History and Philosophy of Physics

A FORUM OF THE AMERICAN PHYSICAL SOCIETY · VOLUME XV · NO. 4 · SPRING 2023

James Edward Young: First African American Physics Professor at MIT

by Ronald E. Mickens and Charmayne E. Patterson, Clark Atlanta University, Atlanta, GA 30314, USA

After completing my physics doctoral studies at Vanderbilt University, Nashville, Tennessee in August 1968, I (Ronald E. Mickens REM) traveled to Cambridge, Massachusetts to use my National Science Foundation Postdoctoral Fellowship at MIT 's Center for Theoretical Physics. After finding my office at the Center, I was soon told that there was another "Afro American" physicist currently at the Center, Dr. James E. Young (JEY), who was visiting for the academic year from Los Alamos Scientific Laboratory, located in New Mexico. It was suggested that the two of us should meet and get to know each other. So, I walked over to JEY's office and left a note for us to have lunch the next day. I provided information as to where I would be at the time: midway on the "infinite hall" at 11:30 AM.

The next day, at exactly 11:30 AM, I looked up from my position along the "infinite hall" to observe a tall, well-built, slender, golden skinned black man, walking at a fast pace towards me. He had Jeri-curled, reddish-brown hair, a clean shaped mustache, and a short devil cut beard. In addition to pink tinted sunglasses, he was wearing light purple colored bell bottom pants with matching shirt, and a dark leather jacket. Both hands were covered with black riding gloves. As he approached, we both smiled and held out our hands. He said "My man!" and my reply was "It is what it is!" This was our first meeting, the start of many more to come.

The major purpose of this short essay is to introduce James Edward Young to an audience who may never have heard of him or know of his scientific career. Other than his published scientific papers and technical reports, very few documents exist which provide details of his family and social life. Hopefully, this bio-essay will provide a basis for a more thorough examination of his life, including his research involving the biosciences and, importantly, his tenure at MIT.

Family

Very little is known about JEY's family and his early life in Wheeling, West Virginia, except that he was born in that city on January 18, 1926. Our search for information on his parents and possible siblings came up empty. However, he did attend the "all Negro" Lincoln High School and graduated in 1941.

JEY married E. Elaine Hunter and they had one child, James E. Young, III. Later JEY and Elaine divorced as told to REM by JEY [10], but the date, reasons for the divorce, and other details of their relationship are murky. JEY did state to REM [10] that in the 1990s he was staying with Elaine in her home in Virginia Beach, VA, while the house he was building was under construction. Clearly, they had a relationship fraught with many complexities.

James Edward Young, MIT, 1983

Continues on page 5

In This Issue

The Sigma Pi Sigma Centennial Congress: Yesterday and Today, Legacy and Promise

By Ed Neuenschwander, Department of Physics, Southern Nazarene University

Every university maintains an alumni association. The alumni continue to identify with their alma mater after graduation, and the university depends on their support. The physics community would benefit from an alumni association. In a sense, we already have one.

In 1921 at Davidson College, South Carolina, five physics students and two faculty members founded the Sigma Pi Sigma physics honor society. Today, Sigma Pi Sigma has chartered over 600 chapters and has inducted some 90,000 historical members. On October 6-9, 2022, Sigma Pi Sigma's periodic convention, or Congress, was held to celebrate the society's centennial. Originally scheduled for 2021, the Covid pandemic pushed the Centennial Congress back a year. The 2022 Congress, or "PhysCon" as these events have recently been called, was held in the Omni Shoreham Hotel in Washington, DC. Of the 1250 people attending (Fig. 1), over a thousand were student physicists.

Fig. 1. (Left) 2022 Sigma Pi Sigma Congress attendees. (Right). Jocelyn Bell-Burnell brings opening remarks. Other plenary speakers seated at the table are (left to right) Eric Cornell, John Mather, and James Gates.

Because this conference celebrated Sigma Pi Sigma's first century, let us review a few highlights of those ten decades.[1] The second Sigma Pi Sigma chapter was chartered at Duke University in 1925, the third at Penn State in 1926 at the instigation of graduate student Marsh White. Marsh became a keystone (and beloved) figure in Sigma Pi Sigma. Under his leadership Sigma Pi Sigma became an associated

Continues on page 9

History and Philosophy *of* Physics
NEWSLETTER

Forum on History and Philosophy of Physics | American Physical Society,
One Physics Ellipse, College Park, MD 20740

Forum Officers
Chair: Alberto Martinez
Chair-Elect: Bruce J Hunt
Vice Chair: Alfred Douglas Stone
Past Chair: Paul H Halpern
Secretary-Treasurer: Dwight E Neuenschwander

Forum Councilor
Catherine Lee Westfall

Other Executive Board Members
Joanna F Behrman
Elise M. Crull
Christopher A Fuchs
Margriet van der Heijden
Jami Valentine Miller
Tiffany Nichols
Donald Salisbury (Newsletter)

Program Committee
Chair: Michel H P Janssen
Joseph D Martin
Paul Cadden-Zimansky

Nominating Committee
Chair: Paul Cadden-Zimansky
Michel Janssen
Chanda Prescod-Weinstein
Audra J Wolfe

Canvassing Committee (Ad Hoc)
Co-Chairs: Margriet van der Heijden
Donald Salisbury

Fellowship Committee
Chair: Paul Halpern
Peggy Kidwell
Katemari Rosa

Pais Prize Committee
Chair: Melinda Baldwin
Melinda Baldwin
Dieter Hoffmann
Jinyan Liu
Gregory Good (ex-officio)

The Forum on History and Philosophy of Physics of the American Physical Society publishes this Newsletter biannually at *http://www.aps.org/units/fhp/newsletters/index.cfm*. Each 3-year volume consists of six issues.

The articles in this issue represent the views of their authors and are not necessarily those of the Forum or APS.

Editor
Donald Salisbury
Department of Physics
Austin College
Sherman, TX 75090
dsalisbury@austincollege.edu
(214) 405-6188

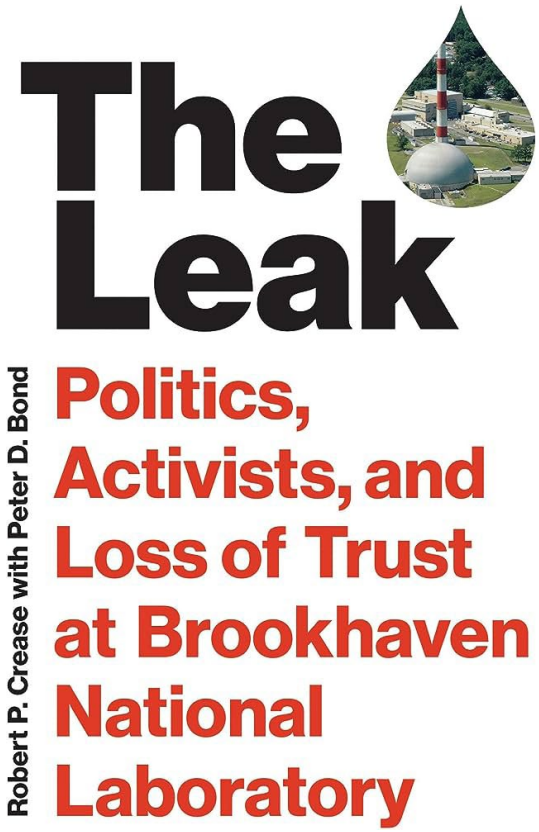
The *Leak: Politics, Activists, and Loss of Trust at Brookhaven National Laboratory*, by Robert P Crease and Peter D Bond

