Melba Phillips’s “Studying Physics in the Thirties—a Personal Reflection”
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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; phone: +1.301.209.3262; 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.

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RUTHERFORD—BE WARY OF SECONDARY SOURCES

By Dr. John Campbell, Author of Rutherford: Scientist Supreme and www.rutherford.org.nz

Ernest Rutherford is one of the most illustrious scientists the world has ever seen. He is to the atom what Newton is to mechanics, Faraday to electricity, Darwin to evolution, and Einstein to relativity.

He was born and highly educated in New Zealand, before leaving in 1895 with three degrees and two years’ research at the forefront of the electrical technology of the day. On the occasion of his 150th birthday, it is rather galling to see modern authors still using older books for their source material, repeating errors that are thereby very hard to get out of the system.

Rutherford has over 40 books written about him. Recent authors have tended to use books written by his friends for their source material, but their reminiscences were often several decades after the event, and they never knew Rutherford in his younger days. Even the first biography, an excellent one by A. S. Eve, Rutherford, written by a close friend from his Canadian days, authorised by his widow, and using his early letters, has its faults. In the first paragraph of nine lines there are two errors and three points that warrant further explanation. Of all those books, only my own (Campbell 1999) used archives of the day for his early life and work in New Zealand.

Honours flowed to Rutherford long after his death. In 2018 the University of Canterbury placed his name on its new, expansive science building. It is a pity that they spelled his name wrong, though that is understandable. Rutherford was born in rural Nelson province. Two months later, when his father was next in town, he registered the birth as “Earnest,” which is therefore his “legal” name.

Rutherford had five degrees from the University of New Zealand (UNZ). The dates are often confused, because northern hemisphere biographers often don’t know about the southern hemisphere academic year. Actually, both hemispheres have the same schedules: exams in late spring, vacation (or work) over the summer, and have the new term start in early autumn. In other words, in the southern hemisphere also, the academic year starts in early February, runs to exam time in November, and covers one year only. However, in Rutherford’s day the UNZ exam papers were then shipped to the examiners in England, a six-week sea voyage. The preliminary results were then
telegraphed back to New Zealand in early February, in time for the students to enroll in the next year’s studies, with the marked papers shipped back to New Zealand for the official records. And so graduation (and hence the date on the degree certificates) was the following August, the year following when the exams were sat.

Another mistake modern biographers often make is projecting their own experiences back into Rutherford’s day when the standard degree was a B.A. This involved studying six subjects equally. Two were compulsory: mathematics and Latin. For his four electives Rutherford chose applied mathematics, English, physical science, and French.

Rutherford was at Canterbury College from 1890 to 1892 for this. Even the college put various authors wrong in that it had him starting in 1891 by referencing a book students signed promising to obey the rules and regulations of the college. For reasons unknown, some 1890 students didn’t sign until their second year. The college should have consulted other records, such as the class lists for 1890.

Of more major concern, modern authors often have Rutherford start his physics research in 1894 rather than 1893. At the same time as he sat his BA exams, he also sat the UNZ senior scholarship exams. This gave the funding for one student in each subject to have a further honors (MA) year. An Otago man won the scholarship for physical science, but Rutherford won the mathematics scholarship. So it was mathematics which funded his MA year (1893). That is why he enrolled for honors in both mathematics and in physical science.

The professor who inspired him into research, Professor Bickerton, taught chemistry and by default, physics. Only the MA in chemistry demanded that a candidate, on presenting himself for examination, hand in a paper certified by his professor that it contained only the student’s work, “embodying the results obtained by himself in some investigation or research in Chemistry.” Professor Bickerton offered Rutherford a project involving “the electrical synthesis of nitro-compounds of hydrogen, carbon and oxygen.” This had to do with Bickerton’s theory of the partial impact of dead stars to explain supernova, a theory he continued to work on to explain even details such as human evolution. Could life-forming compounds be produced during lightning strikes in the atmosphere? [Stanley Miller and Harold Urey attained great fame when they carried out similar experiments in the 1950s (Miller 1953).] Rutherford turned down this project because he didn’t know enough chemistry. (Fifteen years later he had a Nobel Prize in Chemistry.) Instead he chose to extend a mundane undergraduate physics experiment. Was iron magnetic at high frequencies? This was inspired by Nikola Tesla’s demonstration of transmitting power without wires. Tesla’s high-voltage transformer was air cored, whereas it was well known that at low frequencies a transformer was more efficient with an iron core. It is not known why a research paper didn’t have to be undertaken for an MA (Hons.) in physical science, but Rutherford did carry out this work. Perhaps the requirement was overlooked by both professor and student.

Hence Rutherford carried out his first research in 1893 and showed that iron was magnetic to frequencies as high as 100 kHz, though only in a thin surface layer. At the end of 1893 he had to consider his future. One of the few professions open to physics graduates was secondary school teaching, and Rutherford had already failed on three occasions to obtain such a position. One further avenue was a possibility. In London, the Commissioners for the Exhibition of 1851 offered one science research scholarship every second year for a New Zealand graduate student to go anywhere in the world to carry out
research in a field that was important to his country’s industries. To be eligible for this, the student had to be enrolled with the University of New Zealand, so for 1894 Rutherford took a third degree, a BSc degree. Because of the science courses taken for his BA degree, he needed only two more subjects. He elected geology and chemistry. But his real work that year was research for the 1851 scholarship. He continued pushing his earlier research to yet higher frequencies, now using a heavily damped discharge from a Leyden jar to produce the very short current pulses to magnetise his iron needles. Later he used even shorter pulses, using the discharges from a Hertz dumbbell oscillator. He showed that iron was magnetic to frequencies as high as 500 MHz, though in a thinner and thinner surface layer.

There were only two candidates for the 1851 scholarship of 1895, and, after the papers were judged by the examiners in England, the UNZ was asked to nominate the other candidate, a man named Maclaurin, who was doing much more important work extracting gold from ores. On being sent the forms to fill in, he couldn’t accept the conditions in the latest forms, so he submitted the filled-in form unsigned. A remarkable series of telegrams ensued between the UNZ and their agent in England:

2nd April 1895 “Maclaurin declines. Can you recommend Rutherford.”
2nd April 1895 “Certainly.”
8th July 1895 “Rutherford approved.”

Rutherford published his first research paper in the Transactions and Proceedings of the Canterbury Philosophical Institute for 1894 (Rutherford 1894). This covered his second year of research (1894). His first year of research (1893) was the subject of his second paper (Rutherford 1895). These had been the two theses he had submitted for his 1851 scholarship. So when, after his death, his papers were handed in to the Cambridge University Library archives, it was assumed that the research was covered in the order of publication, so his notebooks and theses were catalogued wrongly, thus giving legitimacy to authors getting the work in the wrong order. Sometimes even archives must be used with scepticism.

I hope I have made my point, that for original historical research the archives of the time must be consulted and the use of secondary sources generally avoided because so many are faulty.

References:
NATIONAL HISTORY DAY 2021: COMPUTERS TO THE RESCUE!

By Corinne Mona, Assistant Librarian

National History Day is a beloved highlight of the year for AIP’s History Programs. It can be nothing other than a great pleasure to witness the culmination of the creativity and enthusiasm of the middle and high school students across the U.S. who have dedicated an entire year to a history research project of their choice, guided by their teachers. After competing at local levels along with over half a million participants, finalists attend a grand awards ceremony at the University of Maryland in College Park, just down the road from AIP. Normally, members of the Niels Bohr Library & Archives staff attend the celebratory, bombastic ceremony to congratulate the winners of the History of the Physical Sciences & Technology Prize, which NBL&A has sponsored since 2018.

