

# History of Physics Newsletter

Volume IV, Number 2

February 1990

## ELECTION OF OFFICERS

The election ballots are on the inside of the back page of this Newsletter. Members of the Division are urged to vote and to return their ballots immediately. The following positions are to be filled:

Vice-Chairperson (to become Chairperson the following year),  
Division Councillor to serve for three years, and  
Two Executive Committee Members to serve for three years.

## DIVISION NEWS

### APS 1990 MEETINGS

During the spring of 1990, the Division of History of Physics is sponsoring two sessions of invited papers.

**Washington, DC, "James Clerk Maxwell and His Contributions to Physics"** (on the Centenary of the Scientific Papers of James Clerk Maxwell.) This session is scheduled for Monday afternoon, April 16th, 1990.

The session is being organized by Daniel M. Siegel. Speakers include:

*Martin J. Klein*, "Maxwell as Expositor."

*C. W. Francis Everett*, "The Role of Classification in Maxwell's Approach to Physics."

*Peter M. Harman*, "The Motion of Saturn's Rings: The Adams Prize Essay and the Problem of Dynamical Stability in Maxwell's Physics."

*Daniel M. Siegel*, "The Origin of the Displacement Current."

**Washington, DC, "Field Theory Renormalization from Lorentz to Landau"**

This session is scheduled for Tuesday morning, April 17th, 1990.

The session is being organized by Laurie Brown.

Speakers include:

*Max Dresden*, "Lorentz and Kramers: Toward renormalization."

*Sylvan S. Schweber*, "Renormalization Realized: from 1947 to 1952."

*Robert L. Mills*, "Infinities in Quantum Field Theories."

*Tian Yu Cao*, "New Philosophy of Renormalization: from the renormalization group to effective theories."

## Business Meeting of the Division

Following the Monday afternoon April 16th invited session of the Division of History of Physics, the Division is scheduled to hold its Annual Business Meeting in the same room as the invited session. The Executive Committee will report on the activities of the Division for the past year and on plans for the coming year.

## Division & APS Committees

Both the Division and the APS are interested in involving additional members in their activities. Every year, the Chairperson of the Division receives a request from the APS to suggest persons who would be both able and enthusiastic about serving on an APS committee. The goal is to encourage participation by a wide spectrum of members including persons in the early stages of their careers. The committees of the APS include: applications of physics, constitution and by-laws, education, finance, international freedom of scientists, minorities in physics, panel on public affairs, status of women in physics. If you are interested in the work of any of these committees or in helping to organize invited sessions of the Division, please send a curriculum vitae to the present Vice-Chairperson of the Division, Prof. Alan Franklin, Department of Physics, University of Colorado, Box 390, Boulder, CO 80309-0390.

## New Fellows of the American Physical Society

The APS Fellowship Committee and Council approved the recommendations of the Fellowship Committee of the History of Physics Division for three candidates to be appointed Fellows of the APS. The new fellows are:

**Elizabeth Garber**, of SUNY at Stony Brook

*Citation:* "For her research in the history of physics, including the development of kinetic theory and molecular science in the 19th century."

**Erwin N. Hiebert**, of Harvard University

*Citation:* "For his research in the history of modern physical science and its relations with philosophy and religion."

**Alfred Romer**, of St. Lawrence University of Canton, NY

*Citation:* "For his contributions to the history of modern physical science and to physics education."

The History of Physics Newsletter (HPN) is published by the Division of History of Physics of the American Physical Society. It is distributed free to all members of the Division. Others who wish to receive it should make a donation to the Division of History of Physics of \$10 per volume (\$5 additional for airmail). Each volume consists of 5 issues, Editor: Albert Wattenberg, Department of Physics, University of Illinois, Urbana, IL 61801. Associate Editors: Stephen G. Brush, Department of History and Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742, and R. D. Sard, Department of Physics, University of Illinois, Urbana IL 61801.

### Report of Division Councillor, S. Brush

Of interest to the History Division is that at its November meeting the APS Council approved the Publication Committee recommendation that the APS switch to acid-free paper and incorporate the change into the 1991 budget. (The action was supported by Brush and other historians as a way to enhance the shelf life of APS "archival journals" for the benefit of future historians.