Review by Catherine Westfall (Michigan State University)

The Leak: Politics, Activists, and Loss of Trust at Brookhaven National Laboratory is about the lab's High Flux Beam Reactor (HFBR) – a valuable and safely operating neutron scattering facility – and how it came to be permanently shut down. But *The Leak* only appears to be about that episode. Actually, the book depicts what might befall any Big Science facility, especially one conducting nuclear research. The book even foretells things that are happening right now in our political landscape having nothing to do with Big Science – such as the conspiracy theories, fake facts, echo chambers that surround discussions of issues such as vaccines, elections, and global warming and others.

The book is written by Robert P Crease, a science historian at Stony Brook University (and a former editor of this newsletter) who also wrote a history of the first 25 years of BNL; and Peter D Bond, who served as Physics Department head and then Interim Director of BNL. These roles may seem to make the authors interested parties, but their roles also gave them advantages, for they clearly had access to documents and interview subjects that would have been difficult or even impossible for others, even other science historians, to access. Crease and Bond seem to have earnestly tried to provide an objective view of the episode, and do not hesitate to point out mistakes, even embarrassing and terrible ones, by lab scientists, lab administrators, and DOE officials.

The book's story line is about how, 25 years ago, a trivial technical failing – the leak of a non-hazardous substance near the HFBR – led to a political, media, and activist firestorm. The Department of Energy mishandled oversight, politicians postured to score environmental credentials, activists lied to advance agendas. Crease and Bond relate all this vividly; reading the book is alternately pleasing, funny, and horrifying. It's told like a novel, whose driving forces and characters include anti-nuclear activists (actor Alec Baldwin, supermodel Christie Brinkley), DOE Secretaries (Federico Peña, Bill Richardson), politicians (Senator Alphonse D'Amato), prominent science administrators (John H Marburger), and others. Cameo appearances include *Da Vinci Code* author Dan Brown. Bizarre happenings include accusations that the lab harbors UFOs, and an inebriated high school student ingesting tritium from a self-illuminating "EXIT" sign – a safe amount of tritium, but whose concentration was higher than that in BNL's tritium leak.



Well-intentioned actions backfired. After the leak was announced, the DOE insisted it approve any and all lab press releases. This backfired because it took a week for the DOE to get approvals, which made it seem as if the lab was trying to hide things. The DOE also ordered the lab to be "transparent" by releasing data about the tritium plume as it came in. This backfired because journalists got data before BNL scientists could analyze it, allowing the newspapers to spin things any way they wanted. Imagine the Federal government forcing doctors to publish all your bloodwork numbers before your doctor had a chance to evaluate them.

What's frightening about the BNL episode is that it was Big Science as usual. The Federal government gives and takes away. Politicians back you and then attack you. DOE officials support you then cave. Newspaper columnists love you and hate you. You aren't on an activist group's radar and then you are. Meanwhile, you are doing great science, helping the nation's mission, and earning prizes. What's different about the BNL episode is that it was a "perfect storm" in which everything that could go bad did and turned against the lab at the same time. And the consequence was the destruction of an important scientific facility – a reactor neutron source – of the sort that materials science needs, and cannot now replace.

The DOE once held a "Lessons Learned" conference devoted to this event. When the Fermilab speaker reached the podium, her first slide said, "There but for the grace of God...." It could have happened anywhere, she continued – even at her lab, which does not have a reactor. As she suggested, anyone interested in Big Science needs to pay attention to what happened at BNL in 1997, and try to discover lessons.

The Leak doesn't really offer such lessons. Crease and Bond asked many of their informants and interview subjects – including scientists, administrators, politicians, activists, and others – what they think the lessons were, and include these in an appendix of "Retrospectives." Most of these lessons are pretty obvious, and largely unattainable: Get politicians on your side. Forge trusting relationships. Cultivate influencers. Be transparent. Keep it clean. Probably the most insightful

Continues on page 12

Executive Summary of the 2023 FHPP Executive Committee Meeting

Ed Neuenschwander,
FHPP Secretary/Treasurer

The FHPP Executive Committee meeting was held on April 16 at the APS meeting in Minneapolis. After being called to order by Chair Paul Halpern at 9:00 AM, discussion turned to APS meeting attendance trends. Relevant points mentioned included registration fees growing larger, travel support growing smaller, people growing used to working remotely, increasing financial strains on APS due to open access (much of the APS management team are now business people, although journal people are still physicists). Attendance at recent APS March meetings has "exploded," while attendance at the April meeting declined. The difference is an order of magnitude: about 13,000 attended the March meeting, 1,300 at the April meeting.

At 9:30 am as had been scheduled, the CFO of APS, Jane Gould, and the APS CEO, Jonathan Bagger, dropped in on the meeting. Bagger announced that 2023 will mark the 125th anniversary of the founding of APS, offering an opportunity to "refresh the strategic plan." For this purpose he is reaching out to all APS Units. APS "needs focus," which requires history. (It has been observed that we study history not merely to understand the past, but to understand the present.) Gould noted that "legacy is the business of FHPP." Goals of the 125th anniversary include showing "progress on diversity." The creation of a FHPP study group charged to research APS history with an emphasis on inclusion was suggested. It was noted that physicists, like all human beings, have been known to whitewash history. When APS tells its own history of inclusion, we should do better than emphasizing only grand highlights. Real progress in inclusion and diversity, and the elimination of structural obstacles, will be apparent when it occurs in the routine and mundane. Life is mostly lived in the ordinary, and that is where progress is judged.

Discussion turned to the reasons and logistics of moving the APS headquarters from the American Center for Physics (ACP) in College Park, Maryland, to downtown Washington DC. The new address is 555 12th St. NW, by the Metro Center. After serious study of real estate assets, in February 2022 APS closed the sale of a 45,000 ft^2 building in Long Island and purchased a 10,000 ft^2 building closer to New York City. The ACP was put up for sale, and the buyer will lease back the History Center facility for ten years. (While practical reasons for this transition are understandable, as one who worked in the ACP for two years, and visited it twice annually for board meetings for over twenty years, like many others I feel a sense of personal sadness in thinking of that beautiful wooded campus becoming another commercial property.)

The discussion returned to APS meeting logistics. The need for child care makes a remote access option attractive to physicists with young children. This topic reveals competing values. On the one hand, online meetings increase convenience and reduce expenses. On the other hand, in-person meetings build community. Societies are held together by personal relationships.