Of course, like so many other large-scale events during this global pandemic, the ceremony for 2021 took place on the stage everyone can see from home: YouTube. Although the 2020–2021 school year was undoubtedly very challenging for students, the projects, which can be documentaries, exhibits, papers, performances, or websites, were of the usual high caliber. We would like to extend special congratulations to the prize winners of the Junior Division (grades 6–8) and the Senior Division (grades 9–12), especially winners of the History of the Physical Sciences & Technology Prize, for their incredible work during this year of historic difficulty. Given the virtual nature of this year, it is perhaps unsurprising that both winners for our sponsored prize chose topics related to the history of computer communications.

The winning project from the Junior Division is a paper entitled “Claude E. Shannon: The Father of Digital Communication,” by Advith Natarajan from Susan B. Anthony Middle School in Kansas. Natarajan writes, “We all know the household names like Edison and Bell, but few are familiar with the discoveries of Claude Shannon. I wanted to tell the story of an overlooked genius who revolutionized our world.” The paper gives a detailed view of Shannon’s work to prove the existence of an unbreakable code during World War II in an effort to secure communications between President Roosevelt and Prime Minister Winston Churchill. Natarajan goes on to explain Shannon’s contributions to information theory, including the introduction of the concept of entropy to information, Shannon’s work at Bell Labs and MIT, and his impact on digital communications as a whole. The paper, from the introduction to the extensively annotated bibliography, must have been a labor of love and perseverance; Natarajan states that it went through 25 rounds of edits.

Tyler Kaus, from Chadron Senior High School in Nebraska, won the Senior Division prize for his video called “Grace Hopper: Computer Communicator.” The focus of the video is Grace Hopper’s development of several systems of computer language, culminating with COBOL, which is still used today. It also touches on the barriers she encountered based on her age, as well her work as a communicator of computer technologies, and the lasting impact of her work and its applications in the last few decades. With fun special effects and clever editing, it is clear to see that Kaus enjoyed making the captivating ten-minute-long video, which you can watch at https://bit.ly/3CcaiDR.

Claude Shannon.
Credit: Konrad Jacobs,
Mathematical Research Institute of Oberwolfach.

Benjamin Franklin Peery dreamed of bigger things in life, from engineering, to physics, to astronomy. Peery was born in 1922 and spent most of his childhood in Minnesota. WWII interrupted his college education. After the war, Peery earned a BS in physics at the University of Minnesota, an MS in physics from Fisk University, and a PhD in astronomy at the University of Michigan. He worked from 1959 to 1976 at the University of Indiana, where he researched cool giant stars and stars with the element technetium. This 1977 oral history interview was conducted just before Peery joined Howard University, where he built up astronomical research and teaching infrastructure. Peery was active in the American Astronomical Society and the International Astronomical Union. He retired from Howard University in 1992 (Cowley 2011). The passages below were selected to illustrate both Peery’s journey in science as he discovered a calling in astronomy, as well as the mundane but undeniable difficulties of working as a Black astronomer prior to the passage of the Civil Rights Act.

Peery had had an interest in airplanes and aeronautical engineering since childhood but decided to go into physics in college:

**Benjamin Peery:** I thought I was going to be an aeronautical engineer, but first I changed my mind several times during the course of that year, and by the end of that first year, I had decided I really wanted to be a physicist — which is what I am mainly.

**David DeVorkin:** What were the things that caused you to change? Do you remember any instances?

**Peery:** Oh, I don’t know. I think it’s because I’ve always been rather strongly philosophically inclined, and it seemed to me that physics really got down to the bedrock of our existence in a way that engineering didn’t. I think it was really because of the philosophical appeal, the appeal that large questions of existence have always had for me, much stronger.

After earning his bachelor’s degree, Peery taught at the Agricultural and Technical College of North Carolina (a historically Black institution, now the North Carolina A&T
State University), encountered segregation, and discovered a love of teaching:

**Peery:** It was a very bitter reality, I should say, my going there, to college mind you, with a bachelor’s degree, as an instructor in physics. In those days education in the South, and certainly North Carolina, did not permit the hiring of White professors in Black colleges. Black colleges were all Black, from stem to stern. And so, consequently, because of the paucity of Black physicists they said, “Come on board.” I stayed there for two years and had a very interesting experience there. I learned physics as I’d never learned it before, by teaching it. And I was terribly compulsive about my teaching. I was just determined to be the best teacher that ever walked across the campus. I spent an enormous amount of time, to myself, just getting my physics down. And it was a terribly radical experience for me. I really feel very very favored in having had that opportunity. It was great. I decided I was crazy about teaching too, as a consequence from that experience. These were things I didn’t know, you understand. These were all new explorations for me at the time. I didn’t really know what I wanted to do. I wasn’t exactly sure what physicists did anyway.

Peery also discovered a love of astronomy:

**DeVorkin:** Well, did you get any of them [the students] interested [in astronomy]?

**Peery:** No. I’d never looked through a telescope at that time. This is something else I must mention, because it’s one of the great experiences I had. I had never looked through a telescope. I’d never seen a telescope. But in our physics laboratory, we were on optics at the time, I remember very distinctly, and the students were making small Galilean telescopes, setting their lenses on meter sticks, etc. I thought, “Hey, why don’t I take one of these things out after it gets dark, and look at the sky?” So I stood outside of the physics building. I remember distinctly, I was standing on the front steps, and the sky was rather murky. There were lights all about. That didn’t occur to me. But I held this meter stick up with the two lenses, and apparently by accident I directed the darned thing right at the Milky Way. And I saw these stars up there, just fantastic numbers of them. And I was so astounded that I dropped the meter stick, and lenses were falling all over the place. It was just such an overwhelming experience, to see this murky gray sky and yet, with these lenses, to see all these countless stars out there. I wasn’t prepared for it at all.

**While at Indiana University, Peery made McDonald Observatory in Texas his primary observing location and went twice a year. However, traveling to the observatory was difficult:**

**Peery:** In those days, McDonald Observatory was a very isolated place. We stayed in cottages on the mountain. There were half a dozen cottages, and the person who was second in command actually lived up there, and a couple of other people, and it was a lovely existence. You could bring your family down. Finally, as a quaint note on that score, I have always been very unhappy about the fact that I saw my friends bring their families down, and yet I could not bring my family down for the following reasons. In those days — I’m talking about the very early sixties — airplane fare was pretty rough. Still is, but I guess my pocket isn’t quite as flat today as it was then. As a matter of fact, I went to work making $6,000 a year at Indiana.
perhaps drive down through Tennessee, Kentucky or Tennessee, Arkansas, into Texas, and then across Texas, or you could go through Oklahoma and then through the Texas Panhandle. … But the point is that it took you through what was a stretch of what, to Blacks was, at that time, very uncertain territory. … But the point, I do want to stress this point—now, west Texas, of course, was the really Wild West, while eastern Texas is South. It’s strictly Dixie, you know.

DeVorkin: I wasn’t aware of that.

Peery: Oh yes. The spirit — the Wild West is in western Texas.

DeVorkin: University of Texas is western?