## APS & AIP NEWS

**A Special Historical Session arranged by the Astrophysics Division** - To commemorate the 75th anniversary of the General Theory of Relativity, the Astrophysics Division has scheduled an historical session of invited papers at the Washington APS meeting on Wednesday morning, April 18th, 1990. The title of the session is "General Relativity: Past, Present, and Future."

**APS "Unity in Physics Day"** The APS has scheduled a program for Tuesday afternoon, April 17th, 1990. Gerald Holton will be one of the distinguished speakers at a session beginning about 1:00 PM.

**Changes in the Governance of the APS** - As reported in the previous issue of this Newsletter, the Constitution and By-laws of the APS are being revised by the Council of the APS and the changes will be submitted for approval or disapproval to the membership. The Council members have found themselves in disagreement on whether Councillors representing a Division should be elected only by members of that Division or by the entire membership of the APS. Information on this and other changes in the APS Governance should be appearing in the **Bulletin of the APS**.

**Other APS Items** - (1) There is a proposal to move the AIP from New York to Baltimore. The APS

is opposed to this move. (2) Walter Massey was elected Vice-President of the APS.

**AIP Award to Amaldi** - Edoardo Amaldi of the University of Rome was presented on October 3rd with the AIP John T. Tate International Award. He received the Tate Award "for his crucial role in the rebuilding of Italian and European physics following the devastation of World War II, for his leadership in the establishment and operation of CERN as a great international laboratory, and for his many other contributions to international physics." He was a key associate of Enrico Fermi during the 1930s and was a coeditor of the "Collected Papers of Enrico Fermi." In the last two decades, he has presented articles and talks at conferences on the history of neutron physics.

**AIP PINET** - A new and expanded version of PINET went online in September 1989. It is a comprehensive online database service for the physics and astronomy community. It is readily accessed using your modem and an 800 number. PINET mail offers world-wide Telex and Fax capabilities. There is an hourly connect charge (and a \$15 registration fee) which can be charged to credit cards or a Group Account. For more information call the PINET Administrator at (516) 349-7800, ext 441.

### News from the AIP Center for History of Physics:

a) **The Laser History Project** is in its final stages. A catalog of the interviews and other historical materials obtained during the project is planned for publication in 1990 by the the AIP. A book from the Laser History Project will be published by the Massachusetts Institute of Technology Press in 1990. Many oral history interviews, along with letters and other materials, are now available from the AIP Center. The AIP Center staff are putting the collection on microfilm, and a first copy is expected to go to the University of Illinois Archives. Subsequent copies will be available at cost to other research libraries.

b) **Finn Aaserud will become director of the Niels Bohr Archive** at the Niels Bohr Institute in Copenhagen. He has been Postdoctoral Historian at the AIP Center for the last four years during which time he documented physicists' involvement with science policy in the specific case of Project JASON. Almost all the interviews have been edited and are available from the AIP Center's Niels Bohr Library.

## MEETINGS

**British Society for the History of Science** - A major international conference entitled "The Scientific Revolution: Science, Technology, and Medicine" is to take place at Keble College, Oxford on July 17th-20th, 1990. The conference will address a broad range of themes relating to science, technology, and medicine in the early modern period. For further informa-

tion, including the possibility of offering a paper, contact Dr. John Hendry, 58 Canfield Gardens, London, NW6 3EB, England.

A Conference on "Physical Laboratories" to be held at Cambridge on July 5th-7th, 1991, is in the planning stage. Anyone interested in participating is invited to contact Dr. Andrew Warwick, St. John's College, Cambridge, England.

**History of Science in China** - The Sixth International Conference on this topic will be held at Robinson College, Cambridge, on August 2nd-7th, 1990. For further information and copies of circulars describing the meeting, write to Jane Rowell, Conferences, 43 Norwich Street, Cambridge CB2 9EW, UK.

**History of Science Society - The 1990 Annual Meeting** will be held in Seattle, Washington at the Holiday Inn Crowne Plaza on October 25th-28th, 1990. Information on the program can be obtained by writing to the Program Co-chairs, Peter Galison and Timothy Lenoir, at: Program in the History of Science, Stanford University, Stanford, CA 94305-2024.