The American Center for Physics, 1993-2023. Thanks for the memories.
photo credit: ACP

For the full report on the 2023 FHPP executive committee meeting, see https://engage.aps.org/fhpp/governance/executive-committee/committee-members/archived-reports

All of the executive committee meeting reports from 2019 through 2023 are now available at this website.

Continues from page 1

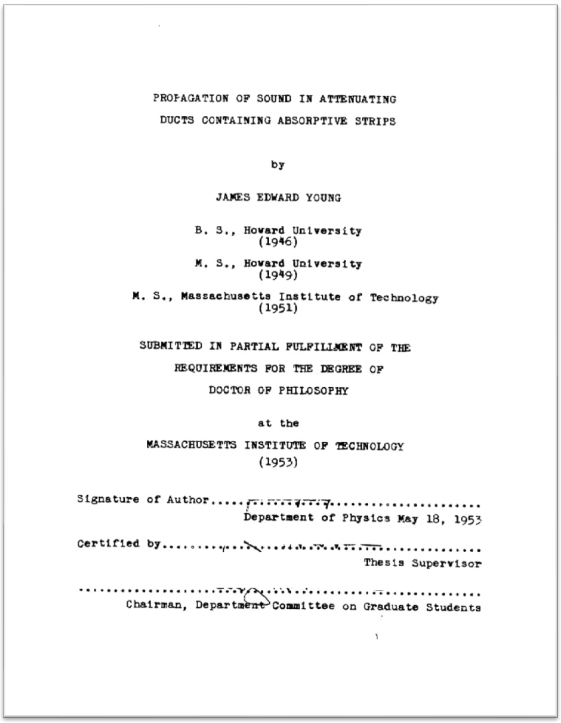
Education

While in high school, JEY had an extensive general interest in science, particularly the areas of physics, mathematics, and medicine which took up his attention when he was not involved in regular high school coursework. At the time, the two outstanding Negro colleges having good physics programs were Fisk University in Nashville, TN and Howard University located in Washington, D.C. He decided on Howard and obtained his BS Physics degree in 1946. However, relatively nearby was Hampton Institute, Hampton VA, and they needed an instructor for their (introductory) general physics courses. JEY was hired after graduation from Howard as Head of the Hampton Physics Department, while also pursuing the Master of Science Degree in Physics at Howard. He remained as Head until 1949, the same year that he received the M.S. Degree in Physics from Howard University.

Jim's graduate advisor at Howard university was Herman Branson [2], who received his B.S. degree in 1936 from Virginia State College (Petersburg, VA) and Ph.D. in Physics from the University of Cincinnati in 1939. Branson had joined Howard University in 1941 as an Assistant Professor, in both Departments of Chemistry and Physics. Branson was known for his significant contributions to the mechanisms as to how proteins work in the human body. Of interest is the fact that Branson was later involved in a public dispute with the chemist Linus Pauling over Branson's contribution to the determination of the structure of the alpha helix. This research took place in 1948-1949 at the California Institute of Technology, in the laboratory of Pauling, when Branson was on leave from Howard University. While this matter was never resolved to the satisfaction of Branson [3], Branson 's work in the biosciences did influence JEY's future career and research.

In 1949, JEY left Howard University with the MS Physics Degree for MIT (Cambridge, MA.) He received the MS degree from MIT, without specification, in 1951. The "without specification" meant that he focused on several general areas of interest (physics, mathematics, and electrical engineering) without satisfying the requirements of a specific academic department. This work was supervised by Richard H. Bolt, MIT Department of Physics.

JEY continued his graduate work at MIT and received the Ph.D. in Physics under the direction of Philip M. Morse, an expert in the area of the propagation of sound.



PROPAGATION OF SOUND IN ATTENUATING
DUCTS CONTAINING ABSORPTIVE STRIPS

by

JAMES EDWARD YOUNG

B. S., Howard University
(1946)

M. S., Howard University
(1949)

M. S., Massachusetts Institute of Technology
(1951)

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
(1953)

Signature of Author.....
Department of Physics May 18, 1953

Certified by.....
Thesis Supervisor

.....
Chairman, Departmental Committee on Graduate Students

Cover Page of James E. Young's Dissertation, May 18, 1953

Professional Experience

Over the course of his career, JEY had a broad range of professional experiences. Below is a brief summary of some of these activities.

After his PhD studies at MIT, JEY was a Postdoctoral Fellow at the MIT Acoustics Laboratory during 1954-1955. Other postdoctoral and/or Research Assistant positions were held at the University of South Hampton, Department of Aeronautical Engineering, Southampton, England, 1956; Niels Bohr Institute, Copenhagen, Denmark, 1961-1962, Oxford University, Oxford, England, as Research Assistant to R. Peierls, 1965-1966; and Tufts University School of Medicine, Department of Cell Biology and Anatomy, Boston, MA, 1985-1986.

During the period 1964-1981, JEY was a Visiting Professor at four academic institutions: The University of Minnesota, Minneapolis, MN, Visiting Associate Professor, 1964; MIT, Visiting Professor of Physics, 1968-1969; Harvard University, Visiting Scientist in the Physics Department, 1978-1979; and Howard University, Visiting Professor of Physics (1980-1981). He also held a long-term visiting position, beginning in 1990, at the California Institute of Technology, as an Associate in Physics. JEY had long-term employment at two quite different institutions during his career in science and technology. The first was at the Atomic Weapons Research and Development Facility, Los Alamos Scientific Laboratory, Los Alamos, NV, where he was a staff member in the Theoretical Division during 1956 to 1970. The second position was at the academic institution, MIT, where he was a Professor of Physics in the Center for Theoretical Physics, beginning in 1970 and retiring on July 1, 1991 with the honorific title of Professor of Physics Emeritus. JEY was an active consultant, especially to companies involved with biomedical issues. In particular, he provided expert advice to General Dynamics, La Jolla, CA, 1957-1958; H.U.R.T. Inc., Huntsville, AL, 1980; NYGENE Inc., Yonkers, NY, 1985-1986; and NuLabs, Dubai, 2000.

Research

At both Los Alamos Scientific Laboratory (LASL) and MIT, JEY was productive in his research efforts and, as a result, published a number of articles and technical reports. From his vita [11], it is estimated that he has some 50 or more publications in the peer-reviewed, scientific research literature and a similar number of technical documents, some of which are classified. All of his open published work appears in high-level peer review journals such as Annals of Physics (New York), Journal of the Acoustical Society of America, Journal of Chemical Physics, Nuclear Physics,

Physical Review, Physical Review Letters, and Physics Letters.

