities working on the history of physics.

One year ago, Olival Freire, Jr., and Antonio Videira—two leading historians of physics in the country—decided that it was time to gather that community to a national meeting. They invited six young researchers to join the organizing committee, namely, Indianara Silva, Reinaldo de Melo e Souza, André Noronha, Heráclio Tavares, Ivã Gurgel, and Thiago Hartz—the last two responsible for leadership of the organization. The event took place at the Institute of Physics of the University of São Paulo on September 2–6, 2019.

The meeting had invited speakers who gave plenary talks, delivered minicourses, and joined roundtables, and registered participants, who could present thirty-minute oral communications or simply attend as listeners. Since it was the first meeting, things were quite unsure. The organizers expected to have about sixty abstracts submitted for oral communications. Moreover, about eighty undergraduate students interested in pursuing graduate studies in history of physics also registered as listeners, and many of them even submitted abstracts related to their bachelor thesis. In total, 187 abstracts were submitted, of which 121 were accepted for presentation and were arranged in 33 sessions (about seven parallel sessions per day). At the end, among invited speakers, the organizing committee, and registered participants, 180 people attended the event.

There were five plenary talks, one each day. Roberto de Andrade Martins presented his research about Leopold Courvoiser’s attempts to detect the electromagnetic ether in the 1920s and 1930s. Christina Barboza discussed the visual representa-
tions in astronomical expeditions in Brazil from 1850 to 1950, emphasizing early attempts to photograph the sun’s corona. Mateja Ploj Virtic, a Slovene visiting professor at the University of São Paulo, explained how the historical epistemology of science and technology has been inserted in the curriculum of pre-service-teacher education in Slovenia. Luiz Carlos Soares presented his forthcoming book about traveling teachers of natural and experimental philosophy in 18th-century England. And Carlos Ziller Camenetzki presented some perspectives on the history of Brazilian science, emphasizing his discoveries about the history of astronomy in the 17th century.

There were six minicourses, ranging from three to five hours each. They happened in two parallel sessions in the mornings. Thaís Forato and Breno Arsioli Moura lectured together on several approaches to Isaac Newton’s work, while Olival Freire lectured on the history of quantum mechanics. Thiago Hartz discussed the history of causality in physics, while Mauro Condé presented an introduction to the historiography of science. Finally, Cibelle Celestino Silva analyzed the persistence of the mechanical interpretation of nature in electromagnetism during the 19th century, while Andréia Guerra explained the relevance of history of science to science curriculum.

The first roundtable discussed the consolidation of the history of science community in Brazil. Thomás Haddad presented, in that roundtable, his work as the editor in chief of the Revista Brasileira de História da Ciência. Christina Barboza and Olival Freire reflected about their work as former presidents of the Brazilian Society for the History of Science. Rogerio Monteiro, the current vice president of the society, explained the projects that are on the way.

The second roundtable reflected on gender in the history of physics. Indianara Lima Silva presented her current research on the life and work of the Chinese-American experimental physicist Chien-Shiung Wu. Patricia Kauark-Leite explained the work of the German mathematician and philosopher Grete Hermann on the philosophy of quantum mechanics.

The meeting ended with a third roundtable about history of physics in Brazil. Nelson Studart presented the scientific trajectory of Theodoro Ramos, the first Brazilian physicist to work on quantum mechanics, in 1923. Ildeu de Castro Moreira—the current president of the Brazilian Society for the Advancement of Science—told the history of the 1919 expedition to Sobral, a city in northeast Brazil, whose experimental data supported, one hundred years ago, Einstein’s prediction about the deflection of light by a gravitational field.

The event had the institutional support of the Brazilian Society for the History of Science and of the Commission on the History of Physics (DHST/IUHPS). Due to the severe budget cuts in the Brazilian funding agencies that happened this year, the organizers were unable to secure funds for the event. Therefore, all resources came from the registration fees and, to a lesser extent, from the University of São Paulo.

The organizers expect the event to become biennial.

KELVIN, WENNER, AND THE AGES OF THE SUN AND THE EARTH

By Sally Newcomb, Volunteer

Again browsing the shelves of the Wenner Collection with Allison, the title of one box stood out immediately: Age of the Earth, featuring articles by William Thomson (1824–1907), aka 1st Baron Kelvin. Kelvin has twenty-four total papers present in the Wenner Collection, and this box contains three of them that address a great controversy in physics and geology of the 19th century. Naturally, the age of the Sun was part of the story. For physicists before the end of the century, the interest lay in the application and fine-tuning of thermodynamics and the necessary mathematics. However, the best calculations for the age of the Earth at the end of the century were put into question with the discovery of radioactivity and its impact.

Thermodynamics was only one field in which William Thomson—made Lord Kelvin for his accomplishments—excelled. Sadly, as applied to the ages of the Sun and Earth, it was also the one where his intransigence sullied his reputation in the final decade of his life. Over his long career, Kelvin published many (hundreds of) notable papers in mathematics and physics, as well as being admired and awarded for novel instruments and his pioneering work in the fabrication, characteristics, and operation of cables for long distance undersea communication between continents. Kelvin remained interested in the ages of the Sun and the Earth over the second half of the 19th century, and these three papers (among others he wrote on the same topic) advance his arguments for the origin and maintenance of the Sun’s heat and dissipation, and that of the Earth.