Peery: Oh yes, sure. You see, Dallas, Houston — all this territory was strictly Southern in its style and its traditions as anywhere you could find in the South. And the point is that Blacks could not get into motels in those days. You didn’t know where you were going to sleep. You didn’t know where you could eat, even. That was part of the viciousness of it all. If only there were a well-established set of guidelines, you could avoid the embarrassment and the frustration. …

…. Well, even in Van Horn [near McDonald Observatory], I remember well, in those days, a restaurant across the street. We always had a bus stop in Van Horn, and across the street from the bus depot was this restaurant, with its little typically uniquely Southern sign, “No Negros.” You see. Well, the thing is that Blacks generally despised driving through the South because of the uncertainty. And for this reason I never took my family there, until after the Civil Rights Act in 1964, which fairly well outlawed this kind of thing. And I remember so beautifully, in the winter of ’67, I was observing over Christmas time, and so I took my family, my wife, my daughter, who was then… 2 ½—and my mother. And we had the most marvelous time. We were driving, stopping at restaurants. We spent two nights on the road on the way down, and we’d stop at these various places. We’d say, “By God, we’re going into this hotel,” or “We’re going into this motel, wow! Isn’t this different from anything that’s ever gone on before?” I remember Sweetwater, Texas, was one place we stopped one night at a Holiday Inn. Sweetwater, Texas, is famous for a great lynching that occurred there a couple of generations ago, a long time ago. But the name of Sweetwater has lived in Black memory for a long time because of this. So here we were stopping at this Holiday Inn, in Sweetwater, Texas, and we thought that was a lot of fun. We were treated just like anybody else, of course, with great courtesy and all. What I’m trying to say is that in that time, there was the sharpest break in social practices in this country. And a consequence of that break, that discontinuity in social practice, was something that people other than Blacks would not suspect followed. I mean, just the idea of taking your family to a mountaintop where you’d live for a couple of weeks would seem like the most natural thing in the world to do. And yet, there was just too much unpleasantness involved for me to do that, until the late ’60s. And that was just wonderful. Just wonderful. It was just a ball.

References:
• Interview of Benjamin Peery by David DeVorkin on November 5, 1977, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD, USA. www.aip.org/history-programs/niels-bohr-library/oral-histories/33698.
ACQUISITIONS SPOTLIGHT 2020

COLLECTION DEVELOPMENT IN AN UNUSUAL YEAR

By Allison Rein, Associate Director of Library Collections & Services

I don’t think there’s much left to write about 2020 that hasn’t already been written. We can all agree that it was a challenging year. We spent the months of March–July with almost no access to our physical collections. And from July–December we had very limited access. But we didn’t let that stop us from growing our collections in exciting new ways.

We acquire new books by both purchasing and donation. When we purchase books, we divide those up into new or modern purchases and rare books, though the lines are often blurred for our purposes, as we define rare books as anything published before 1920. However, most of our collection has actually been built through donations from former physicists. We’ll spotlight some of those in the future. Email us at nbl@aip.org if you want a more exhaustive list of recent additions.

2020 by the numbers:
• We purchased 146 books (22 were rare books)
• We cataloged 1,146 books (while almost entirely working from home)
• We received about 1,000 books from 16 different donors

Here are just a few of our favorite acquisitions from the past year:

Jane Marcet, Conversations on Chemistry, 1809

We had the 1813 edition of this work, but we wanted to purchase this earlier edition of one of the most important chemistry textbooks ever published. Marcet wrote for the general public, and even other women. She explained scientific concepts in simple language and encouraged people to conduct scientific experiments at home. Both Michael Faraday and Thomas Jefferson read her books and recommended them for all those interested in learning chemistry (Rossotti 2007).


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Greenham Common Women’s Peace Camp Zine, 1983

This 1983 zine-style newsletter was made by the Greenham Common Women’s Peace Camp, a coalition of women in the United Kingdom protesting the placement of nuclear cruise missiles at the RAF Greenham Common in Berkshire, England. Protests started in 1981 and continued for many years, despite the missiles arriving in 1983 (Imperial War Museums). We’re excited to add this more ephemeral publication from an anti-nuclear women’s social movement to our collection. Even though it’s not a scientific publication, we think it adds important context to the conversation around scientific achievement in weapons creation and nuclear science.


Arecibo Observatory, in Puerto Rico, has sadly shuttered, but we wanted to keep the magic alive by purchasing this mystery novel set at the observatory. The author, Colin Hines, also happens to be an atmospheric physicist who spent much of his career at the observatory. He passed away in 2020 (Manek 2020). NBL&A is the only library in the world that has this book in its collections, according to worldcat.org. From the publisher’s description: “Laureen Fortune, still foxy at forty, visits the Arecibo Observatory as guest of former lover Kelly Collins, an astronomer from the University of Chicago. The Observatory’s spectacular radio/radar telescope… has drawn a number of other scientific investigators and hangers-on to its site in northwest Puerto Rico. Laureen knows several of these as long-ago friends and/or lovers, brought together by the Observatory’s unique attractions. Laureen inhales the tortured history and mixed-up culture of the Isle of Enchantment until the idyll is broken one day by the discovery at dawn of a body that has fallen from the suspended structure, pierced the dish, and been disemboweled in the process. Finding herself and Kelly quite reasonably under suspicion of murder, she converts from pseudo-scientist to amateur crime investigator and, by her naturally contrarian processes of thought, identifies the true culprit and obtains a confession. She chooses not to reveal her solution to the investigating authorities, which, for their own reasons, would prefer not to be told.”
Joseph Lecornu, *La Navigation Aérienne*, 1903

This gorgeous book is a history of flight before the era of the airplane. In fact, it was published the same year as the first Wright brothers’ flight at Kitty Hawk. It includes a portrait of Sophie Blanchard, the first woman to become a professional aeronaut. Sophie was France’s chief air minister for ballooning for Napoleon (Dunlop 2016). The illustrations throughout the book are marvelous and even cover pre-Wright brothers airplanes, though few of the aircraft pictured could ever have been successfully flown. It’s a beautiful depiction of the many ways humans have tried to launch themselves into the air.


Other purchases in 2020:

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<td>1986</td>
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<td>Al-Khalili, Jim</td>
<td><em>The House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance</em></td>
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<td>Alladi, Krishnaswami (ed.)</td>
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<td>The Women of the Moon: <em>Tales of Science, Love, Sorrow, and Courage</em></td>
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<td>Anderson, Kelli</td>
<td><em>This Book is a Planetarium</em></td>
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Barton, Ruth  
*The X Club: Power and Authority in Victorian Science*  
2018

Bittel, Carla (ed.)  
*Working with Paper: Gendered Practices in the History of Knowledge*  
2019

Brotorns, Victor Navarro  
*Jeronimo Munoz: Introduccion a la Astronomia y la Geografa*  
2005

Brown, Jpat (ed.)  
*Scientists Under Surveillance: The FBI Files*  
2019

Bub, Tanya  
*Totally Random: Why Nobody Understands Quantum Mechanics*  
2018

Buckley, Arabella  
*A Short History of Natural Science*  
1910

Budker, Dmitry  
*Physics on Your Feet: Ninety Minutes of Shame but a PhD for the Rest of Your Life*  
2015

Burleson, Donald  
*UFO Secrecy and the Fall of J. Robert Oppenheimer*  
2008

Carwell, Hattie  
*Blacks in Science: Astrophysicist to Zoologist*  
1977

Cerami, Charles  
*Benjamin Banneker: Surveyor, Astronomer, Publisher, Patriot*  
2002

Chinnici, Ileana  
*Decoding the Stars: A Biography of Angelo Secchi, Jesuit and Scientist*  
2019

Clark, Janet Howell  
*Lighting in Relation to Public Health and Biological Effects of Radiation*  
1924