JEY's research can be characterized as investigations in four general areas of mathematical and theoretical physics [11]. Brief listings of his contributions are given below:

Acoustics

- Study of propagation of sound through elastic plates, pipes, and absorptive strips in ducks...
- Calculation of correlation functions for noise fields...
- Investigation of losses by means of heat conduction in acoustic layers

Nuclear Physics

- Study of charged particle reactions of light nuclei...
- The use of perturbation expansions in the formal theory of scattering...
- Investigation of mathematical issues related to the optical potential...
- Application of the many-particle Green's function formalism to nuclear processes

Elementary Particles

- Asymptotic expansion of scattering amplitudes of elementary particles...
- Regge theory and the triple Regge vertex...
- Lepton-lepton scattering
- Electromagnetic mass differences of pions...
- Threshold pion production in nucleon-nucleon collisions

Mathematical Physics

- Kernel and equisummation properties of uniformly elliptic operators...
- Relating generalized expansions to Fourier integrals...
- •Construction of a closed form differential renormalization group generator for critical dynamics

MIT Experiences

JEY had generally cordial relations with many members of the Center for Theoretical Physics. In particular, he was socially and research interactive with several of the individuals that he first met at LASL. This included Francis Low and Earle Lomon, and later Vigdor Teplitz. Jim knew everyone on a first name basis and was very kind and prompt to introduce visitors to the Center to its faculty, postdoctoral fellows, graduate students, and staff.

According to a list compiled by Edmund Bertschinger [1], Professor of Physics at MIT, Jim produced six Ph.D. students and supervised at least five Bachelor of Science theses. The following is a list of his doctoral students, along with the titles of their dissertations:

- Shirley Ann Jackson, 1973, "The study of a multiperipheral model with continued cross channel unitary"
- S. James Gates, Jr., 1977, "Symmetry principles in selected problems of field theory"
- Abhay Ram, 1977, "Effective range expansions for a SU(2) x U(1) model of weak interactions"
- Ricardo Ruiz de Querol, 1982, "Turbulence in binary fluid mixtures", (co-supervised by James E. Young and David R. Nelson)
- Darell James Johnson, 1986, "Statistical mechanics of a vortex system in a two-dimensional inviscid incompressible fluid"
- Roger K. Brooks, 1987, "Unidexterous world-sheet supersymmetry and the heterotic string theory"

Jim's two most "publicly famous" students were Shirley Jackson and S. James Gates. It is of great interest to note that he never published with his students.

JEY had one somewhat curious trait, well known by many at MIT. He often would break out into a discussion on scientific matters such that what he was stating was totally incomprehensible to his listeners. I experienced this on several occasions. This is what James Gates stated on this issue (see [9], pp.788)

> "...there was Jim Young, whom I met on one occasion as an undergraduate. I think I was a junior, and the regular lecturer for one of our courses in electrodynamics was away. Jim was a guest lecturer. He came in, gave a lecture none of us understood, and I said to myself, "I never want to work with that guy!"

We asked William Quivers, a Black graduate student in physics at MIT, to comment on JEY; his full and enlightening statement is given below:

"I began my graduate studies at the Institute in the Fall of 1969, and I was surprised to find out there was a senior black faculty member in Physics. After I met Shirley Jackson, who was a graduate student with me, she told me about Jim Young who ended up being her advisor. I don't remember the actual details of how I met Jim. When I met him, he didn't look like what I expected a physics professor to be: he wore boots and had Jeri curls. He definitely stood out! He was thin, taller than me, looked to be in his 40s, and there he was in the Center for Theoretical Physics. Once I found out he existed, I told my parents. My dad, who was preparing for med school after WW2, said that he remembered a really young guy named Jim Young who was teaching a refresher physics course at Hampton in the late 1940s. I described Jim Young to dad, who said, "That sounds like him!" When I told Jim Young my dad remembered him, Jim didn't remember my dad among the hundreds of students he had taught over the years. I never took a course with him, and he didn't become my advisor because I never asked him too. I was aware of the problem of black students only going to him, and I didn't want to add that burden or perception. In turn, I was worried about what it would mean in such a white institution to be taken on by a black professor. It turned out he wasn't the best person to have worked with because he was known as a hard task master in general. Although I never had him in a course, he became sort of an unofficial advisor to me. When I was looking for someone to work with, he helped me figure out who I should seek out. When I ran into a rough patch while I was at MIT because my advisor was leaving, I took a masters and felt quite adrift. I told him what was going on and how down I was feeling. He told me not to be discouraged and that he thought I would be able to make a contribution to the field. That helped a lot. I am very grateful he was in my life." (William Quivers, July 7, 2023)

Service to the Physics Community

In the 1970s JEY was very involved with various issues of interest to the American Physical Society. He provided good service to three of its important committees: Panel on Public Affairs (1969-1970), Committee on Minorities (1977-1978), and Committee on Committees (1979) [11]. In addition, he was a member of the Fulbright Hayes Committee, Council on International Exchange of Scholars during 1979-1981, and was Committee Chair in 1979.

During several summers in the 1970s, both JEY and I (REM) were Visiting Researchers at the Stanford Linear Accelerator Center (SLAC) located near Palo Alto,

CA. In addition to our research, we also enthusiastically engaged in a Summer Science Program for minority students, many of them undergraduates from HBCUs. We also provided mentoring for some of these students and gave several lectures on our current research activities. The Summer Science Program was directed by the African-American physicist, Ernest Coleman who, at the time, was a member of the Physics Department at the University of Minnesota.

An important program at MIT that JEY was heavily involved with was the MIT-HBCU Exchange Program for Physics. This program was initially funded by the Department of Education and was based on a grant written by Earle Lomon, a professor in MIT's Physics Department. There was strong input from a number of individuals associated with MIT: Earle Lomon, James Young, Ronald Mickens, Margaret MacVicar [6], and Charles Grant (postdoctoral Fellow from Panama). The main goal of this program was to increase significantly the number of African Americans who earned Ph.D.'s from MIT in STEM. Students from six HBCUs were to spend their junior or senior year at MIT taking courses and immersing themselves into the academic and social activities of the Institute. All courses were graded on a pass/fail basis. The idea was to say to the students: "this is MIT! Do you think that you could survive and succeed here? If so, then come on!" Perhaps the most outstanding member of this group of students was Ronald McNair, who obtained a PhD in laser physics, and went on to become a NASA astronaut.

The six HBCUs involved in this program were Alabama A&M University (Huntsville, AL); Fisk University (Nashville, TN); Hampton Institute (Hampton, VA); Norfolk State University (Norfolk, VA); North Carolina A&T State University (Greensboro, NC); and Virginia State College (Petersburg, VA).

After this program was initiated, major roles in fulfilling its goals were taken on by JEY (MIT), Howard Foster (Alabama A&M), James Davenport (Virginia State), Ronald E. Mickens (Fisk), Earle Loman (MIT) and Margaret MacVicar (MIT). Except for a few of the living participants and decision makers, this program has been largely forgotten.

One of the most important and significant things that JEY and REM did together was to organize at Fisk University a day of celebrations to honor our "physicist elders", i.e., African-American teachers and researchers who taught at the HBCUs and mentored and prepared generations of students who went forth to have successful careers in STEM in spite of the many obstacles placed in their way [7,8]. The particular individuals we thought about and discussed were:

- James R Lawson (Fisk),
- Herman Branson, and Halson V. Eagleson (Howard)
- Donald Edwards (North Carolina A&T)
- John McNeile Hunter (Virginia State)

JEY and I decided that such an event should be held at Fisk because of its long tradition in physics education and research, and the connection to Elmer Imes, the second African-American to receive the doctorate in Physics (1918) and, most importantly, his research was internationally recognized as an important contribution to the interpretation of the physics of molecular rotational-vibration spectroscopy [7,8].