The first of the papers is “On the Age of the Sun’s Heat,” published in 1862 and found on pages 388–393 of MacMillan’s Magazine. This paper includes Kelvin’s first estimate for the age of the Sun. MacMillan’s Magazine was for general readership, so we may find the accompanying articles strange company for Thomson’s paper: as you see in the table of contents, other articles include “Salmon, A Slice of,” “Sonnets,” and “Royal Deaths: The Princess and the Prince” - not an entirely typical place to find a scientific paper.

In “On the Age of the Sun’s Heat,” Kelvin continued joining the second law of thermodynamics to a Sun heated by collisions of meteorites and the dissipation of that generated heat. He ended with: “That some form of the meteorite theory is certainly the true and complete explanation of solar heat can scarcely be doubted when the following reasons are considered:” (p. 393) followed by his three reasons. A logical estimate for the age of the Earth appeared to be 20 million years, which he found more likely than 100 million and certainly not 500 million. In the paper, Kelvin referenced the “splendid researches of Bunsen and Kirchoff,” who identified elements in the Sun (p. 389). He strongly questioned the estimates of geologists based on observed rates of change in strata. For reference, the commonly accepted age of the Earth now is 4.5 billion years.

The second paper is “The Sun’s Heat,” published in 1887 as an offprint from the Royal Institution of Britain, Weekly Evening Meeting, Friday, Jan. 21, 1887, pp.
Kelvin noted that natural history gave no reason for a change in intensity of solar radiation within human history. He agreed with Helmholtz’s meteorite theory as a source of the Sun’s heat and again noted that the spectroscope was tracing more and more detail about the Sun’s composition. He found a value in horsepower for the mechanical value of the radiation per square meter of the Sun’s surface. As he continued, he recognized the inefficacy of more fanciful calculations and improbable mechanisms—at one point he had tried to make a mechanical model for the ether—but continued trying to find a mechanical analog to which he could fit the mathematics. The second part of this paper attempted to determine something about the early history of the Sun and whether it is getting hotter or colder. It is an interesting, if somewhat mind-numbing exercise, to try to follow his diffuse reasoning.

The third paper in the box is “The Age of the Earth as an Abode Fitted for Life,” published in 1898 from Smithsonian Report for 1897, pp. 337–357. This is Kelvin’s last effort at the age of the Earth. Here his quarrel with the geologists and T. H. Huxley and C. Darwin reached its full extent. He never accepted the immeasurable lengths of time implied for strata deposition nor the observed changes in organic life. More was being learned about the Sun and the melting temperatures of rocks, but Kelvin never agreed that the newly discovered radioactivity of several elements could be a sufficient energy source to give the geologists the time their world required. After a lifetime of innovation and honor, he could not accept the evidence that supplied the “missing link” for the immense reaches of time required by the geologists and biologists.


Sally Newcomb Biography:
After raising two excellent children and following her husband overseas several times, Sally Newcomb rejoined the academic world to add to her B.S. in chemistry. This resulted in a master’s degree in geochemistry and another with the Committee on the History and Philosophy of Science at the University of Maryland. Sally taught inorganic chemistry and physical geology at Prince George’s Community College but retired to write history of the geosciences full time. This resulted in Special Paper 449 with the Geological Society of America and a number of other articles, serving as chair of her GSA division, and coleading a Pardee session on the history of the ophiolite concept, as well as being elected a Fellow of GSA. Sally is currently working on a long paper about early mapping and geological interpretation in mid-18th-century America.


This essay was prepared for a panel at the annual History of Science Society meeting in Utrecht, the Netherlands, in July 2019. The panel—Beyond the Shadow of the Telescope: Recontextualizing John Herschel—also included the scholars Omar Nassim, Stephen Case, Charles Pence, Kelley Wilder, and James Secord. Dr. Good is writing a book titled The Astronomer Who Fell to Earth: John Herschel on Earth as a Planet.

When I began writing about John Herschel for my dissertation some decades ago, the relevant historiography was provided largely by Susan Faye Cannon. Cannon was one of the first scholars to see beyond the shadow of John Herschel’s father, William, and the work that John undertook to complete William and Caroline Herschel’s astronomical research. John did extend his elders’ mapping of nebulae and precise measurement of locations, orientations, and separations of binary star systems. But while John was indeed an astronomer, he was not only an astronomer. It is now time to see beyond both the shadow of the telescope and also beyond the shadow of the questions and perspectives explored so elegantly by Cannon.

Humboldtian science, the beginnings of physics, and the professionalization of science provided three of Cannon’s most important historiographic perspectives on John Herschel. A fourth perspective of a slightly different sort, the question of “true cause” or vera causa, also figured prominently in Cannon’s writings. While these perspectives have guided (either in refinement or in critical reaction) much Herschel scholarship since Cannon, including my own, it is time to turn away from these and look at new questions.

First, the problem with a focus on Humboldtian science is that it is not a category of that historical period but a later invention, and it places too great an emphasis on one person. I am not denying that Humboldt contributed to and characterized a certain approach to science, but it is a distortion to foreground him. I accept that Humboldt emphasized taking physical science into the field, that precise measurements were essential, and that most natural phenomena result from a complex and dynamic interplay of forces.
But he was not the first to do so. Horace Benedict de Saussure and Marc-Auguste Pictet preceded Humboldt in these characteristics. Moreover, much of what has been called Humboldtian science by Cannon and others was shaped at least as much by the work of Pierre Laplace, Jean-Baptiste Biot, and by others from practical astronomical communities. Taken as a whole (or as several wholes), this is the background that John Herschel fits into. Herschel knew Laplace and Biot’s works thoroughly, and he saw Humboldt’s work as consistent with their insistence on physical laws and attention to measurement.

