

# History of Physics

NEWSLETTER

A FORUM OF THE AMERICAN PHYSICAL SOCIETY • VOLUME X • NO. 2 • SPRING 2007

## Preserving Our Own History

*Some Notes from the Forum Chair, Virginia Trimble*

Dear All,

Here are eight items—the first two new, the others ongoing—where you could make a difference.

**“Retirement Packages.”** No, not continued health care. But the AIP Center for History of Physics would like to preserve in its archives a short record of the work of each retiring academic physicist or allied scientist from major academic institutions. A standard package includes: (1) a complete CV with bibliography; (2) one or more photographs (those showing the scientist at work are particularly desirable); (3) any appropriate press releases, clippings, or other biographical or autobiographical materials; and (4) sound recordings of any speeches or reminiscences made at a retirement function, or of the scientist describing his work. These can be sent to the Center for History of Physics, One Physics Ellipse, College Park, MD 20720, attn: Spencer Weart, Director. Retirements should be interpreted to include deaths, either early ones or where no retirement package was compiled.

Your part in this: If you have recently retired yourself or are about to, please compile your own retirement package (reluctantly, we exempt recently deceased colleagues from this task) and send it in. Copy this item to your department chair and urge strongly that packages be sent in for your recently retired or deceased colleagues. Nag occasionally to make sure it happens. Note that this is not intended to replace full archives for major figures (Fred Reines, if you want an example), though the Center is happy to help departments find appropriate locations for these.

Are you at a “major institution”? Oh dear, I was afraid you

would ask this; but it is really your judgment call. I propose to declare the University of California, Irvine a major institution on the grounds that several folks recently retired from there did things that should not be forgotten. And yes, I shall nag them to provide retirement packages.

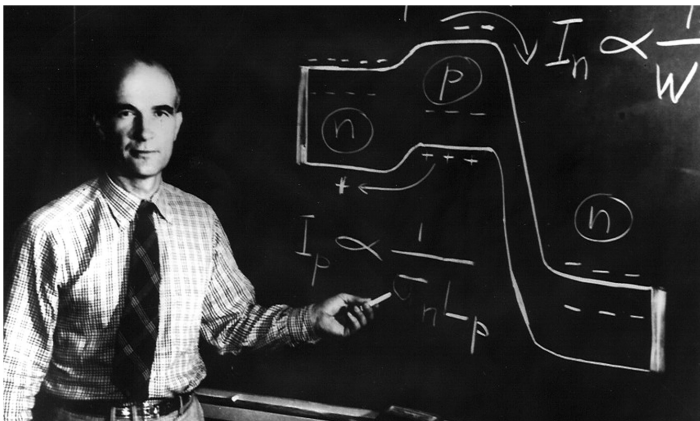
**Departmental Histories.** Many departments have already generated these in book (or occasionally electronic) form. At the initiative of Executive Committee member David Jackson, the Forum wants to encourage this to become a universal practice and to make the results widely available. It should not be limited to prestigious institutions, where a short history might mean a short book. I recently saw a perfectly charming one from the Department of Physics & Astronomy at the University of Manitoba.

There are three stages at which you can help.

a. A history already exists and a copy has been deposited at the Niels Bohr Library. Three cheers! Then please just send a bibliographic citation and information on library or other access to JDJackson@lbl.gov. The Forum will attempt to compile a registry of the histories and put occasional updates in the APS newsletter.

b. A history already exists but the Bohr Library does not yet have a copy. Two and a half cheers! Please make sure it gets one (Niels Bohr Library, One Physics Ellipse, College Park MD 20740). And send the bibliographic and availability information to JDJackson@lbl.gov.

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*William Shockley explaining the theory of minority-carrier injection involved in the operation of junction transistors. See review of **Broken Genius** on page 7*

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## Preserving Our History

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c. No such history exists, or the one that was written for the department's 50th anniversary in 1932 is a little out of date. Please think about who connected with your department might be persuaded to compile such a history and twist a suitable arm.

A note on this project will appear shortly in your APS newsletter. To see a partial web listing of materials already available, go to:

<http://www.aip.org/history> ---> Book Catalog ---> General; then enter "physics departments" and highlight "Institutional Histories held at AIP" in the Limits box.

**Nominate a Colleague for Fellowship.** This process has now gone online only, at: <http://fellowship.aps.org>.

See the article by David Cassidy on p. 9 for more details. You will need an APS user ID and password. Contact Shelly Johnston ([johnston@aps.org](mailto:johnston@aps.org)) if you don't have one or have forgotten it. The Forum deadline is 11 May 2007. Other units have earlier deadlines. We are entitled to put forward 12 candidates per year and generally average 1–2. If you are taking

advantage of this opportunity, please tell your Chair ([vtrimble@uci.edu](mailto:vtrimble@uci.edu)) before the April APS meeting in Jacksonville, so that we know how many nominees there will be.

**Volunteer for Something.** If you have an idea for a March or April 2008 history session, contact David Cassidy ([chmdcc@hofstra.edu](mailto:chmdcc@hofstra.edu)), who will serve as our 2008 Program Chair. If you are willing to help out on a committee or something, please tell the incoming Forum Chair, Bill Evenson ([Bill.Evenson@uvsc.edu](mailto:Bill.Evenson@uvsc.edu); note that "uvsc" stands for Utah Valley State College, and it is easy to twist the letters around so that the e-dress doesn't work), who will appoint the committees. And if you might be willing to be a candidate for the Forum Executive Committee or the Chair sequence or other office, or would like to suggest a colleague, get in touch with the outgoing Chair ([vtrimble@uci.edu](mailto:vtrimble@uci.edu)), who will be attempting to organize nominations later this year.