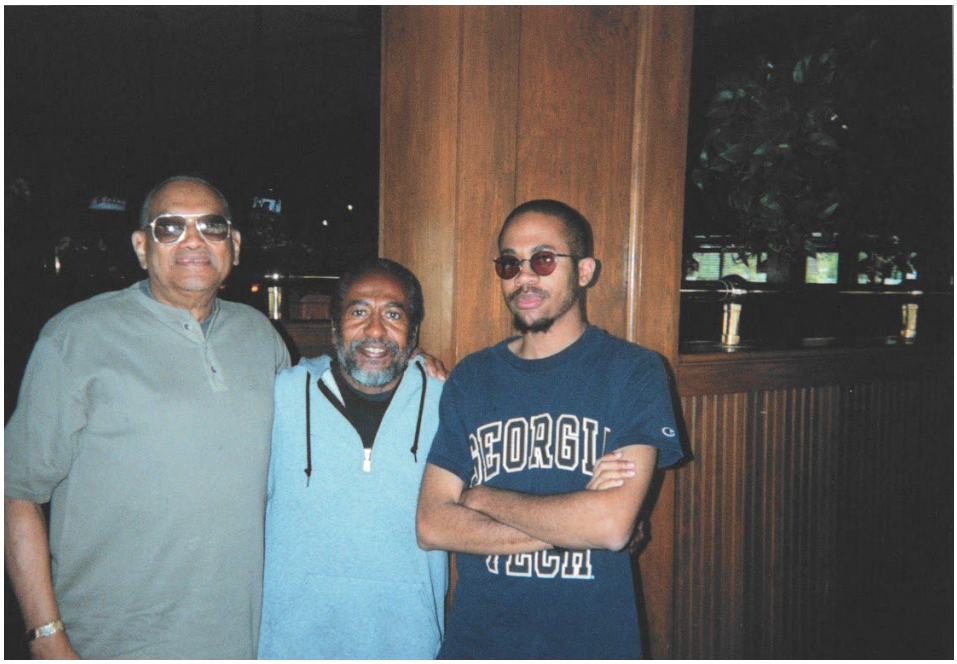
JEY and I set ourselves up as a committee of two to organize the celebration which was held at Fisk University on December 9, 1972. The three individuals honored were Halson V. Eagleson, Donald Edwards, and John M. Hunter. This gathering led to a similar celebration in 1974 at Howard University. Out of these and several other meetings emerged the concept of a national organization for African American physicists. Such an organization was inaugurated on April 28, 1977 at Morgan State University, Baltimore, MD, with interim administrative structures and officers. A detailed history of what is now named the National Society of Black Physicists (NSBP), is given in an essay by James C. Davenport, which appears in ref. [7], pages 6-12.

Social Life

One on one, in social settings, Jim was easy to talk with as long as he was not the topic of discussion. Consequently, he rarely engaged in "chat" about his (past) marriage or family. Over the years when he and I were present in non-physics, social environments, he was extremely courteous, kind, and pleasant, always willing to let his companions know that he was well-versed on a range of subjects which included all types of music, various forms of art, and foods from around the world.

During my stays at MIT, JEY and I "jointly socialized" on many occasions with several MIT faculty and/or graduate students. They were always pleasant events. Such was also the case when the two of us were at SLAC during summers where we had overlapping appointments at this research facility.

The only time I detected maybe some disappointment from Jim was when his upcoming marriage to an Atlanta, GA school teacher was canceled [10]. This took place in the late 1990s. However, prior to this development JEY, me, and my family met on a number of occasions for lunch or dinner. The photo below was taken of Jim, myself and my son at Pappadeaux Seafood Kitchen in Atlanta, GA, circa 2000. The next photo includes my daughter (Leah) and wife (Maria).



JEY throughout his life was always in a state of "incognitioness." When he wished to be alone or not speak to someone, he would "make it so". This is the current situation with Jim. For essentially two decades he has cut off all contact with his former friends and colleagues, except for rare occasions where he communicates by letter. These letters are handwritten in a formal script writing style mimicking letter forms of the 17th and 18th centuries on oversized, long white paper that existed in Europe during the mid-20th century. My letters from him are general, long greetings related mainly to myself and my family. I respond, but he does not reply. We've been engaged in this "exchange" for 20 or so years!

Medical School

While nuclear physics, elementary, particle physics, and mathematical/theoretical physics formed the crux of JEY's research, he always had long and deep interests in the biosciences (see [11], the section on "some previous studies and investigations in the biosciences".) Consequently, it should not be surprising that in 1983 he enrolled in the Harvard University Division of Medical Sciences and completed two years of the pre-clinical curriculum.

As he often discussed with me, his view of human diseases flowed from a model that considered the body to be a complex dynamic system. This system has a number of both stable and unstable steady states, with the stable states corresponding to a "healthy" body and the unstable states giving rise to an "unhealthy" body. Taking this view to be correct allows the conclusion that the central role of medicine is to create mechanisms that force the body to transform from unhealthy to healthy states. My understanding is that Jim was working on mathematical models that could aid in the implementation of this methodology.

JEY stated that he was involved with several West Coast-based startups related to this work, but I have no idea or clues as to the eventual outcomes of these ventures.

The End

We have presented for you an overview of some aspects of life and scientific career of James Edward Young, the first African American Professor in the Physics department at MIT. He took this position in 1969 and retired in 1991 with the title Emeritus Professor. Jim had a "complexity" of relationships with the Black faculty, students, and staff. He was conflicted about MIT, but survived there for 32 years. However, he was a very good friend to me (REM), but never a scientific colleague! At MIT, JEY thought he was in Eden... but there be dragons!

We look forward to someone carrying out the research and associated tasks that will permit the writing of a full biography on him, which includes his motivations for doing and acting as he did.

Acknowledgments

The authors thank Ms. Imani Beverly and Mr. Brian Briones, reference librarians at the Atlanta University Center's Robert W. Woodruff Library for their help in obtaining copies of documents, articles, and books related to this project. Without their timely actions, this work would have been greatly delayed.

Comment

Throughout this essay, we generally refer to James Edward Young as either 'Jim" or "JEY". Also, this essay is written from the perspective of REM, mainly because REM was a friend and colleague of JEY. However, equal contributions were made by the two authors to the overall production of this work.

References

[1] Emailed, dated March 10, 2023, from Edmund Bertschinger to Ronald E. Mickens.

[2] Wikipedia: Herman Branson. https://en.wikipedia.org/wiki/Herman_Branson. Accessed 7/26/2023.