Herschel also drew on another background: British natural philosophers such as Thomas Young and Thomas Thomson. This addresses a problematic issue. Should physical science ca. 1820 be seen as proto-physics? There might be some argument in favor of this for a few scientists, but not generally. Herschel considered himself a natural philosopher. When he undertook his studies of crystals, he was just as concerned with their chemical components as he was with how they interacted with polarized light. To understand crystals required both chemical and physical investigation. His interests were shaped by a long tradition of matter theory, supplemented by Laplace’s extension of force laws from the macro to the micro world. It is worth noting that during the decade after Herschel attended Cambridge—that is, when he was in his twenties and beginning his research, he worked closely with William Hyde Wollaston and E. D. Clarke in chemical and crystal studies. Caroline Herschel had guided John through table-top chemistry in his youth, and he never lost this interest in chemical analysis. Taking this into account, Herschel’s later photochemical research and dye research, in addition to his work on spectral analysis, makes much more sense. Herschel’s physical science was not just proto-physics.

My third point regards the question of professionalization. In Herschel’s time, and in his social context, science was not a profession. This is an ahistorical category that becomes an interesting and applicable category at best half a century later. Certainly there are some aspects of scientific lives ca. 1820 that later become part of “professions”: specialized societies, a few paid positions for researchers, etc. But Herschel and even colleagues like George Peacock, Edward Sabine, and George Airy did not consider their status the same as the old professions of clergy, military, and the law. While Peacock was ordained, Sabine was a military officer, and Airy was a government official, they saw themselves as contributing to science but living as gentlemen, with sets of concerns special to that status. They, like Herschel, would not have said their profession was science. We would do better to explore their social and cultural contexts on the terms of their times and lives.

My last point regards the question of the relation of philosophy of science to the practice of science in Herschel’s research. My dissertation and my first publication focused on Herschel’s scientific methodology and its relation to his optical research. In my article “John Herschel’s Optical Researches and the Development of His Ideas on Method and Causality” (1987) I tried to show how Herschel’s methodological ideas developed from this research, combined with sources related to mixed mathematics and the Scottish Common Sense philosophers. I am troubled that scholars continue to refer almost exclusively to Herschel’s *A Preliminary Discourse on the Study of Natural Philosophy* when discussing his methodological standards. The *Preliminary Discourse* is a wonderful book, but it can best be read against the context of his actual research writings. Anyone who reads it in tandem with his research writings will never again call Herschel a Baconian inductionist, pure and simple.

In summary, Herschel scholarship needs to turn away from narratives based on the old tropes of Humboldtianism and the seemingly teleological development of modern disciplines like physics and of modern social structures such as professions. We need also to supplement our readings of his published popular writings—not just the *Preliminary Discourse* but also his astronomy texts and *Encyclopedia Britannica* articles. It is a rather obvious recommendation, but historians need to base their analyses on Herschel’s scientific publications and his archives. There is certainly no shortage of those!
The Historical Astronomy Division Prize Committee is pleased to announce that Dr. Robert W. Smith is the recipient of the 2020 Le-Roy E. Doggett Prize for Historical Astronomy. The Doggett Prize is awarded biennially to an individual who has significantly influenced the field through a career-long effort. In his decades-spanning career, Robert Smith has worked alongside astronomers and engineers to produce in-depth histories of the Hubble Space Telescope and James Webb Space Telescope, written a series of well-regarded books, and generated groundbreaking articles addressing the history of cosmology in the 19th and 20th centuries. This award recognizes both his scholarly achievements and his lengthy record of research mentorship to the next generation of science historians.

Robert Smith received his PhD in the history and philosophy of science at the University of Cambridge in 1979 under the guidance of previous Doggett Prize recipient Michael Hoskin. From 1982 to 1998, he held the position of historian in the Department of Space History at the Smithsonian Institution’s National Air and Space Museum (NASM) in Washington DC, serving as the department chair during his last three years there. While at NASM, he was also an adjunct professor in the Department of the History of Science, Technology, and Medicine at The Johns Hopkins University. In 1998, Robert joined the faculty of the Department of History and Classics at the University of Alberta in Edmonton, Canada; he served as chair from 1998 to 2003.

Robert has been the Lindbergh Chair of Aerospace History at the Smithsonian Institution and a fellow at the National Humanities Center, as well as a McCalla Professor and Killam Annual Professor at the University of Alberta. He was the History of Science Society’s 2012 Sarton Memorial Lecturer at the meeting of the American Association for the Advancement of Science. In 2016, he won the University of Alberta’s Faculty of Arts Award for Full Professors for Excellence in Research.

Robert’s main scholarly interests are in the history of science and technology from the late 18th century to today. Among his broad array of research topics are the discovery of Neptune; the rise of astrophysics; the technology and science of large reflector telescopes; the development of 20th-century cosmology, especially its observational aspects; Big Science; and historical themes in space science, including NASA and especially the Hubble Space Telescope (HST). He is currently acting as on-scene historian to the James Webb Space Telescope, attending project meetings, conducting interviews, and reviewing project documents. He is also editor of the forthcoming book, *Neptune: From Grand Discovery to a World Revealed*, which examines the circumstances and varied reactions to the discovery, the controversies that swirled around it, and what these events tell us about the nature of discovery and the history of astronomy. The book explores, too, later studies of Neptune, including the revelations of the *Voyager* spacecraft.