Cotes, Roger  
*Hydrostastical and Pneumatical Lectures*  
1747

Cullingford, Alison  
*The Special Collections Handbook*  
2016

Danielsson, A.T. (ed.)  
*Physics Education and Gender: Identity as an Analytic Lens for Research*  
2020

Dark, Richard  
*The Hilarious Universe*  
1932

Dry, Sarah  
*Waters of the World: The Story of the Scientists Who Unraveled the Mysteries of Our Oceans, Atmosphere, and Ice Sheets and Made the Planet Whole*  
2019

Dupré, Sven (ed.)  
*Perspective as Practice: Renaissance Cultures of Optics*  
2019

Durkan, Colm  
*Size Really Does Matter: The Nanotechnology Revolution*  
2019

Eisenkraft, Arthur  
*Active Physics: Home, Teacher’s Edition*  
1999

Electricity Council  
*The History and Philosophy of Science & Technology. Eight Lectures.*  
1958

El-Nadi, Lotfia (ed.)  
*The Brilliant Zewail*  
2019

Fara, Patricia  
*A Lab of One’s Own: Science and Suffrage in the First World War*  
2018

Feld, Bernard T.  
*A Voice Crying in the Wilderness: Essays on the Problems of Science and World Affairs*  
1979

Ferry, David  
*The Copenhagen Conspiracy*  
2019

Fisher, Elizabeth  
*Enjoy Your Science Meeting!*  
2019

Fisher, Phyllis  
*Los Alamos Experience*  
1985

Frankel, Felice  
*Picturing Science and Engineering*  
2018

Frize, Monique  
*Laura Bassi and Science in 18th Century Europe*  
2013

Froehlich, A. (ed.)  
*Space Fostering Latin American Societies: Developing the Latin American Continent through Space, Part I*  
2020

Gbur, Gregory  
*Falling Felines and Fundamental Physics*  
2019

Golinski, Jan  
*Science as Public Culture: Chemistry and Enlightenment in Britain, 1760–1820*  
1992

Gooday, Graeme  
*Domesticating Electricity*  
2018

Greene, Robert Ewell  
*Robert A. Thornton, Master Teacher: Scholar, Physicist, Humanist*  
1988

Greenspan, Nancy  
*Atomic Spy: The Dark Lives of Klaus Fuchs*  
2020

Thorndike  
*Sciences from Below: Feminisms, Postcolonialities, and Modernities*  
2008

Harding, Sandra (ed.)  
*The “Racial” Economy of Science: Toward a Democratic Future*  
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2020

Herschel, John  
*Results of Astronomical Observations Made During the Years 1834, 5, 6, 7, 8 at the Cape of Good Hope*  
1847
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GIVE YOUR IRA a Vacation

Last year Congress gave your IRA a much-needed vacation. No one had to make a required minimum distribution from their IRAs. Why not give your RMD another year off?

Make a Required Minimum Distribution Work for You

Last year as part of special legislation, Congress said there would be no RMDs in 2020. This year, the RMD is back for everyone 72 years and older. Most people do not like taking money from their IRA. They have saved for years, and they would prefer to let it grow. Worse yet, when you take the RMD, you pay income tax on that distribution.

The IRA Charitable Rollover Is an Annual Vacation for Your IRA

While you still must distribute money from your IRA if you are 72 or older, you can do it in a tax-advantaged way. If you are age 70 1/2 or older, you can contact your IRA administrator and ask them to make the distribution directly to our mission. When you do:

• You do not pay income tax on the distribution (but you also receive no income tax deduction)
• You receive gift acknowledgment for the full amount of the distribution
• You satisfy your RMD up to $100,000
• If you and your spouse have your own IRA, both of you can use the IRA charitable rollover

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Melba Phillips is a name that sparks great admiration and affection at the American Institute of Physics. Phillips (1907–2004) led an extraordinary life as a physicist. She was one of the first doctoral students of Robert Oppenheimer and developed the Oppenheimer-Phillips process with him in 1935, was the author and editor of textbooks and history of science works, taught at several universities and colleges and was later involved in higher administration, and served as the American Association of Physics Teachers’ first woman president. Her papers are housed at the Niels Bohr Library & Archives, which is where I came across a typewritten transcript with penciled-in corrections of a speech that she gave during a 1978 meeting of the American Physical Society entitled, “Studying Physics in the Thirties—a Personal Reflection.” I was intrigued to see that part of the speech is about her experience as a woman in physics through the decades. As she writes, women have been underrepresented in physics for decades, though a great shift happened between the 1930s, when her class at Berkeley had four women in the physics master’s program and another four in the physics doctoral program, and the 1950s, when physics became glamorous and social attitudes changed, to the detriment of women interested in careers. The development and deployment of the atomic bombs in World War II made physics an attractive subject, though it had not had much national attention before, and physicists suddenly found themselves being invited to have unprecedented power in politics and in universities, which had the unfortunate effect of discouraging women’s participation in physics (Kaiser 2004). The disparity between women and men who earn degrees in physics is still wide to this day; even as of 2019, women made up only 20% of physics PhDs granted in the U.S. (Mulvey 2021).

Here is an excerpt of the speech, taken from the last two pages of the transcript, using her penciled-in corrections. Please email nbl@aip.org if you wish a copy of the entire speech transcript. This excerpt begins during a description of her years as a doctoral student at Berkeley in the 1930s. It is fascinating to read her perceptions of the time, along with some of her own misconceptions about women’s abilities in science in the second to last paragraph.

Excerpt from Melba Phillips’ speech, “Studying Physics in the Thirties—a Personal Reflection,” given during a 1978 meeting of the American Physical Society:

Were women discriminated against in the department? It did not seem so, certainly not as students. We had teaching fellowships on a par with everyone else. It is true there was one professor who would not take women assistants but it was no hardship to miss that option. Quite the contrary! Two honorary fellowships, supported by the bequest of a Professor Whiting, carried the then usual stipend of $750/annum but involved no duties; I was awarded a Whiting Fellowship my third year, and the guys did not seem to mind. I should add that 1932 was the year of the real crunch; the university budget was cut, including salaries and stipends. The percentage cut was greater for non-faculty lines—I remember feeling some outrage at what seemed unfair decisions, news of which leaked from the meeting of the Faculty Senate. But there was no overt discrimination on account of sex. In 1933, when I took my degree, there were no good jobs for anybody. I was a research assistant for one year at the University, and part time instructor the next, and although it was not quite enough to live on I was no doubt paid the same pittance as the one or two other assistants and instructors. We made jokes about theoretical physics being so beautifully useless, managed to keep doing some research, and by and large enjoyed ourselves on practically no money at all.

I should mention that two of the four women PhDs of those years [at Berkeley] gave up physics about that time—I hesitate to say they “married and got out of the competition” as I was advised to do a few years later by a prominent physicist who shall be nameless, but they did get married, and they did get out of the competition. The fourth married too, but spent a long career in college teaching. There were very few jobs of any kind, and there was no question but that in the job market men were given preference—for what were held to be humanitarian reasons. This was true of research fellowships, too. The ones I got in the end were specifically designed for women—the Helen Huff Fellowship at Bryn Mawr, and the Margaret E. Maltby AAUW Fellowship on which I went to the Institute for Advanced Study. In the later 30’s things began to open up a little.

Jobs were more plentiful and the number of physicists growing by the end of World War II—the “physicists’ war” had made that difference. But apart from those already in the pipeline the women had stopped coming. Why?