[3] David Eisenberg, "The Discovery of the Alpha-Helix and Beta-Sheet, the Principal Structural Features of Proteins," *Proceedings of the National Academy of Sciences*, vol. 100 (2003), pp. 11207-11210.

[4] Wikipedia: Sylvester James Gates. https://en.wikipedia.org/wiki/Sylvester_James_Gates. Accessed 7/26/2023

[5] Wikipedia: Shirley Ann Jackson. https://en.wikipedia.org/wiki/Shirley_Ann_Jackson. Accessed 7/14/2023.

[6] Wikipedia: Margaret MacVicar. https://en.wikipedia.org/wiki/Margaret_MacVicar. Accessed 4/15/2023.

[7] Ronald E. Mickens, *The African American Presence in Physics*, National Society of Black Physicists, Atlanta, GA, 1999. pp. 6-11.

[8] Ronald E. Mickens, *Edward Bouchet: The First African American Doctorate*, World Scientific, Singapore, 2002, Appendix D.

[9] Clarence G. Williams, Technology and the Dream: Reflections on the Black Experience at MIT, 1941-1999, The MIT Press, Cambridge, MA, 2001.

[10] James Edward Young, private oral communications with Ronald E. Mickens, 1999-2001.

[11] Vita of James E. Young, Ph.D. Items given to Ronald E. Mickens, circa 2001, unpublished. A copy of this item is located at the Robert W. Woodruff Library of the Atlanta University Center, Inc. in the "Black Physicists Collection, created by Ronald E. Mickens.

[12] Wikipedia: James Edward Young. https://en.wikipedia.org/wiki/James_Edward_Young. Accessed 5/17/2023.

Continues from page 2

society of the American Association for the Advancement of Science in 1936, reached 43 chapters in 1941, and became a Member Society in the Association of College Honor Societies in 1945. Marsh's various leadership roles in the society spanned seven decades.[2]

In 1950 AIP organized its Student Sections program, and the next year Sigma Pi Sigma became an Affiliated Society of the American Institute of Physics (AIP). By 1965, when Sigma Pi Sigma could boast over 100 chapters, suggestions were floated about merging Sigma Pi Sigma and the AIP Student Sections. After the AIP Governing Board approved the proposed merger, a special Sigma Pi Sigma convocation was held in 1967 at Purdue University to close the deal. The merger was narrowly approved. The AIP Student Sections were reincarnated into a new sister society to Sigma Pi Sigma, the Society of Physics Students (SPS). Marsh White and Sigma Pi Sigma President Worth Seagondollar [3] wrote the "linked but distinct" societies' Constitution.

Sigma Pi Sigma and SPS share the same Executive Committee and governing board—the National Council [4] that seats one student and one faculty representative elected from each of 18 Zones. The student Councilors elect one of their colleagues to be their voice as a full member of the Executive Committee. Sigma Pi Sigma and SPS elect separate Presidents, charter their own chapters, and carry distinct membership criteria. Anyone may join SPS, and new undergraduate members may supplement their SPS membership with a one-year complementary membership in any one of the ten AIP Member Societies. One is elected into Sigma Pi Sigma by the local chapter, subject to eligibility criteria as articulated in the society's Constitution.

For about two decades after the merger, many officers in AIP Member Societies saw the Society of Physics Students as merely a club for students, nice to have but little more than a sidebar. But by the mid-1990s enough people in AIP leadership positions thought otherwise, seeing within SPS and Sigma Pi Sigma deep potential for the physics community and its future. SPS physics majors are not merely takers of courses; they should be seen as *undergraduate physicists*. And Sigma Pi Sigma could be much more than an honor society whose influence ends with a certificate, a gold pin, and a line on one's CV—an alumni association that engages not only those who, after graduation, pursue explicit physics careers, but also engages, for the long term, those who excelled as physics majors then moved into diverse professions where they are friends of physics dispersed throughout the wider public.[5] The latter are society's "hidden physicists" (the term borrowed in analogy to the hidden symmetries of elementary particle physics).[6]

Under a series of Sigma Pi Sigma/SPS Directors who were backed by AIP leadership, efforts to integrate SPS and Sigma Pi Sigma indelibly into the culture of physics forged ahead. This was done through focused messaging, upgrading programs and publications, negotiations with AIP Member Societies, frequent personal visits by society leaders to SPS Zone Meetings and local chapter events, organizing SPS-sponsored contributed sessions at AIP Member Society meetings, establishing SPS summer internships,[7] and investing seriously in the Sigma Pi Sigma Congresses. At every opportunity deliberate efforts were made to communicate to the physics community the messages that (1) SPS is much more than a "club for the kids," and (2) Sigma Pi Sigma members offer a wide community of physics ambassadors sprinkled throughout the larger society. Since 1992 the Sigma Pi Sigma Congresses have been prominent flagships for seeing Sigma Pi Sigma and SPS as respected participants in the wider physics community.

During the years immediately after the merger, as AIP focused resources on establishing SPS, a hiatus of Sigma Pi Sigma Congresses resulted until the 1992 event in Dayton, Ohio. About a hundred people participated in the Dayton meeting, half of them members of the Council, Executive Committee, and AIP staff. The driving forces behind the scenes of the 1992 Congress were former presidents Worth Seagondollar and George Miner, and Sigma Pi Sigma Historian Peggy Dixon. They saw in the 1992 Congress not only the restoration of an essential component in Sigma Pi Sigma life, but also rehearsal for a significant upcoming milestone event: the 75th anniversary Congress of Sigma Pi Sigma, the "Diamond Jubilee," to be celebrated in 1996.

This resumption of the Congresses and the approaching Diamond Jubilee offered Sigma Pi Sigma an opportunity to reflect over the meaning of its existence. While the Constitution describes the society's purpose, by looking outward beyond itself a deeper a Mission Statement for Sigma Pi Sigma was drafted in 1995 and approved by the Council at the 1996 Diamond Jubilee. Its four dimensions have been emphasized at every opportunity since then. Paraphrasing and annotating them here, they are:[8]

Honor: Recognizing and celebrating high scholarship in physics (as all academic honor societies do in their respective disciplines—but the Statement goes on to articulate a broader vision).

Encouragement: Through its values and programs, Sigma Pi Sigma offers encouragement to *all* who engage with physics, from promoting science appreciation among elementary school children and the general public, to scholarships, research support, and internships for undergraduate physicists; from encouraging those who seek advanced degrees, to maintaining connections with physics-degree alumni who enrich an astonishing diversity of professions within physics *and* beyond it. Sigma Pi Sigma is blessed with explicit *and* hidden physicists. The Hidden Physicists range from actuaries to engineers, physicians to patent lawyers, and everything in between, but with their skills in thinking as physicists they are ambassadors within the wider society for physics appreciation and the importance of evidence-based reasoning.

Service: Members of Sigma Pi Sigma were blessed with the encouragement of family and friends, with fine teachers, mentors, and opportunities. It is often observed that to whom much is given, much is required. Sigma Pi Sigma exists not merely for its members to celebrate themselves, but to help them use their talents and connections to make the world a better place for all.