The Historical Astronomy Division is pleased to recognize our colleague Robert W. Smith for his significant scholarship and his numerous contributions to the history of astronomy. The award will be presented to him at a plenary session of the 235th Meeting of the American Astronomical Society, to be held next January in Honolulu, Hawaii. We look forward to recognizing his achievements and to hearing his plenary lecture!
Announcing the Taylor-Wei Dissertation Fellowship

In the History of Meteorology

Thanks to a generous gift, the Department of the History of Science of the University of Oklahoma is pleased to announce the creation of the Taylor-Wei Dissertation Fellowship. This award, named in honor of the scientific achievements of Dr. Ronald C. Taylor and Dr. Ming-Ying Wei, consists of a $25,000 stipend for one year of research and writing on any topic related to the history of meteorology, climate science, and/or technologies related to those fields, broadly construed. We are interested in supporting social and cultural approaches to weather and climate as well as more technically-focused work.

Graduate students from any institution are encouraged to apply. Opportunities will be available for the recipient to take advantage of the unique resources at OU, such as the National Weather Center and associated laboratories and the exceptional History of Science Collections, but there is no residence requirement.

Applicants should submit by January 1, 2020 a cv, a proposal of no more than 2500 words, including notes, that outlines the dissertation project and how it would benefit from the award, and a letter of recommendation (submitted separately) from the applicant’s doctoral committee chair or advisor. As the recipient must be ABD by the beginning of the award period, this letter should note when the student passed or is scheduled to take his/her general exams. Application materials should be submitted by email to Professor Hunter Heyck, Chair, Department of the History of Science: hheyck@ou.edu. We are more than happy to respond to questions from applicants or advisers.

November, 2019
The Wenner Collection is composed of brilliant discoveries made by physics pioneers. The contents of the books and journals are invaluable to anyone with an interest in the history of physics. While masterful, the works can be highly technical reads, especially to the layperson. The foreign language works (Latin, French, Italian, German, Swedish, and Russian, to name a few) also add a layer of complexity to English readers. As I inventory this collection, I routinely encounter one element that can be admired without a physics or foreign language background. This element is marbled paper.

Popular among scientists and natural historians, marbled paper was once thought to have magical qualities that placed it within the realm of alchemy. Fittingly, this magical paper is dotted among the Wenner Collection’s scientific texts. While the Collection’s papers primarily depict European patterns from the 19th century, marbled paper’s history extends much further back. Some sources date the paper back to the Ming dynasty, however, concrete examples start to appear in Japan around the 12th century.

Marbled paper has taken different names throughout its colorful history. Early Japanese paper marbling, known as suminagashi, roughly translates to floating ink—a delightful description of the marbling process. Turkish marbled paper, known as ebru, roughly translates to cloud art. Ebru served a practical purpose in addition to its aesthetic qualities. Its unique patterning was used to prevent forgery of government documents, as erasure would disrupt the pattern and become highly detectable.

**The marbling process**

I know I opened this article declaring that marbled paper could be enjoyed independently from physics, but that, of course, isn’t true. Physics is an all-encompassing discipline, and even magical marbled paper cannot escape its reach. Phenomena such as Brownian motion, colloidal systems, and capillary action all come into play during the marbling process.

Richard Wolfe, author of *Marbled Paper: Its History, Techniques, and Patterns*, defines the marbling process as

"...dropping, throwing, or otherwise depositing mineral and vegetable colors upon a watery surface that has been ‘stiffened’ or made slightly thick through the addition of a starchy substance. This additive produces a viscous, less fluid medium which under proper conditions is conducive to the support of colors on its surface. A chemical substance of one sort or another is added to the colors beforehand to help sustain them on the surface by causing them to expand into thin films, and to keep them from commingling with one another. Finally, the resulting color pattern is absorbed onto paper.”

To execute the process, one needs a few basic tools:

1. A marbling trough. This is a receptacle that holds the water, color, and dipped paper sheets.
2. Brushes. These are tools with bristles that drop color in irregular configurations. Brushes create highly concentrated colors. “Beating” and “sprinkling” are two common brush techniques. The beating method involves tapping the brush against a forearm or finger to release the color. The sprinkling method, what I imagine would be Jackson Pollock’s preference, encourages freely shaking the brush.
3. Quills, styluses, and pencils. These are tools with precise tips that allow the marbler to drop color with control. These tools distribute color more thinly than brushes.
4. Combs. Combs are long bars with attached teeth. Combs are dragged across the liquid surface to create patterns.
5. Skimmers. Skimmers are thin pieces of wood or paper used to clean the liquid surface of residue after each sheet of paper has absorbed the set pattern.
6. Drying operations. After draining off excess liquid and color, papers are hung on cords in nonobtrusive locations to fully dry. After drying, vibrant colors are achieved by burnishing the paper.

**Patterns**

Marbled paper patterns vary greatly across time and place. The graphic on the left depicts a small sample of patterns found in the Wenner Collection. Pattern identification was established with the help of Wolfe’s *Marbled Paper* and the University of Washington’s digital collection of marbled papers.
OUTREACH AND ENGAGEMENT AT CHP: RESOURCES FOR EDUCATORS AND THE PUBLIC ON THE HISTORY OF SCIENCE

By Hannah Pell, Research Assistant

The goal of the Center for History of Physics (CHP) is to support the efforts of the scholarly community to document, investigate, and understand the nature and origin of developments in the physical sciences and their impact on society. When it comes to outreach and engagement, the latter part of our central aim warrants special attention. Public outreach and history of science share a common value: communicating the human side of science in an effective way. Over the past several years, CHP has pursued several significant efforts to forge connections between the study of physics with its history by sharing the stories of the people behind the science.