**Recruit New Members.** For someone who is already an APS member, joining the Forum is just a matter of sending a message to [membership@aps.org](mailto:membership@aps.org) announcing the desire to do so. The first two APS forums are free. If you are giving a talk in your department or someone else's, try to recruit there. My standard spiel is: "Please hold up your hand if you are a member of APS." (usually a good showing) "Please hold up your hand if you are a member of APS and not yet a member of the Forum on History of Physics." "Good. The sign-up sheet starts here!" And to the nearest such person hand a clipboard or tablet ruled for printed name and signature. Then send in the list.

**Sponsor Something.** The Forum currently has two kinds of "sponsorship/naming opportunities," invented in the past few years, and we are definitely open to others. One is partial support of travel for students coming to APS meetings and giving contributed talks in FHP sessions. There will be five John Bardeen students at the March 2007 meeting (with thanks to his family), and some number of Rolfe Glover students at the April meeting (with thanks to Richard Prange). These currently run \$600 each.

The other opportunity is naming of talks in regular invited sessions to honor

someone (one each for March and April), so that we can provide travel money for an occasional outstanding speaker who no longer has research grants or who will be coming from overseas. There will be a Franco Rasetti speaker in March (Thank you, Bob Resnick!) and a Samuel K. Allison speaker in April (Thank you, Jim Cronin!). The donors get to choose who is honored (deceased is best, we think), and the program committee selects the speaker. The cost for 2008 will be \$1,200 each.

There are lots of other things APS units are allowed to do that we are not currently doing, to which donors' or honorees' names might be attached. If you have an idea, please suggest it to the Forum Secretary-Treasurer Thomas Miller ([Thomas.Miller@hanscom.af.mil](mailto:Thomas.Miller@hanscom.af.mil)) or to one of the Chair-sequence folks (Trimble, Evenson, Cassidy, the person you are about to elect).

**Host a Talk.** The Speakers Bureau co-organized by the Topical Group on Gravitation and the Forum on History of Physics is soldiering on, attempting to provide speakers on general relativity, history of physics, cosmology & relativistic astrophysics, Einstein, and related topics, especially for four-year or geographically isolated colleges. We are now the Las Cumbres Speakers Bureau (with extra hearty thanks to Las Cumbres Observatory and its director Wayne Rosing for their help), and you can request a speaker at: <http://www.phys.utb.edu/WYPspeakers/REQUESTS/howto.html>.

The Las Cumbres Observatory site is: <http://www.lcogt.net/>.

**Congratulate Max Jammer.** Obviously we all do collectively. I suspect a good many of you would like to do so individually. His postal address is: 9 Itamar Benavi St., 92349 Jerusalem, ISRAEL. Of course, he also has a phone number and an e-dress, but notes and letters sent by mail are likely to be less disruptive.

*News Flash!* In late December, as an end-of-Chanukah present, we were offered a very impressive donation to support named lectures. The donor will be thanked in a future Forum mailing, after details have been worked out and anonymity waived.

## History of Physics

The Forum on History of Physics of the American Physical Society publishes this Newsletter semi-annually. Nonmembers who wish to receive the Newsletter should make a donation to the Forum of \$5 per year (+ \$3 additional for airmail). Each 3-year volume consists of six issues.

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## Editors' Corner

Recently I was perusing my spotty collection of past issues of the "History of Physics" newsletter, which reaches all the way back to 1991. I'm basically a member of the "paper generation" and find it difficult to throw away anything in print that might be useful for future work — especially if it's of a historical nature. So having stepped in as Editor for the next few years, I'm finding it helpful to look back in this collection and see what my predecessors considered important.

The newsletter's content and style has varied substantially since 1991, mostly for the better. Page counts have generally ranged from 8 to 24, reaching a high of 32 pages during Ben Bederson's tenure, when I served as Associate Editor. For the last 10 years or so, the Fall issue has come out in September or October, with coverage of the Forum sessions at the March and April APS meetings the core element. In the "Spring" issue, usually published in February due to the Forum elections in March, candidate bios and statements are the staple diet. And, almost always, there has been at least one book review. This issue is no different.

Other Editors have seen fit to include summaries of articles and books that members might be interested in, plus lists of meetings in the history of science and of grants and fellowships in the discipline. Similar information is also published by the AIP Center for History of Physics in its biannual "History Newsletter," which Forum members also receive, generally in May and November. Given the high costs of printing and mailing our newsletter, which consume a major fraction of the Forum budget, I am reluctant to duplicate the AIP's fine efforts here.

Instead, I have initiated a new column called "We Hear That . . ." (see page 8) to focus on what our very own members have been doing recently in advancing the history of physics. Doubtless this is just a partial listing, and much more is going on that I am not aware of. Therefore I would appreciate it if members could email me (mriordan@ucsc.edu) on any such activities, whether publishing or speaking or on the web, that should be included in future issues. I'd also appreciate comments on what else you think the "History of Physics" newsletter should be doing.

— Michael Riordan, Editor

## Forum Sessions at the 2007 APS Meetings

By Bill Evenson, Chair, Forum Program Committee

The Forum Program Committee has planned some interesting history sessions at the 2007 APS meetings: March (Denver, CO, 5–9 March 2007) and April (Jacksonville, FL, 14–17 April 2007). Both meetings will also include sessions for contributed papers on the history of physics.