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By 1950 the social situation in the country had changed. The depression was forgotten. Affluence began to mean a flight to the suburbs. Women stopped going into any professions which demanded persistence and dedication of purpose—they opted out of any serious pursuit of a demanding professional life because of pressures against their embarking on such careers. The pressures were social, not economic, but certainly pervasive. There arose a tendency not to take seriously professional goals for women, and it began to require considerably more strength of character to persist than it did earlier in the century. It was at that stage that role models became necessary, and they were often not enough to make the difference.

This was not due merely to male chauvinism. Men themselves felt they had to be more competitive because of pressures on them. In the 30’s no one expected physicists to become rich, but now they became eligible for fashionable upperclass life. There are always exceptions, but on the whole neither men nor women were so competitive in the 30’s; later most male physicists strove for the kind of success that had come within reach. It is possible that women are not as competitive as men, on the average. Many of us were not trained for competition—we want our rights, as we perceive them, but I do not know any woman personally who would be capable of the kind of behavior exemplified by Watson in The Double Helix. At least not about science! I doubt that there is any intrinsic sex difference in scientific ability, although there may be differences in kind of ability. I remember that Irène Joliot-Curie brought up the subject in the only private conversation I ever had with her. She did not know the answer, but she confessed that while she insisted on doing her own chemistry, for physical apparatus she relied on personnel who in her experience were male. Was this innate, or was it her training? I wondered later how her mother had felt about such matters, but she may not have known.

The social pressures against scientific careers for women persist to-day, regardless of encouragement from high places. To counteract them examples may have some effect, although I would give encouragement for the study of science and math in the schools higher priority. Legal and judicial measures are important—Affirmative Action, ERA, a possible Equal Opportunities for Women in Science and Technology Act. There are pitfalls. It has been said that in the past women had to be better than men to receive the same consideration. The danger continues that women, just as minorities in comparison with whites, will not be held to the same standards of performance as men, that they are judged either more severely or more leniently. To minimize this danger, to assure equal rights and opportunities instead of the tokenism we have now, women must take this into account. I will not say that women must be scientists first and women after, any more than that men should be scientists first and men after, but the profession is seriously demanding. It would be a mistake to persuade any young woman to go into physics unless she is genuinely attracted by the subject and is willing to work long and hard in preparation for a career. But if she does do this, and does persist in science, she is likely to find the life rewarding indeed!

—Melba Phillips

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IN THE SKY WITH DIAMONDS: PHOTOGRAPHS OF PHYSICS IN THE 1960s

By Sam Holland, AV/Media Archivist

If I could pick a different era to live in as someone of my current age, I would choose the 1960s. I try not to idealize the past too much, since I know it was not exactly the good-old-days picture that is so often painted. Racism, sexism, inequality, war, and devastating political assassinations took place, which left the people of the U.S. shocked and desperate for change. (I am mainly focusing on the U.S. here, since it is what I am most familiar with.) And, this one is comparatively insignificant, but savory Jello dishes were still really popular, and I just can’t get behind that.

But as a result of all this, the 1960s were an important time. People woke up and spoke out about the injustices they saw and experienced. They pushed back against the Vietnam War and the draft. It was a significant era in Black communities’ ongoing struggles for equal rights. The Stonewall protests took place, and equality for LGBTQ+ communities was demanded. The U.S. feminist movement began its second wave. People spread messages about peace and loving one another. It wasn’t perfect, but I do admire many of the cultural movements of the ‘60s.

Additionally, I enjoy the fashion of the 1960s and love the music. Jimi Hendrix, Simon & Garfunkel, the Hollies, the Animals, the Temptations, the Supremes, Sam Cooke, Johnny Cash, and the Four Tops are just a few of the amazing artists and groups making music in the ‘60s. And don’t even get me started on the Beatles. Oh, to be an unsuspecting young person just going about their business on February 9th, 1964, not even realizing their whole existence was about to be transformed by Paul, John, Ringo, and George on the Ed Sullivan Show.

Many noteworthy events took place in the sciences during the 1960s as well. These photographs from the Emilio Segrè Visual Archives illustrate some of these events and how they shaped what was to come.

On May 16, 1960, Theodore Maiman built on decades of knowledge about stimulated emission and created the first laser, which stands for Light Amplification by Stimulated Emission of Radiation. Prior to this, there were only masers, which are like lasers but with longer wavelengths. But the invention of the laser with its shorter wavelengths brought more possibilities than Maiman ever could have imagined. Today, lasers are commonly used in optical surgeries and other medical procedures, as well as tattoo removal, hair removal, engraving, precision cutting and welding, fiber optic technologies, laser-disk storage methods, weaponry, and so very much more (Figure 4).

In 1963, Maria Goeppert Mayer became the second woman to ever win the Nobel Prize in Physics. See Figure 5. When Goeppert Mayer won 1/4th of the prize in 1963, a woman hadn’t been recognized with the Nobel Prize in Physics in six decades. (Marie Curie received her Nobel Prize in Physics in 1903!) So it was kind of a big deal.

The 1963 Nobel Prize in Physics was divided, one half awarded to Eugene Wigner “for his contributions to the theory of the atomic nucleus and the elementary particles, particularly through the discovery and application of fundamental symmetry principles,” the other half jointly to Maria Goeppert Mayer and J. Hans D. Jensen “for their discoveries concerning nuclear shell structure” (The Nobel Prize 2021).

Goeppert Mayer helped to pave the way for future women scientists to receive recognition for their work. Now nearly six more decades have passed, and we can finally celebrate two more women who have won the elusive prize: Dr. Andrea Ghez (2020) and Dr. Donna Strickland (2018). Hopefully in another 60 years (or, you know, sooner) the physical sciences will grow into a more inclusive field for women, people of color, and other historically excluded groups.

In 1965, a brand-new observatory was founded in Chile called the Cerro Tololo Inter-American Observatory (CTIO). It forms the southernmost branch of the Kitt Peak National Observatory based in Tucson, Arizona. The observatory is known for its research on the Magellanic Clouds, the expanding universe, and many more cosmological subjects. Figure 6 shows the attendees of the dedication ceremony for the observatory, which took place in November 1964.

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The 1960s also brought an exciting development to the American Institute of Physics—the Niels Bohr Library! Admittedly, I may be just a little biased about this one, but its formation was valuable for the history of science and those who study it. The Niels Bohr Library (the “& Archives” was added many years later) was dedicated in September 1962. At the ceremony, J. Robert Oppenheimer, Richard Courant, George E. Uhlenbeck, and Hettie Heineman spoke. Oppenheimer, who is shown at the podium in Figure 7, called the ceremony “an occasion of particular sweetness.”

Niels Bohr was asked to attend, since the library was named after him by his friend Dannie Heineman, but could not due to health reasons. He did, however, send the following message, which was read at the start of the ceremony:

“I am much moved to have my name associated with the library for the history of physics, the establishment of which has been made possible by the generosity of the late Dannie Heineman. Historical studies are an important tool for the understanding of man’s position in the modern world. And in this century the history of science assumes particular significance. It is therefore gratifying to see so great an increase of creative scholarship in that field. And I hope that its furthering development will be greatly encouraged and facilitated by the opening of this library” (Niels Bohr Library Dedication Ceremony, 1962).

You can check out a full audio recording of the ceremony on the NBL&A/CHP shared YouTube channel! Search for “AIP History” to find us.