The 1991 Annual Meeting will be held in Madison, Wisconsin from October 30th to November 2nd, 1991; this will be a joint meeting with the Society for the History of Technology. In addition to normal sessions, there will be a special conference entitled "Critical Problems and Research Frontiers in History of Science and Technology." There will be plenary sessions both jointly and separately of the two societies, as well as twelve to fifteen smaller discussion sessions in each field. Suggestions for the meeting should be sent immediately to Frederick L. Holmes, Section of the History of Medicine, Yale University School of Medicine, 333 Cedar Street, New Haven, CT 06510.

**The Roland Eötvös Physical Society** in association with the Hungarian Academy of Sciences, the Hungarian Philosophical Society, and three Hungarian Universities have planned a conference entitled "History of Thermodynamics - Facts, Trends, Debates" to be held in Veszprém, Hungary, July 23rd-28th, 1990. The time periods planned are: antiquity, Middle Ages, from Galileo to Black, from Carnot to Carathéodory, from Onsager to recent times. The meetings will be held in the Conference Center of the Hungarian Academy of Sciences in Veszprém, near Lake Balaton. For further information and a bulletin listing the invited speakers contact L. Ropolyi, Eötvös University, Department of Natural Philosophy, Rákóczi ut 5, H-1088 Budapest, Hungary.

**The Spanish and Latin American History of Science Societies** - are planning a joint meeting with the History of Science Society in Madrid for June 1991. Those interested in proposing a session should contact Michael McVaugh, Department of History, Duke University, Durham, NC 27706.

**Université de Montréal** - is planning an International Colloquium entitled "The Jews and the Natural

Sciences: Sixteenth Century to the Present" to be held in Montreal in June 1990, in conjunction with an exhibition of rare books and manuscripts. The meeting will explore such issues as the implications of the influx of Jews into the scientific professions, the cultural specificity of Jewish contributions to science, interaction between Jewish culture and the ethics of science, and Jews as producers and popularizers of scientific knowledge. Correspondence concerning the meeting should be sent as soon as possible to Yakov M. Rabkin, Département d'Histoire, Université de Montréal, C.P. 6128, Succursale A, Montréal, Québec, Canada H3C 3J7. Telephone: (514) 343-7218.

**The University of Nice** - A conference entitled "The Concept of Velocity in Astronomy, Mathematics, and Physics from Archimedes to Galileo" will take place in Nice, Cote d'Azur, France on June 8th-10th, 1990. For further information contact Observatoire de la Cote D'Azur (Colloque Vitesse), BP139, 06993 Nice Cedex, France, or CRHI (Colloque Vitesse), UER Lettres et Sciences Humaines, BP369, 0603 Nice Cedex, France.

**Virginia Polytechnic Institute and State University** - will hold its Annual Conference from March 30th to April 1st, 1990. The topic for this year's conference is "The Role of Experimentation in Scientific Change." The participants include some well known historians of science. Further information can be obtained from Joseph Pitt, 309 Patton Hall, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0126. Telephone: (703) 231-5760.

## ANNOUNCEMENTS & REPORTS

### Groundbreaking for Archives II

On October 17th, an enthusiastic crowd assembled under tents (it was raining) to applaud the groundbreaking for the expansion of the National Archives. The six story building will have 1.7 million square feet and is located on thirty-three acres adjacent to the University of Maryland. It took over twenty years of effort to arrive at the groundbreaking for this addition to the National Archives. The new building should be finished in 1993 and opened in 1994.

### The American Society for Mass Spectrometry Joins National Foundation for History of Chemistry

The American Society for Mass Spectrometry, ASMS, has had an Historical Interest Group. At the ASMS annual meeting, the Board voted to affiliate with the NFHC. The idea of mass spectroscopy came out of physics experiments. In 1913 in an article entitled "Rays of Positive Electricity: Application to Chemical Analysis," J. J. Thomson pointed out that

the new technique could be of value to chemists. However up to 1940, Mass Spectroscopy was almost exclusively a field of physics. The applications to nuclear physics by people such as Aston and Dempster were very important to understanding nuclei. By 1941, there were commercial laboratories using mass spectroscopy to perform chemical analysis. The application to geochronology dating developed about the same time. The Helium Leak Detector became common and essential to those doing high vacuum work during and after world war II. The war-time Calutron Uranium Isotope Separation Project was the most gargantuan application of the mass spectroscopic technology by physicist. It was in the 1950s, that Mass Spectroscopists were more likely to be chemists than physicists. The ASMS was formed in 1969, and it currently has about 2,800 members. Inquiries concerning the National Foundation for the History of Chemistry and its affiliates should be sent to the Beckman Center for the History of Chemistry, 3401 Walnut Street, Philadelphia, PA 19104-6228.