The April meeting will feature a two-part symposium on "Building the Elements: 50 Years of B2FH Nucleosynthesis," cosponsored with the Division of Astrophysics, scheduled for Saturday, April 14. Speakers in the two consecutive sessions include David Arnett ("Setting the Stage"), Brian D. Fields ("Big-Bang Nucleosynthesis"), Chris Fryer ("Nucleosynthesis in Supernovae"), Dieter Hartmann ("Gamma Rays as an Indicator of Nucleosynthesis"), Tammy Smecker-Hane ("Chemical Evolution of Galaxies: the Last Frontier"), and Geoffrey R. Burbidge ("B2FH, Nucleosynthesis, and the Microwave Background," The Samuel K. Allison Lecture). For the uninitiated, "B2FH" refers to Margaret and Geoffrey Burbidge, William Fowler and Fred Hoyle, who in 1957 published "Synthesis of the Elements in Stars" in *Reviews of Modern Physics*.

With the Forum on Physics and Society, we are cosponsoring a session on Sunday, April 15, entitled "The Changing Role of Nuclear Weapons in Foreign Policy." The speakers will be Ivan Oelrich ("History of Nuclear Weapons Design and Production"), Christopher Chyba ("History of Nuclear Weapons Doctrine"), and Bruce Tarter ("The Comprehensive Test Ban Treaty: A Perspective from the National Laboratories").

Our third session, also on Sunday, is jointly sponsored with the Topical Group on Gravity. It is titled "History of Gravitational Waves and General Relativity," with Daniel Kennefick ("Traveling at the Speed of Thought: Proving the Existence of Gravitational Waves"), Richard Isaacson ("The Development of LIGO: A View from Washington"), and Ezra Newman ("Survey of the Developments of General Relativity, 1915 – present").

Monday, April 16, features a session celebrating the 50th anniversary of the Russian satellite, *Sputnik*: "*Sputnik*, 1957: Its Effect on Science & Educa-

tion in America." The speakers will be John S. Rigden ("*Sputnik's* Impact on Science in America"), Charles H. Holbrow ("*Sputnik's* Impact on Education in America"), and Roger D. Launius ("*Sputnik* and the US Space Program"). Later on Monday we will join the Forum on Physics and Society for a joint Awards Session. The Abraham Pais Prize for the History of Physics address, prepared by its recipient Max Jammer, will be presented by his representative.

The Forum also plans to have at least one session for contributed history papers at the April meeting.

Here is an update on our exciting Forum sessions at the March meeting in Denver. For Monday, March 5, we have organized a special session: "The 20th Anniversary of High Tc Superconductivity: 'Woodstock' Revisited." Speakers include Georg Bednorz, Brian Maple, Paul Chu, Douglas Scalapino, Paul Grant, Robert Cava, Marvin Cohen, Shoji Tanaka (the Franco Rasetti Lecture), Laura Greene, Aharon Kapitulnik, and Douglas Finnemore. That evening there will be a special session commemorating the 50th anniversary of the BCS (Bardeen-Cooper-Schrieffer) Theory of Superconductivity, organized by the Division of Condensed Matter Physics.

Does anyone have photos from the 1987 'Woodstock' Session on High Tc Superconductivity? If you do and are willing to share copies (any format), please contact me (bill.evenson@uvsc.edu). We would like to use them with the session in March and for a history that is being written.

There will be two contributed-paper sessions in March: on Tuesday and Thursday, March 6 and 8, plus a Wednesday symposium: "Condensed Matter Physics at Synchrotron Facilities: History as Prologue to the Future," cosponsored with the Division of Physics of Beams and linked to two related symposia sponsored by the Forum on Industrial and Applied Physics and the Topical Group on Instrument & Measurement Science. Speakers at the FHP/DPB session will be Joachim Stohr ("Soft X-ray

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# Forum Elections: Candidate Biographies and Statements

The Nominating Committee of the Forum on History of Physics has chosen a slate of candidates for the 2007 elections. You will soon be asked to vote for Forum Vice-Chair, Secretary-Treasurer, and two at-large members of the Executive Committee. The person elected to be Vice-Chair normally becomes the new Chair-Elect in 2008 and Chair of the Forum in 2009.

If you have an email address registered with APS, you will receive a message inviting you to vote electronically. If you do not have such an address, you should have received a paper ballot by mail. If you want a paper ballot but have not yet received one, please

either email your request to the Secretary-Treasurer Thomas Miller (thomas.miller@hanscom.af.mil), or contact him postally (Boston College Institute for Scientific Research, Air Force Research Laboratory/VSBXT, Hanscom AFB, MA 01731) or by telephone (781-377-5031). The closing date of the election for online voting is 18 March 2007; the final date for receipt of paper ballots is March 23.

Biographical information and statements by the candidates appear below. Similar materials can be found online at: <http://www.aps.org/units/fhp/elections/candidates07.cfm>.

Please vote!

## Candidates for Vice Chair

### Gloria B. Lubkin

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**Biographical Information:** Gloria Lubkin received an A.B. degree in physics from Temple University and an M.S. degree in physics from Boston University. After two years as a nuclear physicist in industry, Lubkin joined *Physics Today* as Associate Editor (1963–69). Since then she has been Senior Editor (1970–84), Editor (1985–94), Editorial Director (1994–2000), Editor at Large (2001–03), and is currently Editor Emerita. She helped found the Theoretical Physics Institute at the University of Minnesota and has served as co-chair of its advisory committee since 1987. In 1990 Minnesota named a chair in theoretical physics in her honor.