Fellowship: All organizations and communities are held together by relationships. In doing physics or astronomy or hyphenated physics there must be no ethnic, gender, racial, national, or generational boundaries. Sigma Pi Sigma transcends

Fig. 2. The exhibition hall at the 2016 Congress.

walls and barriers, uniting a wonderfully diverse group of people who gather in community around these great things that go under the heading of Physics.

When the Diamond Jubilee was held in Atlanta, Georgia, the organizers hoped that at least a hundred people would participate. Towards that end the Congress was held jointly with the Southeast Section of APS. Oceanographer Robert Ballard who famously located the *Titanic* was the banquet speaker, which helped build attendance.[9] Following the Diamond Jubilee, the Sigma Pi Sigma Congresses continued to grow. The 2000 Congress[10] was held at the American Center for Physics in College Park, Maryland. Among the plenary speakers was Nobel Laureate Bill Phillips. The 2000 Congress theme put to Sigma Pi Sigma members this question: What would you like to tell the physics community? Physics alumni from industry told their stories, followed by panel discussions. Student members of the Council presided over the sessions and introduced speakers, which became standard practice in subsequent Congresses.

The next Congress in 2004 may be considered the breakthrough meeting for attendance. It was hosted by the University of New Mexico.[11] Among many other distinguished speakers, the 2004 meeting featured Dame Jocelyn Bell-Burnell, AIP Governing Board Chair Mildred Dresselhaus, Nobel Laureate Carl Weiman, and Presidential Science Advisor John Marberger. Dr. Burnell was such an encouraging supporter of the meeting (even working with staff behind the scenes) that she was declared Honorary Chair for all subsequent Congresses.

A 2004 Congress sub-theme was "Science and Ethics," chosen for the meeting's proximity to Los Alamos. A private tour of the Trinity Site was arranged for Congress participants. Standing by the Trinity Site monument, Worth Seagondollar, who worked on the plutonium core that was detonated at Trinity, shared his thoughts about the meaning of the site. As the after-dinner speaker at the closing banquet, Worth shared his stories, and during an entire hour, in a vast ballroom holding several hundred listeners, you could hear a pin drop—everyone hung on to each word. This was history come to life, told by a participant. For example:[12]

* After describing how he reported daily to Enrico Fermi, Worth paused, then added reverently, "I have great respect for that man."

* One night Worth dropped one of the plutonium core hemispheres, denting the edge. He hastily grabbed the Geiger counter to see if the protective silver coating had been compromised (it hadn't), then grimly worked all night with a ball peen hammer, gently tapping the damaged edge of the hemisphere back into shape. The next morning Worth received an unscheduled visit from Robert Oppenheimer, who gave him a hard look and said, "Mr. Seagondollar, it is well that you solved your problem."

* At the predawn test on July 16, 1945, Worth was situated twenty miles from Ground Zero. He had taped glass from an arc-welder's helmet over a peephole in a large sheet of cardboard. When the first light from the explosion reached him, its intensity was so bright that Worth momentarily thought that he had forgotten to attach the glass!

Subsequent Congresses have continued to grow. Since the Diamond Jubilee, all AIP Member Societies, as well as numerous corporate and university sponsors, have increasingly supported the Congresses, filling the exhibition halls with their displays and representatives (Fig. 2).

The 2008 Congress was held at Fermilab, where speakers included Leon Lederman.[13] The 2012 Congress in Orlando, featured, among others, Freeman Dyson and John Mather.[14] The 2016 Congress, held in San Francisco, included Eric Cornell, Jocelyn Bell-Burnell, and James Gates at the podium.[15] Increasing the Congress frequency, the 2019 Congress was held in Providence, RI,[16] with presentations by Jocelyn Bell-Burnell, Ellen Williams, John Mather, and others. This brings us to the centennial-plus-one meeting with some 1250 attendees. Plenary speakers again included honorary Chair Jocelyn Bell-Burnell, along with Nobel Laureates Eric Cornell and John Mather, APS President James Gates, and other luminaries [17]. PhysCon now has a life of its own, and the

Fig. (3). Left: Jocelyn Bell Burnell engages a student in discussion during the 2022 poster session. Right: Several dozen works of art—with physics themes—were on display in the 2022 PhysCon.

enthusiastic participation of all AIP Member Societies offers evidence that Sigma Pi Sigma and SPS have earned the respect of the entire physics community.

Beginning in the 2000 Congress, the meetings have included poster sessions for students to present their research. With the 2004 Congress at Fermilab, physics art exhibitions have become another popular feature (Fig. 3). The art entries and the research posters are judged, which adds interest.[19] By highlighting together the works of art and the research posters, the Congress proudly exhibits the creative spirit that is so deeply shared by art and physics.

A serendipitous historical echo between our centennial celebration and popular culture was on display in the Omni Shoreham lobby. On their American debut concert tour in 1964, in Washington DC the Beatles stayed at this hotel. The historical Beatles display in the Omni lobby bore the heading "Yesterday, and Today," a fitting echo to the Sigma Pi Sigma Centennial Congress purpose of celebrated our society's legacy and promise (Fig. 4). Although the PhysCon attendees of 2022 were not as boisterous as the screaming fans who swarmed the Omni in 1964 hoping to glimpse the Beatles (no police lines were necessary at PhysCon), the Sigma Pi Sigma crowd *did* cut loose (respectfully so) during the Dance Party (sponsored by APS!)—the meeting's final event—where, amid the music, dancing, display booths and refreshments, crowds of students swarmed around their physics rock stars, seeking selfies and autographs. The physics rock stars were open and generous in their joyful engagement with their younger colleagues. All the physicists at the Omni in 2002—undergraduate physicists and Nobel Laureates alike—happily shared in an experience of celebration and inspiration. We remembered and honored the past, enjoyed the present moment, and we now proceed with anticipation into the next hundred years, which promises new legacies.

Fig. (4). Left: A Beatles history exhibit in the hotel lobby. Beneath the "Yesterday and Today" heading one sees the playlist for their Washington DC concert, scribbled out by John Lennon on the hotel's stationary, Right: the 2002 Sigma Pi Sigma Congress logo:"100 Years of Momentum." Respecting yesterday and today, while looking to the next 100 years.

Ed Neuenschwander is a former Director of SPS and Sigma Pi Sigma.

[1] Peggy Dixon, *Sigma Pi Sigma Historical Highlights: 1921-2003* (AIP Press, 2003). For more recent history see https://www.sigmapisigma.org/sigmapisigma/about/history. In 2021 the documents of Sigma Pi Sigma were officially amended to designate Sigma Pi Sigma the *physics and astronomy* honor society. See Emma Rasmussen, "Sigma Pi Sigma, the Physics *and Astronomy* Honor Society," *Radiations* Spring 2022, 18-19.

[2] Tracy M. Schwab, "Marsh W. White," Radiations, Fall 1995, 16-19. The Society of Physics Students offers several annual Marsh White Awards to SPS chapters for physics outreach activities. Stephanie Campbell, "Marsh W. White Dies at 102," *Radiations* Spring 1999, 5.