### **Appropriations for the National Archives and the National Historical Publications and Records Commission and for the National Endowment for the Humanities**

On November 3rd the President signed the General Government Appropriations Act which included \$126.6 million for the National Archives. The legislation earmarked \$5 million for the NHPRC. However under the Gramm-Rudman sequestration, the National Archives' budget is reduced from \$126.6 million to approximately \$120 million.

The Interior Department appropriation legislation for FY '90 specifies \$159 million for the budget of the NEH, a \$6 million increase over the FY '89 budget. \$4.2 million of the increase is for a special initiative in the Preservation Office. Under sequestration these figures are reduced by 5.3 percent.

### **Authors Needed for Bibliographic Sourcebook on Women in physics and chemistry**

Greenwood Press is currently planning to publish a bibliographic sourcebook on women in physics and chemistry under joint editorship of Louise S. Grinstein, Rose K. Rose, and Miriam H. Rafailovitch. Slated to appear in 1992, the book will consist of biographical essays on representative women who have contributed significantly to physics and/or chemistry either through their own research or through the influence they have exerted. Coupled with each essay (6-14 double spaced typewritten pages) will be an annotated bibliography of the woman's work as well as of the primary and secondary literature. To obtain more information about the project, how you might be helpful, and the list of approximately seventy women scientists prepared by the editors, write to Professor Louise S. Grinstein, 1170 Ocean Parkway, Brooklyn, NY 11230.

### **The Bakken Library and Museum of Electricity in Life**

The Bakken Library and Museum has been awarded \$102,943 by the National Science Foundation Teacher Enhancement, Informal Science Education Unit for a series of three summer institutes for secondary physics and biology teachers. Using simple and inexpensive replicas of historical apparatus, participants will recreate historical experiments and learn how an interaction of experiment and theory creates scientific knowledge. The topic for 1990 is optics and vision; for 1991, it is acoustics and hearing. For further information contact the Bakken at 3537 Zenith Avenue South, Minneapolis, MN 55416. Tel. (612) 927-6508.

### **Stephen G. Brush is currently President of the History of Science Society**

During 1990 and 1991, Professor Stephen G. Brush of the University of Maryland, will serve as President of the History of Science Society. During 1990 he will be completing an extended four year term as Councillor for the APS Division of History of Physics. He was the originator and first editor of this Newsletter.

### **NSF Division of Materials Development and of Teacher Preparation and Enhancement has made awards to Historians**

John L. Heilbron of the Univ. of California at Berkeley and Daniel J. Kevles of California Inst. of Technology have been given grants to develop self-contained units keyed to the regular school curricula for biology, physics, and U.S. and world history. Jane Holdsworth of the Thames Science Center has been awarded a grant for a project entitled "Shoot for the Moon" to develop classroom units, experiments, and demonstrations in collaboration with the Smithsonian Astrophysical Observatory, Wesleyan University, and the National Air and Space Museum. John Senior of the Bakken Library and Museum of Electricity in Life has been given a grant to prepare a model for teaching about electricity by building twenty prototypes of an eighteenth-century electricity kit.

### **The History of Women in Science Prize**

The History of Science Society prize of \$500 is awarded in alternate years for a book or an article; this year it will be for an article. Eligible articles may take a biographical, institutional, or other approach. Included in the topic "women in science" are discussions of women's activities in science, analyses of past scientific practices that deal explicitly with gender, and investigations regarding women viewed as scientists. Submit nominations before May 15th, 1990, to the chair of the 1990 committee, Deborah J. Warner, National Museum of History, Room 5717, Smithsonian Institution, Washington, DC 20560

### Gerald Holton Receives Bernal Prize

Gerald Holton, Mallinckrodt Professor of Physics and Professor of History of Science at Harvard, will receive the J.D. Bernal Prize of the Society for Social Studies of Science principally honoring his "path-breaking work on the thematic origins of scientific development."