In the 1960s, she was involved in oral history interviews with Richard Feynman, Robert Serber, Victor Weisskopf, John Wheeler, and John Van Vleck. At *Physics Today* she has emphasized physics history in covering recent events, in historical articles, and in special issues. She was a member of the Forum Executive Committee (1983–86 and 1992–95), Associate Editor of the History of Physics Newsletter (1983–87), a member of the Publications Committee (1993), and served as a member (and one year as Chair) of many Nominating Committees. She has represented the Forum on the APS Council (1998–05) and was elected to the APS Executive Board, serving in 2000–01. She was a member of the APS Committee on Committees (2000–02 and 2004–06), a member of its Audit Committee (2004), a member of the Lilienfeld Prize Committee (1999–02), and its Chair in 2002. She served on the Forum Award Committee (2000–05), which developed criteria and raised funds to establish the Abraham Pais Prize for the History of Physics.

**Statement:** The Forum on History of Physics has been organizing invited paper sessions at both the APS March and April meetings, and they are usually very well attended, suggesting that lots of physicists who are not Forum members are in fact interested in history of physics. I believe that we should also try to organize invited paper sessions at APS divisional meetings, such as those devoted to plasma physics or fluid dynamics. Because the Forum is allowed only a limited number of invited paper sessions at each meeting, in recent years we have increased the number of historical sessions by co-sponsoring sessions with other units, such as the Forum on

Physics and Society, the Nuclear Physics Division, the Division of Particles and Fields, the Division of Condensed Matter Physics, and so on. We should continue to pursue such co-sponsorships.

Many people don't truly grasp what physicists do, or what the nature of science is, or how our understanding has been achieved, or how physics contributes to society. While we continue to organize sessions on the intellectual history of physics and occasional sessions on the history of science policy, we should also consider sessions on the benefits (and sometimes risks) of past physics research. Forum activities can provide insight and intellectual resources for physics teaching and be helpful in communicating physics to the public.

### Ronald E. Mickens

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**Biographical Information:** Ronald E. Mickens is the Distinguished Fuller E. Callaway Professor of Physics at Clark Atlanta University. He received his Ph.D. in theoretical physics from Vanderbilt University and has held postdoctoral positions at the MIT Center for Theoretical Physics, The Joint Institute for Laboratory Astrophysics, and Vanderbilt University. His current research interests include nonlinear oscillations, difference equations, and numerical integration of differential equations using nonstandard finite-difference schemes, mathematical modeling of periodic diseases, and the history and sociology of African Americans in science. He has published more than 250 research papers, authored 240 abstracts, written six books, and edited eight volumes. Professor Mickens serves on the editorial boards of several research journals, including the *Journal of Difference Equations and Applications*. His professional memberships include the American Association for the Advancement of Science (AAAS), the American Mathematical Society, the American Physical Society (of which he is a Fellow), the Society for Mathematical Biology, and the History of Science Society.

Professor Mickens has organized symposia and special sessions of invited lectures at regional and national meetings of the AAAS and APS, and at various other research workshops and

conferences in the areas of theoretical physics, history of physics, mathematics applied to vibrational engineering, nonlinear dynamics, and the mathematical biosciences. His publications in the history of science include biographic essays that have appeared or will appear in *African American Lives*, *American National Biography*, *Encyclopedia of African American Culture and History*, and *New Dictionary of Scientific Biography*. His edited volume,

*Mathematics and Science* (Singapore: World Scientific, 1990), explores the many varied relations between mathematics and both the physical and social sciences.

**Statement:** A deep, fundamental understanding of physics requires an appreciation and knowledge of its history and sociology. The history of physics can be used to find out in particular fields why certain concepts arose, their subsequent evolution, and who were the main players in the development of the important issues related to the field. The teaching of the history of physics is an excellent vehicle for introducing students to science and how its methods and purposes differ from other areas of knowledge. This history can also be used as a mechanism to initiate neophytes into our community by making them aware of its traditions and the realization that they can both belong to and participate in its ongoing processes and institutions. My goals with regard to the Forum on the History of Physics would be to make known to the wider physics community the significant contributions of non-traditional scientists and to create new ideas as to how the history of physics can be effectively used to enhance interest in science at the pre-college level.

## Candidates for Secretary-Treasurer

### Thomas M. Miller

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**Biographical information:** Tom Miller spent nearly a decade at Georgia Tech, emerging with a Ph.D. degree in 1968. He served on the physics faculty at New York University for over six years, followed by four years at Stanford Research Institute and 16 years on the physics faculty at the University of Oklahoma, with temporary duty at the University of Birmingham (UK) and the Joint Institute of Laboratory Astrophysics (JILA) in Colorado, before settling in the Boston area and working at the Plasma Chemistry Laboratory of the Air Force Research Laboratory (AFRL). He has served on various APS committees and in the 1970s was Secretary-Treasurer of DAMOP—the Division of Atomic, Molecular and Optical Physics. His research is in chemical physics, with an emphasis on low-energy electron and ion interactions with molecules. His interest in the history of physics stems from colloquia at Georgia Tech with the likes of Peter Debye and William Bragg. In recent times he has been the *de facto* curator of the collection of Lord Rayleigh's books and papers at AFRL.

**Statement:** I like the Forum on History of Physics because it enables physicists who are not professional historians to take part in preserving and communicating the history of our field. I think Forum activities, from the popular sessions at APS meetings to ef-

forts encouraging histories of physics departments, are valuable. I wish to be active with the Forum in accomplishing these missions.