Teaching Guides on Women and Minorities in Physics
In 2012, Greg Good, director of the Center for History of Physics, had an idea: to collect stories highlighting often-forgotten contributions of women and minorities in the history of the physical sciences. As he wrote in the 2016 History Newsletter, “my goal was to provide a richer vocabulary for teachers and students to explore the ways gender, race, and other distinctions have affected lives and careers in science.” Over the past seven years since this idea became a project, teams of Society of Physics Students interns and graduate students in the history of science collaborated to develop the collection we have today: nearly sixty teaching guides that illuminate stories of scientists from traditionally underrepresented groups, the challenges they faced, and their invaluable contributions to modern science.

The teaching guides tell stories of women who were overlooked for Nobel Prizes among other forms of recognition, African Americans who persisted amid the Civil Rights movement and segregation, immigrant physicists who undertook incredible research and responsibility while navigating international political situations, and scientists who overcame physical limitations to continue pursuing their research. In many cases, the stories are even told by the scientists themselves through oral history interviews, archival photographs, and historical documents and correspondences.

Over the next year, we aim to increase awareness and usage of the teaching guides through published articles and blog posts, new social media channels, conference presentations, and workshops. As we continue to see little increase to the number of women, African Americans, and Hispanics pursuing collegiate or graduate study in physics or astronomy over the past decade, CHP aims to explore the role that history can play in cultivating a more inclusive physics community today and for the future—by addressing the impact on society of developments in modern physics through public history.

Web Exhibits
In addition to the teaching guides, CHP has a collection of thirteen online web exhibits. Together the exhibits function like a mini museum of physics history, guiding users through biographies, emerging ideas, and moments of discovery that have shaped the discipline. Visitors can explore interactive timelines of prominent physicists’ lives through their own words, such as Andrei Sakharov, Werner Heisenberg, Ernest Rutherford, Albert Einstein, and Marie Curie. Several exhibits detail the gradual unfolding of scientific innovations, including global warming, lasers, transistors, and the cyclotron. Additionally, several exhibits highlight the complexity and collaboration behind important discoveries: the electron, fission, pulsars, and superconductivity, to name a few.

The web exhibits are an especially useful resource for self-guided learning. Within many of the exhibits, students can find detailed essays and explanations of the scientific concepts, as well as a consolidation of additional resources on the topic. These exhibits have been authored and assembled by historians of science over the past several years and highlight specific people, topics, or periods in physics and allied fields by incorporating archival resources. The collection is still growing today—a forthcoming exhibit will detail the history of a geophysical research vessel named Vema from the 1950s through the 1970s.
History of Physics Through Public Outreach and Educational Resources

Even at first glance, it is easy to see that our free teaching guides and online web exhibits are useful resources for public outreach and science education. Our materials challenge the idea that progress in physics is straightforward by highlighting diverse stories, experiences, and voices from the history of physics. Complexity, in fact, is and has been the norm in science.

Incorporating the history of physics can be an effective way to challenge prevailing narratives of who a “physicist” can be and what it means to do science. The need for discussions about inequity in physics and science in the classroom has become clear; many educators have expressed interest in (and have developed their own) classroom materials to increase general interest in physics, especially for students who identify with traditionally underrepresented groups in the discipline. As we aim to cultivate a more diverse and inclusive physics community, we will continue to ask ourselves how history can play a role in doing so.

We hope that you will visit our web exhibits and help spread the word about our teaching guides. If you would like to offer any feedback or suggestions, please feel free to contact me at chp@aip.org.

Photograph appeared in “Pickering’s Harem” by Barbara L. Welther and was taken in front of newest and largest building of Harvard College Observatory. Image courtesy of AIP Emilio Segrè Visual Archives.

The laboratory notebook entry of scientist Walter H. Brattain records the events of December 24, 1947, when the transistor effect was discovered at Bell Laboratories. Alcatel-Lucent/Bell Labs, courtesy AIP Emilio Segrè Visual Archives.
“I propose that science be taught at whatever level, from the lowest to the highest, in the humanistic way. It should be taught with a certain historical understanding, with a certain philosophical understanding, with a social understanding and a human understanding in the sense of the biography, the nature of the people who made this construction, the triumphs, the trials, the tribulations.” —I. I. Rabi

This quote, from renowned physicist I. I. Rabi, Nobel laureate in 1944 for his discovery of nuclear magnetic resonance, is the first thing students read in the Harvard Project Physics textbook. Rabi, among others involved with Project Physics, advocated tirelessly for public understanding of and engagement with science, and incorporating history into the science curriculum was an important part of their efforts. In the tumultuous years of the Second World War, physics education in the United States shifted in both scope and focus, and the Harvard Project Physics initiative was at the forefront of this change.

The State of Physics Education During and After the Second World War
Due to the nature of the Second World War, the demand for physicists increased dramatically, during the war and immediately after it. Nicknamed “the physicist’s war” by then Harvard president James B. Conant, this phrase “had referred to an urgent, ambitious training mission: to teach elementary physics to as many enlisted men as possible.” The United States needed many more physicists—and fast.