[3] Worth Seagondollar was President of Sigma Pi Sigma at the time of the merger and chaired the merger meeting ("I've never worked harder in my life!"). He and Marsh White negotiated successfully with the Association of College Honor Societies for Sigma Pi Sigma to remain an ACHS member after the merger. Following Worth's retirement, the Council bestows one Worth Seagondollar Award at each Sigma Pi Sigma Congress to "recognize an exemplary level of commitment and service to the Society of Physics Students and Sigma Pi Sigma." See Jean Krisch, "A Celebration of Service: Worth Seagondollar," *Radiations* Spring 1998, 9-10. Worth was, of course, the first recipient of the Worth Seagondollar Service Award. After Worth's passing in 2013, a tribute to him was published: "Dr. L. Seagondollar: A Tribute to a Key Figure in Sigma Pi Sigma History" (written by SPS/Sigma Pi Sigma staff), *Radiations* Fall 2013, 7; Jean Krisch, "A Celebration of Service, *ibid*., 8.

[4] In recent years a few international chapters of SPS have been chartered. For administrative purposes those international chapters are adopted into existing Zones.

[5] A graphic from p. 6 of the Fall 2012 issue of *Radiations*, "Field of Employment for Physics Bachelor's in the Private Sector, Classes of 2009 and 2010 Combined," shows Engineering (32%), Non-STEM (26%), Computer or Information Systems (21%), Physics or Astronomy (5%), Other STEM (8%), Other Natural Sciences (8%). Data, AIP Statistical Research Center.

[6] Editorial, "The Origin and Future of the Term 'Hidden Physicist,'" *Radiations* Winter 2000, 18. Radiations includes a regular column "Spotlight on Hidden Physicists."

[7] An endowment by John Mather for the SPS Internship Program should be noted. Dr. Mather's steadfast engagement with SPS and Sigma Pi Sigma is influential and deeply appreciated.

[8] "The Mission Statement for Sigma Pi Sigma," *Radiations* Spring 1996, p. 20.

[9] 1995 Congress, Atlanta, GA, the "Diamond Jubilee," with theme "Looking Back, Looking Forward." For details see the Fall 1995, Spring 1996, and Spring 1997 issues of *Radiations*.

[10] 2000 Congress, American Center for Physics, College Park, MD. Theme: "What Would You as a Sigma Pi Sigma Member Like to Tell the Physics Community?" Speakers were William Phillips (1997 Nobel Prize) and James Trefil (2000 Gemant Award) and several Sigma Pi Sigma alumni with careers in industry. The banquet speaker, Felice Frankel (Artist in Residence and Research Scientist in EE and Computer Science, MIT) brought the explicit influence of art into the Congresses. See the Fall 1999, Spring 2000, and Summer 2000 issues of *Radiations*.

[11] 2004 Congress, University of New Mexico, Albuquerque, NM. Theme: "Heritage and Promise" with an emphasis on "Physics and Ethics." Speakers included Jocelyn Bell-Burnell (discoverer of pulsars), John Marburger (Science advisor to the President of the United States and Director of the Office of Science and Technology Policy), John Rigden (author of *Hydrogen: The Essential Element* and Director of AIP Physics Programs), Carl Wieman (2001 Nobel Prize in Physics), Worth Seagondollar (Manhattan Project alumnus and former President of Sigma Pi Sigma), Kenneth Ford, former AIP CEO and Ivy Mike alumnus), and several others. For details see the Fall 2003, Spring 2004, Fall 2004, and Spring 2005 issues of *Radiations*.

[12] Professor Seagondollar's 2004 Congress after-dinner talk was recorded. It may be found at https://www.youtube.com/watch?v=AsYGSqSzWcA. Most of the talk is published in "A Tribute: In His Own Words," *Radiations* Fall 2013, 10-13. The article carries this note: "For a full transcript of Dr. Seagondollar's talk, visit www.sigmapisigma.org/seagondollar.pdf." See also Karen Williams, "Eyewitness to the Bomb," *ibid*., 9.

[13] 2008 Congress, Fermilab, Batavia, IL. Theme: "Scientific Citizenship: Connecting Physics and Society." Plenary speakers included Jocelyn Bell-Burnell,

Leon Lederman (Director Emeritus of Fermilab, Nobel Laureate), Jill Tarter (Director of the Center for SETI Research), Neal Lane (Director of National Science Foundation), Julia Phillips (Sandia National Labs), Fred Jerome and Rodger Taylor (authors of *Einstein in Race and Racism*), Richard Garwin (consultant to the US Government on military technology and arms control), and several others. See the Fall 2007, Spring 2008, and Fall 2008 issues of *Radiations*.

[14] 2012 Congress, Orlando, FL. Theme: "Connecting Worlds Through Science and Service." This Congress featured a tour of NASA Kennedy Space Center. Speakers included Jocelyn Bell-Burnell, Freeman Dyson, John Mather (Nobel Laureate), and others. See the Fall 2011, Spring 2012, Fall 2012, Spring 2013, Fall 2013 issues of *Radiations*.

[15] 2016 Congress, "Unifying Fields: Science Driving Innovation." Speakers included Jocelyn Bell-Burnell, Eric Cornell, James Gates, and others. See the Spring 2019, Fall 2016, Spring 2017 issues of *Radiations*.

[16] 2019 Congress in Providence, RI: "Making Waves and Breaking Boundaries," *Radiations*, Fall 2019 and the Spring 2019 and Fall 2019 issues of the SPS *Observer*. Speakers included Jocelyn Bell-Burnell, Ellen Williams, John Mather, and others.

[17] 2022 Centennial Congress, Washington, DC. Theme: "100 Years of Momentum." Speakers: Jocelyn Bell-Burnell, John Mather, Eric Cornell, James Gates, and others. See the Spring 2021 and Fall 2021

[18] The 2008 Congress art exhibit is the cover story in the Fall 2009 *Radiations*.

The Leak: Politics, Activists, and Loss of Trust at Brookhaven National Laboratory, by Robert P Crease and Peter D Bond

Continues from page 3

remark is by John H. Marburger, who became BNL lab director after DOE fired AUI. What happened at BNL, Marburger said, is like a catastrophe in the engineering sense, when a complex system grows out of sync with its environment, so that only a small tug causes it to collapse – and it doesn't matter what the tug is or how significant. The important thing is to do what you can to keep your facility in synch with its surrounding communities. Marburger's diagnosis is surely right, but it doesn't give Big Science much practical advice.

So what, then, can someone interested in Big Science get out of *The Leak*? It's an awareness of all the big and little things that might collaborate in creating storms, perfect and otherwise. The book's excruciating narrative will surely motivate planners and operators of Big Science facilties to look for ways to head off getting out of synch. We thought that the only thing Big Science had to worry about were things that helped do in the Superconducting Supercollider – budget overruns, technical mistakes, and lack of political will. *The Leak* shows that there is much, much more to fear.