## Candidates for At-Large Member of the Executive Committee

### Jeffrey S. Dunham

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**Biographical Information:** Jeff Dunham is an experimental physicist with a background in nuclear physics, laser spectroscopy, and nonlinear dynamics. He received his B.S. degree in physics, with distinction, in 1975 from the University of Washington, where he worked as a student assistant at the Nuclear Physics Laboratory. At Stanford University he completed graduate work in experimental nuclear physics, receiving the M.S. degree in 1979 and the Ph.D. degree in 1981. In 1983 he came to Middlebury College, where he served as department chair for 12 years. He has held visiting appointments at Stanford University, Colby College, Los Alamos National Laboratory, and Saratov State University in Saratov, Russia. He was Chair of the New England Section of the American Physical Society in 2004 and a member of the Physics Graduate Record Exam Committee at the Educational Testing Service from 1998 to 2004. Since 1999 he has been editor of the Apparatus and Demonstration Notes section of the *American Journal of Physics*. He is a member of APS, AAPT, Sigma Xi, American Association for the Advancement of Science, and the History of Science Society.

**Statement:** I am an avid consumer of the literature on the history and philosophy of physics, and a strong supporter of the goals of the Forum on History of Physics. Throughout my teaching career I have attempted to bring historical perspective to standard physics courses. For example, in the last term of a junior-level electricity and magnetism course, I require a final paper that involves a "translation" of Einstein's 1905 relativity paper to the modern notation found in a standard textbook; useful diagrams and missing steps in Einstein's derivations are to be supplied. This kind of exercise deepens student appreciation for the evolution of our discipline in ways that problems sets cannot. I also teach courses for nonscientists, with titles such as "The American Atomic Bomb and Soviet Espionage," "Chaos, Complexity, and Self-Organization," and "Twentieth Century Physics and the Cultural Imagination." These courses succeed best when taught from a historical perspective, and physics teachers are fortunate that many of our colleagues in physics, history, and philosophy have taken time to provide us with excellent books and videotapes to stimulate the interest of students who want to know something of the historical development of our discipline. I am also an avid reader of more specialized historical work, such as that found in *Physics in Perspective* and *Isis*, and would like the Forum to lend support for this kind of serious historical scholarship by showcasing the best of it at its meetings. The Forum on History of Physics is an excellent resource for APS members, yet I believe it would be made stronger by working more

## Candidates for At-Large Member of the Executive Committee (*continued*)

closely with specialized groups in the disciplines of history and philosophy that focus on physics and its conceptual development.

### **Clayton A. Gearhart**

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**Biographical information:** I am currently Professor of Physics at St. John's University in Minnesota. I did my undergraduate work at Rensselaer Polytechnic Institute and my graduate work at the University of Minnesota (Ph.D., 1979, with Bill Zimmermann). I began professional life as an experimental liquid-helium physicist, but I became interested in the history of science in my undergraduate years, and after leaving graduate school began pursuing it as a research interest. That transition was aided when, in 1981, I had the good fortune to participate in a National Endowment for the Humanities Summer Seminar at Yale University, directed by Martin J. Klein. I have also benefited from the support and encouragement offered by the History of Science Program at the University of Minnesota. Currently, my research focuses on the history of thermodynamics, statistical mechanics, and early quantum theory. (Consult my web site for the particulars, including a few reprints and slide shows for talks.) I am a long-time member of the APS, AAPT, the Forum on History of Physics (serving on the 2005–2006 Nominating Committee), and the History of Science Society.

**Statement:** The history of physics has much to offer physicists. Physics majors are often surprised and encouraged to learn that physics was not handed down from on high, but developed a step at a time, often in much more confusing and disorganized (and more creative) ways than textbooks sometimes suggest. Students outside the sciences often find science more interesting when they can also study its historical and philosophical underpinnings. For me, there are other attractions: I often understand the physics better when I learn its history; and I always find the history fascinating. The Forum has over the years done an outstanding job of bringing physicists and historians of physics (who are often themselves physicists) together. It gives historians an audience, particularly for the more technical history, an aspect that historians of science all too often neglect. It shows physicists how their discipline actually developed, and helps to instill in us a more sophisticated sense of our history, in contrast to the oversimplified (not to say inaccurate) picture sometimes found in texts and in the folklore we hand down from one generation of physicists to the next. As someone with a foot in both camps, I would be honored to contribute to the Forum's work through service on the Executive Committee.

### **Gordon L. Kane**

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**Biographical information:** Gordon Kane is a theoretical particle physicist and particle cosmologist. He is the Victor Weisskopf Collegiate Professor of Physics at the University of Michigan, and Director of the Michigan Center for Theoretical Physics. Kane has published over 175 research papers, written or edited eight books (two for general readers), and given nearly 200 talks at national or international meetings plus many seminars, colloquia, and public talks. One co-edited book is on the history of supersymmetry, and one general book contains historical perspective. He has been a Guggenheim Fellow and is a Fellow of the American Physical Society, the American Association for the Advancement of Science, the Institute of Physics of England, and the Johns Hopkins Society of Scholars.