### Sources in Electrical History

The first in a series of guides to be issued by the Center for the History of Electrical Engineering was compiled by Joyce E. Bedi, Ronald R. Kline, and Craig Semsel. The 234-page illustrated guide lists 1,008 collections in 158 repositories, primarily university archives and state historical societies. Subject and repository indexes are included. "Sources in Electrical History: Archives and Manuscript Collections in U.S. Repositories" is available for \$15.00 prepaid. Send a check or money order made payable to "IEEE" to Sources in Electrical History, Center for the History of Electrical Engineering, IEEE, 345 East 47th Street, New York, NY 10017.

### The Watson Davis Prize

The History of Science Society's prize, named to honor the longtime director of Science Service, is awarded annually to the author of a book useful in undergraduate teaching or promoting public understanding of the history of science. The prize consists of a cash award of \$500. The books should be copyrighted in the last three years. The book should introduce an entire field, a chronological period, a national tradition, or the work of a noteworthy individual. One may submit nominations to the chair of the 1990 committee, Philip J. Pauly, Department of History, Box 5059, Rutgers University, New Brunswick, NJ 08903 before May 15th, 1990.

## BOOK PUBLISHERS

### Annual Reviews Inc.

Compiled and Introduced by *Joshua Lederberg* - **The Excitement and Fascination of Science, Volume 3 parts 1 & 2: Reflections by Eminent Scientists** There are 109 autobiographical, historical, and philosophical essays in this 2300 page collection. They have been reprinted from the pages of Annual Reviews. Of interest to physicists are essays by: *Jesse L. Greenstein, T.G. Cowling, Alfred O. Nier, Emilio Segrè, Joseph E. Mayer, and Gerhard Herzberg*. Write to Annual Reviews Inc., 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0897.

### Basil Blackwell Ltd.

Editors: *Michael Shortland and Andrew Warwick* - **Teaching the History of Science** This new book was published jointly by Basil Blackwell and the British Society for the History of Science. Write to the Executive Secretary of BSHS, 31 High Street, Stanford in the Vale, Faringdon, Oxon, SN7 8LH, England.

### Birkhäuser Boston

Editors: *Don Howard and John Stachel* - **Einstein and the History of General Relativity** Birkhäuser Boston has started a new series called "Einstein Studies" sponsored by the Center for Einstein Studies of Boston University with *Don Howard and John Stachel* as editors. It is a multidisciplinary series, reflecting the wide variety of Einstein's contributions. The series will emphasize the history of twentieth-century science but will include contributions in other areas. This first volume is based on the *Proceedings of the First International Conference on the History of General Relativity* held at Boston University's Osgood Hill Conference Center in May 1986. The volume consists of twelve essays by physicists, historians and philosophers, most of whom are well known. For more information write to Birkhäuser Boston, 675 Massachusetts Ave., Cambridge, MA 02139.

### Boydell & Brewer

*Michel Hunter and Simon Schaffer* - **Robert Hooke: New Studies** Hooke was extremely versatile and made major contributions to an astonishing range of subjects. He was unsurpassed during his lifetime (1635-1703) as an inventor and designer of quantitative scientific instruments including clocks that were needed for navigation. As well as ten articles, there is an introduction and an Appendix; the latter includes a hitherto unknown inventory listing of Hooke's possessions at his death. Boydell & Brewer are publishers for the Royal Historical Society and have recently issued some books of interest to historians of science; a US address is P.O. Box 41026, Rochester, NY 14604. (Telephone: (716)275-0419)

### E.J. Brill

*Lewis Pyenson* - **Empire of Reason: Exact Sciences in Indonesia 1840-1940** The book focuses on astronomy, geophysics, and physics. It demonstrates that in no other European colony or dominion were scientific standards higher or accomplishments more significant than in Java.

*Pierre Duhem* - **Prémices Philosophiques**, and an introduction in English by *Stanley L. Jaki* This is a collection of the first six essays which Pierre Duhem published on the philosophy and history of science during the years 1892 to 1896. *Jaki* is author of nu-

merous articles and books; his "Uneasy Genius" is a monograph on the life and work of *Pierre Duhem*, one of the foremost intellects around the turn of the century. Write to E.J. Brill (USA) Inc., 24 Hudson Street, Kinderhook, NY 12106.

### Cambridge University Press

*Finn Aaserud - Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics* Due to Bohr's influence, the Copenhagen Institute became the world center for the discussion of quantum mechanics in the 1920's, and later it became the center for nuclear theory. The economic support for the center and its outstanding visitors is an important part of this study by Aaserud as well as the historical development of theoretical nuclear physics.