In 1960, construction of an American military research base entirely under the ice in Greenland was completed. See Figure 8. The base was called Camp Century, and its creation was closely connected to the Cold War. Basically, the U.S. wanted to explore the possibilities of hiding people and nuclear weapons in giant ice tunnels. And what they learned is that it is not feasible to hide people and nuclear weapons in giant ice tunnels. Maybe this is one of those hindsight-is-20/20 deals, but I feel like I could have told them that.

Even though the camp did not work out as some may have hoped, it did present the opportunity for climate-related research that yielded early evidence of climate change. But by the mid-1960s, Camp Century was abandoned. In a sad display of irony, nuclear waste was left behind to be buried in the very ice where the environmental studies were carried out.

And, of course, we can’t talk about science in the 1960s without mentioning the Apollo missions, can we? The Apollo Program spanned from 1963 to 1972, with everything up to Apollo 12 taking place in the ‘60s. Figure 9 shows the crew from Apollo 8: Command Module pilot James A. Lovell, Lunar Module pilot William A. Anders, and Commander Frank Borman. They launched into space December 21, 1968, and successfully returned home on December 27th. The mission was very important; it served as a necessary test that ultimately allowed the Apollo 11 mission to land on the moon in 1969.

References:


Figure 1. The coveted jellied veal ring: a delicacy. Photo credit: Steve Noyes/Flickr.

Figure 2. An anti-Vietnam War rally, 1968. Photo credit: Bettmann Archive.

Figure 3. The Beatles, casually becoming internationally loved icons on the Ed Sullivan show. Photo credit: CBS.

Figure 4. Theodore Maiman gets up close and personal with a piece of synthetic ruby crystal, whose excitation generated the light for his invention, the laser. Photo credit: Copyright Hughes Research Laboratories. For copies and permission to publish, please contact Hughes Research Laboratories, pubs@hrl.com.

Figure 5. Maria Goeppert Mayer with King Gustav of Sweden at the Nobel Prize ceremony, 1963. Photo credit: Copyrighted by Reportagebild, Germany, courtesy of AIP Emilio Segrè Visual Archives.

Figure 6. Attendees at the AURA dedication at Cerro Tololo Inter-American Observatory. Photo credit: AIP Emilio Segrè Visual Archives, John Irwin Slide Collection.

Figure 7. J. Robert Oppenheimer, at podium, speaking at the Niels Bohr Library Dedication in New York. Photo credit: AIP Emilio Segrè Visual Archives, Physics Today Collection.

Figure 8. J. Kasl and D. Garfield viewing an ice core sample at Camp Century in 1966. Photo credit: Photograph by David Atwood, U.S. Army-ERDC-CRREL, courtesy of AIP Emilio Segrè Visual Archives.

INAUGURAL HELLEMAN FELLOWS SELECTED

By Joanna Behrman, Assistant Public Historian

About the Fellowships
Four years ago, the American Institute of Physics received a very generous bequest from the will of 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 the United States. Helleman, who died at the age of 76 in 2017, was born in Dordrecht, The Netherlands, and earned his first doctoral degree from Utrecht University in statistical mechanics working with Nico van Kampen. He later earned a second doctorate working with Joel Lebowitz at Yeshiva University. Beginning in 1972, Helleman worked at the University of Rochester where he became interested in the developing field of Hamiltonian chaos. He continued work in this field at the University of Houston. Tassos Bountis, a former doctoral student of his at the University of Rochester, recalled, “Those that were privileged to meet Robert will always remember him not only for his scientific wisdom, but also for his caustic humor and poignant remarks” (Bountis 2018).

This year, Helleman’s dream has been realized as the first round of Helleman Fellowships were awarded. Pepijn Moerman and Jaco de Swart were each awarded a postdoctoral fellowship, and Robert van Leeuwen was awarded a graduate research fellowship. The postdoctoral fellowships provide 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 research fellowships provide a monthly stipend of $3,000 for a 2–6 month period. Although not awarded this year, there is an additional Helleman Graduate Fellowship which offers an annual stipend of $40,000 for an initial period of four years with a possible one-year extension. A graduate fellow would also receive a $10,000 grant for research expenses.

Meet the Fellows
After earning his PhD at Utrecht University in 2019, Pepijn Moerman (Figure 1) came to Johns Hopkins University, where he now works as a postdoctoral researcher. He will spend his fellowship with the laboratory group of Rebecca Schulman in the Department of Chemical and Biomolecular Engineering. His research interests lie with soft matter physics, colloid science, and self-assembly. During his fellowship, he will study how physical principles affect the organization of DNA-coated microparticles to help understand how cell-to-cell communication contributes to self-organization in tissues. Moerman writes:

The development of experimental model systems for self-assembly is important both because it allows us to study physical principles that are also important in biological self-organization in a controlled environment using building blocks that are easy to visualize; and because it is a step toward developing smart materials with desirable life-like properties such as the capability to self-heal, adapt, and reconfigure.

After the fellowship, Moerman hopes to lead a research group which focuses on the nonequilibrium self-organization of biologically inspired materials.

Jaco de Swart (Figure 2) is currently finishing up his PhD at the University of Amsterdam, after which he will spend his postdoctoral fellowship working at MIT. De Swart’s background in physics, history, and philosophy motivates him to study the history of dark matter. He writes:

During my time as a Helleman fellow, I aim to research the historical conditions under which dark matter came to be interpreted as being a yet-to-be-detected particle in the early 1980s. These developments shaped a new cosmological canon, community, and research infrastructure that still manifests itself in today’s “hunt” for dark matter. What can the origins of this research program tell us about the difficulties that are currently being faced in particle physics and dark matter research? Tracing the history of the dark matter problem offers a reflective dimension to current dark matter research and its continuing null-results. At the same time, this historical
research opens up a way to understand how the methods and practices involved in studying the universe have been changing over the past fifty years.

While at MIT, de Swart will work with David Kaiser and looks forward to increased collaboration with the Center for History of Physics as well.

The final fellowship winner, Robert van Leeuwen (Figure 3), is a PhD candidate at the University of Amsterdam, where he works with historian of physics Jeroen van Dongen and string theorist Erik Verlinde. He will spend much of his fellowship at Princeton University, where he will be hosted by Herman Verlinde (yes, the brother of Erik Verlinde, and yes, both are string theorists). His research concerns the relationship between string theory and empiricism. Van Leeuwen writes:

During my fellowship stay, I will be interviewing leading scholars in string theory, and find out about their recollections and thoughts on the subject’s history and relations to the empirical. … My fellowship project will be of importance for building up the historiography of string theory. While documenting the accounts of key contributors to the theory, I hope to shed light on the changing practices of theoretical physics that went together with its development.

Van Leeuwen will spend four months in the United States at Princeton and will travel to conduct oral history interviews.

Looking to the Future
The Helleman Fellowships mark a new era of scholarly exchange between the Netherlands and the United States. While Moerman is starting his fellowship term in fall 2021, both de Swart and van Leeuwen will begin their fellowships in 2022. We’re all very excited and proud of the inaugural group of fellows and hope to see them all visit us soon at the Center for History of Physics.

Applications for these fellowships are accepted every year, with an application deadline of March 1st. Notifications of awards will be made in May. More information about the fellowships and the application process can be found at https://www.aip.org/aip/awards/helleman-fellowships.