**Statement:** Four centuries ago, there was no understanding of how the natural world works, or why it is as it is. Today a great deal is understood. How we got from there to here is fascinating and should be better known to scientists and everyone. History adds meaning to science. I am convinced that understanding how scientific progress occurs improves our ability to make progress and should be more widely available to scientists. I have occasionally taught a general undergraduate course that covers scientific developments in their historical context, "From the Greeks to quarks and dark matter." Understanding the history, and why science flourishes better in some cultures than others, has long been important to me, and I would be happy to contribute to broadening the appeal and availability of the history of science via the Forum on the History of Physics.

### **George O. Zimmerman**

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**Biographical Information:** George O. Zimmerman received his degrees from Yale University. His Ph.D. was completed in 1963, the year he joined the faculty of the Boston University Physics Department, from which he retired in 2000. As an undergraduate he did work in high energy physics at experiments at the Brookhaven Cosmotron and in scanning nuclear emulsions. His work in experimental physics includes the investigation of liquid and solid He-3 in the millidegree region, establishment of the temperature scale at low temperatures with the investigation of a magnetic transition that occurs below 1 millikelvin, the He-3 critical point, magnetism in alloys and intercalated graphite, superconductivity and its applications, and theoretical work on magnetism, superconductivity, and Jahn-Teller effects in colossal magnetoresistance materials.

As a faculty member, Zimmerman taught most of the undergraduate and graduate courses, was department chair for 12 years, chaired the Faculty Council, and was a member and chair of several other influential university committees. In 1978 he and a colleague established the Research Internship in Science and Engineering, a program that brings high-school juniors and seniors into

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# New Books of Note

## **Broken Genius**

*The Rise and Fall of William Shockley, Creator of the Electronic Age*  
by Joel N. Shurkin

Macmillan/Palgrave, 2006, 308 pages.

Reviewed by Michael Riordan

If I had to select ten physicists who have had the greatest impact on modern life, William Shockley would certainly be one of them. With fellow Bell Telephone Laboratories physicists John Bardeen and Walter Brattain, he invented the transistor in the late 1940s and shared the 1956 Nobel Prize in physics for this invention and for their deep physical understanding of its behavior. But unlike them, he pursued the further development of the transistor for more than a decade, racking up dozens of important patents on semiconductor physics and technology. Discouraged by his lack of advancement and eager to profit from his research, he left Bell Labs in 1955 to found Shockley Semiconductor Laboratory in Mountain View, California, bringing the crucial transistor technology west with him to what would eventually become Silicon Valley—and hiring the crack team of scientists and engineers who made this great economic powerhouse a reality during the ensuing years.

Why, then, is *Broken Genius* the first and only biography of such an important scientist? In recent years we have witnessed a plethora of biographies of J. Robert Oppenheimer, for example, one of them reviewed in the last issue of this newsletter. But until the Pulitzer-Prize winning science writer Joel N. Shurkin took up the task over a decade ago, nobody had even attempted a Shockley biography.

The reason, I believe, is Shockley's dark side—his controversial opinions and pronouncements on race and intelligence, which he espoused for the final quarter century of his life, while a Nobel laureate and Stanford University professor. This was too hot a potato, and nobody (including me!) dared to touch it until Shurkin, who had had to write press releases about Shockley while working as a science reporter at the university, stepped into the breach. He is the ideal author for such a biography, for he has previously published

*Engines of the Mind* on the history of computers and also wrote *Terman's Kids* about the measurement of intelligence by Stanford psychology professor Lewis N. Terman. He knows this beat well.

Shockley's forays into increasingly public and bitter debates on the question of race and intelligence occupy most of the last third of this book, in the final section entitled, "Nemesis: Silicon Valley and Obsession." It is the concluding act in a three-part Greek-style tragedy that begins with "Moirra: May and Billy," and continues with "Hubris: War and the Transistor." In this act, Shockley's hand-picked team of scientists and engineers desert him en masse in September 1957 to

found the start-up Fairchild Semiconductor Company, which during the next several years successfully develops and markets silicon-based transistors and integrated circuits. In frequently painful but perceptive detail, Shurkin relates how Shockley finally leaves his failed company for Stanford, where he begins to express his increasingly controversial opinions on African Americans that verge on eugenics. A battle with the National Academy of Sciences ensues, and once-friendly colleagues avoid him. He dies a lonely man, absolutely convinced of the righteousness of his views.

Shurkin traces the roots of this self-destructive behavior back to Shockley's youth, when he was raised as an only child and for a time home schooled by his adoring, intellectual mother May and his aged father William, a peripatetic mining engineer who taught the subject for several years at Stanford. In my opinion, Shockley's World War II activities in operations research were also important, as this is where he began applying the probability and statistics that he learned in quantum mechanics to the understanding and manip-

ulation of social endeavors—in this case, optimizing use of scarce military resources in fighting the war. Shurkin's coverage of these highly secret wartime activities is excellent, including work Shockley did with fellow Bell Labs physicist and friend Jim Fisk on the design of a nuclear pile.

It is an outstanding feature of this book.