Such a drastic increase in the need for physicists demanded a higher number of qualified educators to teach introductory physics in high schools. Teacher-training institutes were established through funding from NSF and private companies, and a surge of government funding was directed toward transforming classroom instruction and the science curriculum at the national level. It became clear to scientists, policy makers, university officials, and educators that it was time to organize a new approach to introductory physics education.

What was Project Physics?
Enter: Harvard Project Physics. Project Physics was founded to “design a humanistically oriented physics course, to attract more students to the study of introductory physics, and to find out more about the factors that influence the learning of science in schools.” It was clear that physics was playing a critical role in the midst of international conflict, and therefore it seemed necessary to discuss ways in which science changes over time and influences society and culture along the way.

The Project Physics curriculum includes a wide variety of educational resources: a textbook, teacher guides, student workbooks, laboratory equipment, reader guides, documentaries, and more. The textbook is organized into six large units: Concepts of Motion, Motion in the Heavens, Energy, Fields and Waves, Models of the Atom, and The Nucleus. The reader guides include personal and popular essays by scientists, beginning with Richard Feynman’s “The Value of Science” (1955), that correspond with the physics material. One of the documentaries they filmed, titled “Particles and People,” follows the construction of the Cambridge Electron Accelerator in the early 1960s. When brought together, the Project Physics curriculum weaves innovations in physics with stories of the scientists involved and demonstrates the usefulness of history to emphasize science’s dynamic progress.

Physics Education Reformers
One particularly notable science education reformer was James B. Conant, who was then serving as the president of Harvard University. He believed that “science instruction in general education should be characterized mainly by broad integrative elements” and advocated for the importance of relating scientific study to other ways of thinking, especially in history and society. He believed that a “common experience of learning [science] would provide ‘for all Americans a foundation of national unity.’” He was influential in the development of the Harvard Project Physics.
Fletcher Watson, Gerald Holton, and James Rutherford.
The three lead authors and directors of the Project Physics curriculum were Fletcher Watson, Gerald Holton, and James Rutherford. Watson was a professor of science education at the Harvard Graduate School of Education, Holton was a professor of physics and science history at Harvard University, and Rutherford was the lead project coordinator. Although the project was based at Harvard University, its success relied on efforts and contributions from educators and scientists from across the country, reflecting the level of national collaboration necessary for tackling the problems of physics education in that time.

Project Physics Influence and Significance
The Harvard Project Physics was evidence of “one time in history when large-scale national reform in physics education appeared possible.” We can’t help but wonder—Why didn’t it last? Why was its influence ultimately limited? And what can we do as historians of science and educators in the modern era to bring curriculum reform back to the forefront?

Incorporating history into science classrooms humanizes the subject matter; physics becomes less abstract and more intimately connected to daily life. The “integrative function of history” encourages students to consider scientific progress as interdependent with other subjects. Gerald Holton recognized this in the first Project Physics Newsletter in 1964 advocating for the project:

“The task is therefore to create, with the aid of both experienced physicists and teachers, physics courses that will be appealing and instructive to a wide variety of students – including those already intent on scientific careers, those who may not go to college at all, and those who in college will concentrate in the humanities or the social studies. For the last group in particular, it is necessary to show that physics is neither an isolated and bloodless body of facts and theories with merely vocational usefulness, nor a glorious entertainment restricted to an elite of specialists. Rather, it should be seen as a beautifully articulated and yet always unfinished creation at the forefront of human ingenuity.”

Therefore, to design an effective physics curriculum, with the specific goal in mind of increasing accessibility, interest, and participation in the discipline, these reformers saw it necessary to incorporate the history of physics into the scientific material. It was through the pursuit of telling stories—of humanizing science—that, they believed, would inspire more students’ curiosity to understand the world through physics. In my mind, this lesson seems to be the lasting influence and significance of the Harvard Project Physics.
Our report of new collections or new finding aids is 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 previously reported collections that now have an online finding aid available.

To learn more about any of the collections listed below, use the International Catalog of Sources for History of Physics and Allied Sciences at www.aip.org/history/icos. You can search in a variety of ways, including by author or by repository.

Please contact the repository mentioned for information on restrictions and access to the collections.

NEW COLLECTIONS

Max-Planck-Gesellschaft zur Förderung der Wissenschaften. Archiv zur Geschichte der Max-Planck-Gesellschaft. Boltzmannstrasse 14, D-14195 Berlin-Dahlem, Germany


Max-Planck-Institut für Kernphysik records. Collection dates: undated.


Erich Regener papers. Collection dates: undated.


American Philosophical Society. Library. 105 South Fifth Street, Philadelphia, PA 19106, USA


Amherst College. Archives and Special collections, Amherst College Library. P.O. Box 5000, Amherst, MA 01002, USA


Cornell University Department of Buildings and Grounds Fall Creek and Beebe Lake records. Collection dates: 1875–1930. Size: 0.4 cubic feet.