References:
THE BIRTH OF X-RAY DIFFRACTION: EXCERPTS FROM A 1963 INTERVIEW WITH WALTER FRIEDRICH

By Professor Peter J. Heaney, Department of Geosciences, Pennsylvania State University

Walter Friedrich (1883–1968) was the first person to build a device that successfully achieved the diffraction of X-rays by a crystal, and he was the first to observe the diffraction pattern produced by it. This epochal accomplishment simultaneously demonstrated the wavelike nature of X-rays and the translational symmetry that defines crystallinity. Had Friedrich performed this study today, he might have been named a cowinner of the Nobel Prize. Instead, Friedrich’s status as a postdoctoral researcher on temporary loan from Arnold Sommerfeld to a privatdozent, Max von Laue, situated Friedrich on the lower rungs of the German academic hierarchy. Consequently, von Laue was named the sole recipient of the Nobel Prize in Physics in 1914, and Friedrich’s contributions seem eclipsed by the likes of the Braggs père et fils, Paul Ewald, Peter Debye, and von Laue himself.

Friedrich recounted the story of the discovery in several published documents, including a decadal anniversary paper in Naturwissenschaften (Friedrich 1922, 363) and a reminiscence in the same journal 27 years later (Friedrich 1949, 354)—both in German. His impressions were not included among the personal remembrances in the semicentennial volume edited by Paul Ewald (Ewald 1962). Then Thomas Kuhn and colleagues spearheaded the Archives for History of Quantum Physics (AHQP) project in the 1960s to “find and preserve primary source materials for the study of the history of quantum physics” (Kuhn et al. 1967). Perhaps to correct the omission in Ewald (1962), Gustav Hertz, Théodore Kahan, and John L. Heilbron traveled to East Berlin to interview Walter Friedrich in May 1963. Hertz (1887–1975) had collaborated with James Franck on inelastic collisions of electrons in gases, for which he won the 1915 Nobel Prize in Physics. Théodore Kahan (1904–1984) was a French physicist who authored two dozen books on radioactivity and quantum physics. John Heilbron (b. 1934) was working on his doctoral studies with Thomas Kuhn at the time of this interview. He is now a professor of history and vice-chancellor emeritus at UC Berkeley.

With the assistance of Dr. Melanie Kaliwoda (Ludwig-Maximilians-Universität München), I have translated and annotated this interview. The full interview with preface appeared originally in Heaney and Kaliwoda (2020). The original interview and its translation also are archived with the AIP Niels Bohr Library & Archives. You can read the original interview in German at https://repository.aip.org/islandora/object/nbla:266548. The translated and annotated interview is available at https://repository.aip.org/islandora/object/nbla%3A3A315886.

Excerpt from Interview with Walter Friedrich
Conducted by: Gustav Hertz, John L. Heilbron, and Théo Kahan
Place: East Berlin, East Germany
Date: May 15, 1963
Walter Friedrich: …At this time, Laue came up with the idea:
If the X-rays have a wavelength as short as was assumed based on diffraction experiments with narrow slits, then they would have to give X-ray interference patterns when passing through an electron lattice, through a crystal. This was discussed for about a quarter of a year in the cafés, as was the custom in Munich at the time.

Théo Kahan: Who was there?

WF: Ewald and Laue.

TK: You were there too?

WF: No, I wasn’t there at all. I heard about it from their later conversations. I had a job studying X-rays with Sommerfeld. I had an X-ray machine, at that time, one of the most intense and powerful X-ray machines, and I had to do some work on particular properties of X-rays and Planck’s quantum theory, okay? …And we talked about it [X-ray interference] for a long time, and the strange thing is that none of the people who were at the meetings, including Röntgen, and Sommerfeld—also Mie when we were skiing, and Starke, (and Wald and Jort)—these were the main people at the time—they didn’t think it would work…

And it was kind of forbidden to do an experiment. “This is not possible; it is superfluous; the thermal vibrations will prevent it [X-ray interference] from happening.” No, people have forgotten, but as we now know, there were statistical problems too. There was only a certain probability that the locations and positions of atoms according to the space lattice were regular, and it seemed like a longshot, you know, that we would observe interference; as we later proved, we needed long exposure periods. And we talked about it, and I said to Laue, “Well, let’s do it in the back [of the lab], let’s do it in the evening,” all right? [Chuckles]. And since, as I said, during the day I was busy with my work with Sommerfeld, my seminar assignments—you know what it is like in an institute—we brought in another student, Paul Knipping. He had just finished his PhD work and was writing it up and had some time.

We built a very simple apparatus… Since we had misconceptions about the nature of these interferences, we first thought—and we should have known better, by the way—that it was the characteristic radiation of the crystal that triggered the interference. That is why we examined copper sulfate, because we thought we were generating the characteristic radiation of copper. Today, we know that this radiation is not at all coherent—just as fluorescent radiation is not optically coherent. As such, no interference could have come from the copper radiation.

Anyway, because I knew about X-rays, I thought, “Well, let’s just irradiate the crystal for ten hours.” So we irradiated for ten hours… And in the evening, it was around 11 p.m. that I took the plate out and put it in the developer tray, and then suddenly a black blob emerged, a black spot from the unscattered X-rays. In addition, there were ring-shaped patterns that were quite irregular, of course, because firstly, the mineral belongs to an irregular crystal system, okay, and also because it was not oriented. And next to these patterns, there was the shadow of a pitcher [Laughter].

TK: A pitcher?

WF: A mug, a Munich mug, a beer mug. And how did that come about? Because the nondirectional radiation, the scattered radiation, cast a shadow of a so-called screw-ring. The crystal was inserted into this screw-ring. This shadow appeared on the plate as a body, short and wide, and the handle on the ring also stuck out. Now, of course, you can imagine my great surprise. I went to Knipping in the morning, and we went to Laue and then finally to our boss and showed it to him…

We then had a jeweler cut a beautiful plate from a sphalerite crystal and grind it perpendicular to the fourfold symmetry axis, and we mounted it in the apparatus. We now had a goniometer as part of it, etc.; the instrument was now much more complicated and finished. Also, different sections of sphalerite, cut in different directions, were examined. We took another picture with a long exposure time. And behold, the beautiful fourfold symmetry was there.
Now you can imagine the great joy! But here was the situation: Max Laue had intuited the phenomenon but did not yet grasp the theory. That’s why we had no idea what it would look like! We expected it would be a blurry thing, and we had set up plates in all directions and were now surprised that suddenly there were very sharp interference spots.

Now Laue sat down straightaway and tried to do the right thing as an optical physicist according to the classic theory of optics. That was the difference between him and Bragg, isn’t it true? He [Laue] developed the theory from the old theoretical formulas about interference, these empirical formulas, and in this way, he was now able to derive equations, which then contributed to the interpretation of this interference phenomenon… Later it was said that we planned it in this order, that his theory emerged, and then the experiments were performed. In reality, the experiments came first, and then the theory followed. That is a mistake, which may give rise to some misinterpretations of the entire history. That’s how it was.

References:
HISTORY: TO THE FUTURE!

By Greg Good, Director, Center for History of Physics

I first interacted with AIP’s Center for History of Physics in 1983 or so, when my application for a Grant in Aid was turned down. I had proposed (with a colleague) to produce a collection of selected letters to and from John Herschel, the noted Victorian natural philosopher and astronomer. That denial was a blessing in disguise. Although my research since the 1980s has moved progressively toward a more global and more recent history of the geophysical sciences, Herschel has always been a part of my narratives. I will return to Herschel toward the end of this piece.