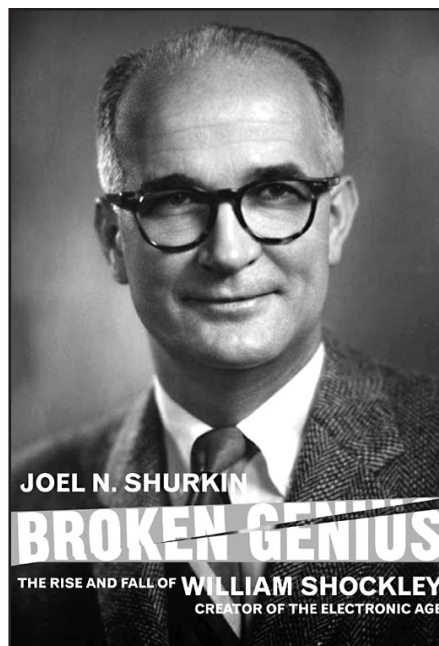
The book is not as strong, however, on the subject of Shockley's role in the invention and development of the transistor. I suspect Forum members will have substantial difficulty with Shurkin's breezy journalistic style here. And with a large number of errors—for example, confusing voltage and current in a few places where he tries to describe what is going on beneath the semiconductor sur-

face. Annoying mistakes like this mar an otherwise excellent treatment of the personal interactions among Bardeen, Brattain, Shockley and other scientists at Bell Labs.

Still, I recommend this book to Forum readers because it fills important gaps in the literature on semiconductor history, having to do with Shockley's activities and public pronouncements outside the immediate area of his scientific expertise. He was indeed one of the major physicists of the twentieth century, deserving of the treatment he receives in Shurkin's even-handed account.

**Michael Riordan** is coauthor with Lillian Hoddeson of *Crystal Fire: The Birth of the Information Age* (W.W. Norton, 1997), a history of the invention and development of the transistor.

*Note: Forum members are entitled to receive a 20 percent discount off the list price of Broken Genius if they order the book directly, through the publisher's web site. That discount can be claimed by visiting Macmillan/Palgrave at: <http://www.palgrave-usa.com> and entering the discount code word P356ED during the check-out process.*



# Recent Books of Interest

A selected list of books on the history and philosophy of physics that have been published in the past two years, as gathered from a variety of reliable sources.

- Arabatzi, Theodore, *Representing Electrons: A Biographical Approach to Theoretical Entities*. Chicago: University of Chicago Press, 2006, 296 pp., illustrated.
- Biagioli, Mario, *Galileo's Instruments of Credit: Telescopes, Images, Secrecy*. Chicago: University of Chicago Press, 2006, 306 pp., illustrated.
- Brown, G. E. and C.-H. Lee, eds. *Hans Bethe and His Physics*. Singapore: World Scientific, 2006, 314 pp.
- Buchwald, D. K., et al. eds., *The Collected Papers of Albert Einstein. Vol 10, The Berlin Years: Correspondence, May–December 1920, and Supplementary Correspondence, 1909–1920*. Princeton: Princeton University Press, 683 pp.
- Byers, Nina, and Gary Williams, eds., *Out of the Shadows: Contributions of Twentieth-Century Women to Physics*. New York: Cambridge University Press, 2006, 498 pp., illustrated.
- Crelinsten, *Einstein's Jury: The Race to Test Relativity*. Princeton: Princeton University Press, 2006, 397 pp.
- DiSalle, Robert, *Understanding Space-Time: The Philosophical Development of Physics from Newton to Einstein*. New York: Cambridge University Press, 2006, 188 pp., illustrated.
- Finkbeiner, Ann. *The Jaxons: The Secret History of Science's Postwar Elite*. New York: Viking Press, 2006, 304 pp.
- Greenspan, Nancy Thorndike, *The End of the Certain World: The Life and Science of Max Born, the Nobel Physicist Who Ignited the Quantum Revolution*. New York: Basic Books, 2005, 374 pp., illustrated.
- Hargittai, I., *The Martians of Science: Five Physicists Who Changed the Twentieth Century*. New York: Oxford University Press, 2006, 313 pp.
- Hirschfeld, Alan, *The Electric Life of Michael Faraday*. New York: Walker and Company, 2006, 258 pp., illustrated.
- Johnson, George, *Miss Leavitt's Stars: The Untold Story of the Woman Who Discovered How to Measure the Universe*. New York: Atlas Books/W.W. Norton, 2005, 162 pp., illustrated.
- Kaiser, David, *Drawing Theories Apart: The Dispersion of Feynman Diagrams in Postwar Physics*. Chicago: University of Chicago Press, 2005, 376 pp., illustrated.
- Longair, Malcolm S., *The Cosmic Century: A History of Astrophysics and Cosmology*. New York: Cambridge University Press, 2006, 565 pp., illustrated.
- Massimi, Michela, *Pauli's Exclusion Principle: The Origin and Validation of a Scientific Principle*. New York: Cambridge University Press, 2005, 211 pp., illustrated.
- Morus, Iwan Rhys, *When Physics Became King*. Chicago: University of Chicago Press, 2005, 288 pp., illustrated.
- Park, Katharine, and Lorraine Daston, eds. *The Cambridge History of Science: Vol. 3, Early Modern Science*. New York: Cambridge University Press, 2006, 894 pp., illustrated.
- Reisch, George, *How the Cold War Transformed Philosophy of Science*. New York: Cambridge University Press, 2005, 418 pp., illustrated.
- Ryckman, Thomas, *The Reign of Relativity: Philosophy in Physics, 1915–1925*. New York: Oxford University Press, 2005, 317 pp.
- Thorpe, Charles, *Oppenheimer: The Tragic Intellect*. Chicago: University of Chicago Press, 2006, 384 pp., illustrated.
- Zirker, J. B., *An Acre of Glass: A History and Forecast of the Telescope*. Baltimore: The Johns Hopkins University Press, 2005.

## Forum Sessions

*Continued from page 3*

Science: From Photon Drought to X-ray Lasers”), Francesco Sette (“Inelastic X-ray Scattering”), Ian Robinson (“Surface Structure as a Foundation of Nanotechnology”), Denis McWhan (“Magnetic X-ray Scattering”), and Sunil Sinha (“The Use of Coherent X-ray Beams to Study the Dynamics of Soft Condensed-Matter Systems”).