Asa Fitch papers. Collection dates: circa 1831–1957. Size: 0.2 cubic feet


Georgetown University. Library. Special Collections Division. 37th and O Streets NW, Washington, DC 20057, USA


Stanford University. Department of Special Collections and University Archives. Stanford, CA 94305, USA


State University of New York at Buffalo. University Archives, 420 Capen Hall, Amherst Campus, Buffalo, NY 14260, USA


Tufts University. Tisch Library. Archives and Special Collections. Medford, MA 02155, USA


University of California, Berkeley. The Bancroft Library. Berkeley, CA, 94720-6000, USA


University of California, San Diego. Scripps Institution of Oceanography. Mandeville Special Collections Library. 9500 Gilman Drive, La Jolla, CA 92039, USA


University of Chicago. The Joseph Regenstein Library. Department of Special Collections. 1100 East 57th Street, Chicago, IL 60637, USA


University of Denver. Penrose Library. 2150 East Evans Avenue, Denver, CO 80208, USA


University of Illinois at Urbana-Champaign. University Archives. 1408 West Gregory Drive, Urbana, IL 61801, USA


University of Illinois at Urbana-Champaign astronomy slides. Collection dates: circa 1976. Size: 0.6 cubic feet.
University of Kansas. Libraries. Kenneth Spencer Research Library. University Archives. Lawrence, KS 66045, USA


University of Miami. Richter Library. Archives Division. Main Library, 8th Floor, Coral Gables, FL 33124, USA


University of Nebraska, Reno. Library. Special Collections Dept., Reno, NV 89557, USA

Vitamin C and health, a lecture by Linus Pauling. Collection dates: 1985. Size: 0.01 cubic feet (1 videocassette (91 minutes)).


University of New Hampshire. Dimond Library. Special Collections. Durham, NH 03824–3592, USA


Charles E. Hewitt correspondence. Collection dates: January 1914–September 1916. Size: 0.1 cubic feet (1 folder).


University of Pittsburgh. University Archives. 7500 Thomas Boulevard, Pittsburgh, PA 15208, USA


University of Texas at Austin. Center for American History. University Archives. Austin, TX 78713, USA


University of Washington. University Archives. Mailstop #0–10. Seattle, WA 98195, USA


Virginia Polytechnic Institute and State University. Carol M. Newman Library. Special Collections Department. P. O. Box 90001, Blacksburg, VA 24062–9001, USA


continued on page 34


Woods Hole Oceanographic Institution. Archives. McLean lab, MS 8, 360 Woods Hole Road, Woods Hole, MA 02543, USA


**NEW FINDING AIDS**

Max-Planck-Gesellschaft zur Förderung der Wissenschaften. Archiv zur Geschichte der Max-Planck-Gesellschaft. Boltzmannstrasse 14, D–14195 Berlin-Dahlem, Germany


Cornell University. Carl A. Kroch Library. Division of Rare and Manuscript Collections. 2B Carl A. Kroch Library, Ithaca, NY 14853, USA


Georgetown University. Library. Special Collections Division. 37th and O Streets NW, Washington, DC 20057, USA


Tufts University. Tisch Library. Archives and Special Collections. Medford, MA 02155, USA


University of California, Berkeley. The Bancroft Library. Berkeley, CA, 94720-6000, USA


University of Denver. Penrose Library. 2150 East Evans Avenue, Denver, CO 80208, USA


University of Washington. University Archives. Mailstop #0–10. Seattle, WA 98195, USA


Virginia Polytechnic Institute and State University. Carol M. Newman Library. Special Collections Department. P. O. Box 90001, Blacksburg, VA 24062–9001, USA


Make sure to follow us on Facebook at @AIPhistory and Twitter at @aip_chp
We gratefully acknowledge the support of many Friends whose contributions have helped to preserve and make known the history of physics and allied sciences. This list is our public acknowledgment of Friends who contributed in 2018 to the Center for History of Physics. Patrons contributed $2,500 or more; Sponsors contributed $1,000 to $2,499; Colleagues contributed $500 to $999; Associates contributed $250 to $499; and Members up to $249. Bookplate donations honor or memorialize a colleague while supporting the purchase or conservation of rare books. * Designates our Physics Heritage Donors, who have given each year for the past seven years or more. + Designates a recently deceased donor. If you would like to join the Friends in supporting the Center for History of Physics, please write to us at One Physics Ellipse, College Park, MD 20740-3843, call 301-209-3006, email development@aip.org, or visit our web page at https://donate.aip.org/helphistory.

PATRONS
Charles W. Clark
Nancy Greenspan
Gerald Holton
Charles W. Misner
Robert & Sarah Newcomb
Benjamin B. Snavely
David Surman

SPONSORS
Ralph L. Burnham
James R. Clynch*
Hans Frauenfelder*
Roderick M. Grant*
James C. McGroddy
Ronald E. Mickens
Charles G. Myers
John B. & Patricia N. Pegram
Gordon P. Riblet*
James L. Smith*
Theodore T. Wall

ASSOCIATES
Stephen L. Adler
Peter R. Almond
William R. Alschuler
Derek Boyd
William F. Brinkman*
William Bumgarner
David C. Cassidy*
Edward N. Clarke
John W. Cook*

FRIENDS OF THE CENTER FOR HISTORY OF PHYSICS

Joseph Frederic Fischeen
Kenneth W. Ford
Theodore & Frances Geballe
Bernard Gottscen
David John Helfanen
Kenneth R. Hogstrom
Charles H. Holbrow
Judy C. Holoviak
Brian J. Kiefer
Arlo U. Landolt
Rex D. Pendley
Robert K. Rader
Steven R. Riedhauser
Diana W. Rigden
Keith Runge*
Gary W. Sjolander
Luther W. Smith
Richard D. Taylor
Spencer R. Weart