My first visit to the American Institute of Physics was in New York City in the late 1980s. The cataloging and indexing implicit in all of the drawers of file cards was astounding—and this was the beginning of today’s online resources at the Niels Bohr Library & Archives and the Center for History of Physics. In the 1990s I visited AIP again and discussed my research with Joan Warnow (later Warnow-Blewett), Spencer Weart, and Ron Doel. My research was migrating from the 19th to the 20th century—and AIP’s oral histories and the International Catalog of Sources were revelations to me as a research scholar. These are still THE essential tools of every historian of the physical sciences.

My research also gradually shifted from a more traditional history of physics to the geophysical and cosmic sciences. These geo-cosmic sciences developed parallel to the more historically minded geology and paleontology, modeled more on astronomy and physical and chemical research. Both of these approaches to studying the Earth in all its parts and its relations to the cosmos drew on natural history, natural philosophy, and natural theology in varying degrees.

My migration deepened into the 20th century, and this drew me to the American Geophysical Union. The AGU History Committee was very active, and I joined it as one of a few historians among many scientists. Some of them were rather famous and, at the time, seemed a little intimidating. It was an initiation into committee work in scientific professional associations and international scientific unions, by now a familiar and rewarding environment to me. Among AIP Member Societies, I have served on history committees of the American Association of Physics Teachers, the American Meteorological Society, and the American Physical Society. I have been part of commissions in the International Union of Geodesy and Geophysics, the International Union of Geological Sciences, the International Union of Practical and Applied Physics, and the International Union of History and Philosophy of Science and Technology, Division of History of Science and Technology.

continued on page 30
My orbit tightened around AIP in 2003, when I was asked to chair the Advisory Committee on History of Physics, a group of about a dozen respected historians, archivists, and scientists. The preparations and reports required input from every staff member of NBL&A and CHP. The short reports that resulted from two intense days of oral presentations provide a time-lapse view of amazing productivity and creativity. I chaired this committee and drafted its reports until 2008. Although I was doing similar service for several historical and scientific professional societies at the same time, or maybe because of that, I recognized AIP’s strong institutional support for history as a mark of distinction. Among the histories of the various sciences, only the history of chemistry had a comparable base. I also knew that professional scientists, professional historians, and professional archivists all looked to NBL&A and CHP for resources and advice. They still do.

Spencer Weart retired as CHP director in 2008, and thanks to the generosity of the Avenir Foundation, I became the first Spencer Weart director of CHP in 2009. I have enjoyed serving in this position for nearing 13 years, and I am thankful for the opportunities AIP gave me to create new activities and new online resources: the Lyne Starling Trimble Lecture Series, the biennial Early Career Conferences for historians of the physical sciences around the globe, the Teaching Guides for K–12 teachers with their emphasis on telling the stories of women and other minoritized groups in the history of physical science, new history of science web exhibits, the beginning of research fellowships at AIP with the Helleman Fellowships and Grant in Aid recipients, oral history expansion, and more.

I think my most important creation at AIP for the future of the history of the physical sciences has been the Early Career Conferences for historians. The central idea of these conferences has been that they are planned by, administered by, and owned by early career historians. Who is going to research and write the histories of physics and meteorology and astronomy? It will be the scholars who are working on their PhDs right now, or who are just a few years beyond. Forty or fifty scholars met at the American Center for Physics in 2011 and again in 2014, in Annapolis in 2016, and alongside the history conference of the European Physical Society in San Sebastian, Spain, in 2018. We were to meet in 2020 in Copenhagen at the Niels Bohr Archives, then this was postponed to 2021, and now to September 2022. Almost 200 early career historians have now attended AIP’s Early Career Conferences, and for decades to come they will be fulfilling the promise of new books, new analyses, and new understanding of the history of physics. And they look to AIP for resources, guidance, and support.

For most of my time as director, CHP has consisted of Stephanie Jankowski (senior administrative support), a postdoctoral fellow,.


The first Early Career Conference, held in 2011 in College Park. The theme of the conference was “Continuity and Discontinuity in the Physical Sciences Since the Enlightenment.” Photo courtesy of Greg Good.

The second Early Career Conference, held in 2014 in College Park. The theme of the second conference was “Global Science, Global Technology, Global Impacts.” Photo courtesy of Greg Good.
and myself. This changed in 2019 and 2020, with new positions in oral history and public history (think science communications but for history). These new positions have allowed CHP to accomplish more than our little trio could dream of. We can and are imagining possible directions for oral histories. The quality, consistency, and accuracy of our online engagement resources are being reviewed at the same time that new lesson plans and new web exhibits are being researched and written. The value of our web exhibits and lesson plans rests on its scientific and historical accuracy and supported analysis. This contributes to the reputation of not only CHP, but of AIP generally.

At the end of calendar year 2021 it will be time for a change in leadership of the Center for History of Physics. After 13 years, I intend to retire and turn my attention to historical writing projects. I have put off writing a book on the appearance of geophysical research in the 19th century. This is where John Herschel enters into my plans. I have not only years of my own research to draw on, but also the wealth of new tools and resources that have become available since I set this book aside.

I also look forward to writing a narrative on the history of space weather. I hope to be in time for the next solar maximum in 2025!

It has been a privilege to work with and at AIP for the last few decades. I look forward to observing the future projects and programs of CHP and NBL&A. I thank AIP leadership, the AIP Foundation, and the donors and benefactors who support the center, library, and archives. I especially thank the Avenir Foundation for its ongoing generous support of both the Niels Bohr Library & Archives and the Center for History of Physics. Our future is brighter because of your trust in us.

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The Fifth Biennial Early-Career Conference for Historians of the Physical Sciences

Crossing Borders and Fostering Collaborations

The American Institute of Physics (AIP) Center for the History of Physics is pleased to announce a fifth international conference for graduate students and early career scholars hosted by the Niels Bohr Archive in Copenhagen, Denmark. The conference will be held in September 2022, rescheduled from September 2020. Precise dates will be announced. The goal of this conference is to foster communication and collaboration among junior scholars and to provide a forum for exploring and reflecting upon current issues in the historiography of the physical sciences.

To submit an application or for more information, please contact earlycareer.aip@gmail.com or visit the conference website at www.aip.org/history-programs/physics-history/early-career-conference.
DOCUMENTATION PRESERVED

Compiled by Chip Calhoun, Samantha Holland, K. Jae, and Melanie Mueller

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 libserv.aip.org. 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

British Library. Department of Manuscripts. 96 Euston Road, London NW1 2DB, England


California Institute of Technology. Institute Archives. 1201 East California Blvd. (Mail Code 015A-74), Pasadena, CA 91125, USA


Henry E. Huntington Library. 1151 Oxford Road, San Marino, CA 91108, USA


Johns Hopkins University. Special Collections, Milton S. Eisenhower Library. 3400 N. Charles St., Baltimore, MD 21218, USA


Museum of Innovation and Science (Schenectady). 15 Nott Terrace Heights, Schenectady, NY 12308, USA


City of Newport News records. Collection dates: early 1980s–late 1990s. Size: 0.2 linear feet (1 box).


University of Oklahoma. Bizzell Library. 401 W. Brooks St., Norman, OK 73019, USA


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NEW FINDING AIDS

St. John’s College. The Library. Cambridge CB2 1TP, England, UK


University of Manchester. John Rylands University Library. 150 Deansgate, Manchester M3 3EH, England, UK


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Columbia University. Rare Book and Manuscript Library. Butler Library, 6th Floor East, New York, NY 10027, USA


Museum of Innovation and Science (Schenectady). 15 Nott Terrace Heights, Schenectady, NY 12308, USA


University of Texas at Austin. Harry Ransom Humanities Research Center. P.O. Drawer 7219, Austin, TX 78713-7219, USA

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.