Your suggestions for Forum sessions in future years are always welcome. Please send them to me at [bill.evanson@uvsc.edu](mailto:bill.evanson@uvsc.edu).



## Candidates for At-Large Member of the Executive Committee (continued)

Continued from page 6

active research laboratories, and the program continues today. Its participants have won many prizes in national science competitions. In addition, he initiated several programs to introduce K-12 students to science.

During his career, Zimmerman collaborated on research with colleagues at the Francis Bitter National Magnet Laboratory and spent sabbaticals at Brookhaven, UC San Diego, Leiden, and Harvard. A speaker at many colloquia and conferences, he recently organized a Forum session at the March 2006 APS Meeting entitled “Low Temperature Physics: A Historical Perspective.”

**Statement:** Many of those who were in on the foundations of “modern” physics or who knew those who were the founders, are now in their seventies or eighties. The definition of founders does not refer only to those who were awarded Nobel prizes or other prestigious recognitions. The definition also includes those who labored and contributed their ideas to the physics community and thus laid the foundation for the achievements.

As a member of the Forum on History of Physics, I will attempt to organize forums where members of the “older” generation of

physicists will be able to share their history and insights with the “younger” generation. Much of what goes on in forums and talks at APS meetings is lost to memory because the proceedings are rarely recorded (other than the abstracts which are published and which reveal only a summary) without conveying the context itself. I will attempt to record and document these sessions so that they can be archived for future generations and so that the ideas and events are not lost.

In addition, I will attempt to interview those physicists who are unable to attend meetings and try to build an archive of personalities and events that were significant to the development of our present day ideas and our profession.

The reason for these actions is the fact that over the years I have known physicists—some famous and some not so famous—whose contributions were lost to history and whose ideas are being rediscovered by the younger generation. Additionally, I have known people in their nineties who have participated in significant events in physics, such as building the atom bomb, who have not had the chance to tell their stories and relay to us the points of view prevailing at the time those events took place. Those are a great loss to history. I want to preserve that which at present can be preserved.

## Call for Fellowship Nominations

By David C. Cassidy, Chair,  
Fellowship Committee

The Fellowship Committee again calls for the nomination of suitable candidates for APS Fellow through the Forum on the History of Physics. The nominations for APS Fellow through the Forum should be based at least in part upon achievements related to the history of physics. The deadline for receipt of all materials at APS is 11 May 2007.

The procedures for nomination have recently changed. The new procedures are now available at: <http://www.aps.org/programs/honors/fellowships/index.cfm>.

According to these procedures, all nominations must be submitted to the APS via the online nomination package provided at this website. The nominee should be a member of the APS in good standing, which may be confirmed through the above website. A

sponsor (nominator) and a cosponsor are required and both must be APS members. Up to two supporting letters from other individuals may be also submitted by uploading to the site. Those writing supporting letters do not have to be APS members. Please visit this website for further information and a list of required documentation.

The nominations will be forwarded to the Forum Fellowship Committee for review. This committee will make its recommendation to the Executive Committee, which will then forward nominations to the APS Council. Fellowship nominations may be submitted at any time, but must be received by the deadline for the next review.

For further information, please contact the Chair of the Fellowship Committee, David C. Cassidy, at [chmdcc@optonline.net](mailto:chmdcc@optonline.net), or the APS at [fellowship@aps.org](mailto:fellowship@aps.org) or by telephone at (301) 209-3268.

## We Hear That . . .

Forum members actively involved in writing about the history of physics include Michael Nauenberg of the University of California, Santa Cruz, who recently had a paper published as the lead article in *Robert Hooke: Tercentennial Studies*, edited by Michael Cooper and Michael Hunter (London: Ashgate, 2006). The title of his article is “Robert Hooke’s Seminal Contributions to Orbital Dynamics.” Nauenberg had previously published a similar article in *Physics in Perspective* and delivered this paper at a 2003 conference at the Royal Society of London celebrating Hooke. Interested parties can download a PDF file of this paper from his web site: <http://physics.ucsc.edu/~michael>

Other Forum members who have recently published articles in *Physics in Perspective* include Per Dahl of Lawrence Berkeley Laboratory and Catherine Westfall of Michigan State University. Dahl wrote about “Berkeley and its Physics Heritage,” in Vol. 8, No. 1 (March 2006) of this quarterly journal, while Westfall published “A Different Laboratory Tale: Fifty Years of Mössbauer Spectroscopy” in the May 2006 issue.

In addition, Charles H. Holbrow of Colgate University wrote “Scientists, Security, and Lessons from the Cold War” for the July 2006 issue of *Physics Today*. History of Physics Editor Michael Riordan of UC Santa Cruz published “How Bell Labs Missed the Microchip” in the December 2006 issue of *IEEE Spectrum*. And Roger H. Stuewer of the University of Minnesota, the Forum Councilor and an Editor of *Physics in Perspective*, contributed “Historical Surprises” to Vol. 15, No. 5 (February 2006) of the journal *Science & Education*.

No doubt we have overlooked recent contributions to the history of physics by other Forum members. Please let us know of any such activities by contacting the Editor ([mriordan@ucsc.edu](mailto:mriordan@ucsc.edu)), and they will be mentioned in forthcoming issues.

# History of Physics

NEWSLETTER

American Physical Society  
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