Thomas & Brenda Corbin
Beth A. Cunningham
Peter Cziffra*
Lloyd Craig Davis
Judy R. Dubno
H. Frederick & Linda Dylla*
Alexander L. Fetter
Edwin R. Fuller*
Donna Hammer
Philip W. Hammer
James Edward Hammerberg*
Shaun Hardy*
Warren Heckrotte
Dudley Herschbach
Rush D. Holt
David W. Ignat
Charles F. Kennel
John S. Kent
Philip Woodson King
Bruce Arthur Kowert
Michael Allen Kriss
Louis J. Lanzerottti*
James D. Larson*
Harry Letaw*
Rudolf Ludeke
Karnig O. Mikaelian
Michael C. Morgan
Lyman Alexander Page
R. G. Robertson*
D. Keith & Margaret Robinson
Nancy Grace Roman+
Michael D. Jones*  
Jo Ann Joselyn  
H. J. Juretschke*  
Thomas Kelsall  
Mark B. Ketchen  
Daniel J. Kevles  
Charles H. King*  
Paul I. Kingsbury  
Kate Page Kirby  
M. B. Kirkham  
Richard & Kay Kobetz  
Adrienne & Rocky Kolb  
Rikio Konno*  
Victor Korenman*  
Raymond Kosiewicz  
Thomas A. Koster*  
Paul Kozlowski  
John Kronholm*  
Marvin S. Kruger  
William Henry Kuhlman  
Roger O. Ladle*  
Arno Laesecke  
Muriel J. Landauer  
James S. Langer  
Timothy Paul Largy  
A. C. Lawson*  
William J. Layton  
Richard Gaylord Leamon  
Hassel Ledbetter  
David R. Lide  
Donald H. Liebenberg  
Kurt Liewer  
Chelcie B. Liu*  
C. David Livengood*  
Peter N. Lombard  
John H. Lowenstein  
Thomas Lucatorto  
John W. Luetzelschwab  
Tim Lynch  
Allison Macfarlane  
Maura & Michael J. Mackowski*  
Hans Mark  
Bruce Marsh  
Lynne Marshall  
John L. McClure*  
Robert Bruce McKibben  
John A. McKinney  
Carla Gretchen Messina  
Robert C. Michaelson  
Andre F. Michaudon  
John Michel*  
Keith Raymond Milkove  
H. Craig Miller  
Paul George Miller  
Mark B. Moffett*  
Michael H. Moloney  
Kurt R. Moore*  
Faith Morrison  
Steven A. Moszkowski  
Carl Oliver Muehlhause  
George P. Mueller*  
Mark R. Mueller*  
Mark Nagumo*  
Indira Nair  
Randolph A. Nanna  
Anthony V. Nero*  
Dwight E. Neuenschwander  
Richard J. Noer*  
Elizabeth Nolan  
Mary Jo Nye  
Robert Olness  
Lynn Olson  
Geraint & Ruth Owen*  
John M. Palms  
William & Janice Parker  
Neil K. Perl*  
Michael Plett*  
John K. Pribram  
Monroe S. Z. Rabin  
Norman F. Ramsey+  
Richard D. Ray  
Albert J. Read  
Joseph Reader  
George Redlinger*  
John J. Regazzi  
T. Douglas Reilly  
Wayne & Jane Repko  
William A. Repuke*  
Won-Kyu Rhim  
John E. Rhoads  
Stanley W. Rhodes  
Paul E. Rider  
Richard A. Robie  
Howard K. Rockstad*  
Alan Rogers  
Edward John Rojek*  
Kenneth L. Rose*  
Lawrence G. Rubin*  
Klaus Ruedenberg  
Kenneth S. Rumstay  
Robert Sahakyan  
Akira Sakai  
Edward G. Sartore  
Walter Scaff  
Philipp G. Schmelzle  
Kathleen N. Schneider  
Robert & Barbara Schneider*  
Alan Schoenfeld  
Melvin J. Schwartz  
Richard F. Schwartz  
Brian B. Schwartz*  
Bertram M. Schwarzschild  
Jan V. Sengers  
Howard Shafer  
Wesley L. Shanhaltzer  
Alan E. Shapiro*  
Yitzhak Y. Sharon  
Joseph C. Shields*  
Eugene R. Smith*  
Lary R. Smith  
Webster Francis Smith  
McLaurin Smith-Williams  
James L. Snelgrove*  
Arnold L. Snyder*  
Daniel I. Sober  
David Lawrence Soderberg  
Siavash H. Sohrab  
Lee R. Sorrell  
Randy M. Spence  
Cherrill M. Spencer  
Christine B. Spirio  
Grace Marmor Spruch  
Frieda Axelrod Stahl*  
Robert W. Standley*  
Walter A. Stark  
Richard Stephens*  
Frank Stern*  
Ian E. Stockdale*  
Alan J. Strauss  
Bertram & Lynne Stries*  
David J. Strozzi  
Curtis J. Struck  
Thomas J. Stuart  
Harry Stuckey*  
Roger H. Stuewer  
Folden B. Stumpf*  
Jean Hebb Swank  
Julius Tabin  
Harvey D. Tananbaum  
Frank Robert Tangherlini  
Takao Tanikawa  
George Tessler*  
David R. Thiessen
LYNE STARLING TRIMBLE SCIENCE HERITAGE PUBLIC LECTURE SERIES

The Lyne Starling Trimble Science Heritage Public Lecture Series features prominent science historians and writers who highlight the important roles that science plays in modern society and culture.

Check out and SUBSCRIBE FOR NOTIFICATIONS on the lecture series at www.aip.org/trimble-lectures