*Helge S. Kragh - Dirac: A Scientific Biography* P.A.M. Dirac was awarded the Nobel Prize for his brilliant mathematical contributions to quantum mechanics during the period 1925 to 1934. Although his book on quantum mechanics was mathematically unconventional, it was the Bible for at least a decade. This is the first full length biography of an exceedingly shy man who had an active exchange of ideas with Heisenberg, Bohr, and Pauli. The book draws extensively on unpublished sources.

Editor: *Mordechai Feingold - Before Newton: The Life and Times of Isaac Barrow* Barrow, (1630-1677) who is not well known, is considered by Feingold as Sir Isaac Newton's mentor and patron. He made contributions to optics and geometry, and he was an influential preacher and classics scholar. The author explores the connections of Barrow's scientific, philological, and religious views to convey the complexity of the seventeenth-century culture.

*Victor E. Thoren - The Lord of Uraniborg: A Biography of Tycho Brahe* On his island fief of Hven, in Denmark, Tycho created a world famous astronomical observatory, chemical laboratory, and general research institute under the patronage of the King of Denmark. At Uraniborg, he constructed astronomical instruments, cast horoscopes, concocted medicines, composed Latin verses, and revolutionized the science of astronomy. His astronomical observations resulted in the first serious challenge to the Aristotelian world view.

Editor: *David B. Wilson - The Correspondence Between Sir George Gabriel Stokes and Sir William Thomson, Baron Kelvin of Largs* Volumes 1 and 2. Stokes and Kelvin corresponded for over fifty years as professors in Cambridge and Glasgow respectively, amassing the largest extant correspondence between two Victorian physicists. The letters discussed people, ideas, institutions, and the physics of the latter half of the nineteenth-century.

The latter four books are scheduled for publication before June 1990. For more information write to Cambridge University Press, 32 East 57th Street, New York, NY 10022.

Three Cambridge Press Books now available in paperback are: *Helge Kragh - An Introduction to the Historiography of Science*; *C.W. Kilmister - Schrödinger: Centenary Celebration of a Polymath*; *D.R. Murdoch - Niels Bohr's Philosophy of Physics*.

### Geophysical Station, Bremen-Roennebeck

*Wilfried Schröder, Editor - Past, Present and Future Trends in Geophysical Research* These are selected papers from the symposia of the Interdivisional Commission on history of the IAGA during the IUGG Assembly held in Vancouver in 1987. There are a broad range of topics including: the Maunder minimum, reports of auroras, Kepler's atmospheric physics, the impact of climate and environment on history. To obtain copies (22 DM) or more information write to W. Schröder, Hechel Strasse 8, D-2820, Bremen-Roennebeck (Geophysical Station), Federal Republic of Germany.

### McGraw-Hill

*Jeremy Bernstein - The Tenth Dimension: An Informal History of High Energy Physics* Jeremy Bernstein has written entertaining and very readable books and articles for the public in such magazines as *The New Yorker*. This book is not for the lay audience but is for physicists and professional scientists. "Informal" in the title means that it does not have footnoted references. Bernstein, as usual, is very readable, and the book is a very informative history of theoretical high energy physics. (See your local bookstore.)

### Princeton University Press

*Werner Heisenberg - Encounters with Einstein: And Other Essays on People, Places and Particles* This is a collection of nine essays and lectures composed during the last year of his life. He discusses philosophical issues such as the choice of the problems pursued. Are the choices according to conscious interest, or are they determined by historical developments?

*David Park - The How and the Why: An Essay on the Origins and Development of Physical Theory* The book begins with Thales and ends with relativity theory and is a personal guide to human efforts to grasp the nature of the physical world. It demonstrates the variety of ways in which people have thought about physics and astronomy.

*Tony Rothman - Science à la Mode* Tony Rothman is an editor of *Scientific American* and a free lance writer on popular science. These essays show in detail how scientists, being human, sometimes abandon objectivity in favor of what is the latest fashion, especially when they are temporarily low on ideas of their own.

Editor: *John Stachel*, Associate Editors: *David C. Cassidy, Jürgen Renn, and Robert Schulman* - **The Collected Papers of Albert Einstein Volume 2: The Swiss Years: Writings, 1900-1909** This volume contains the scientific work that Einstein published during the first decade of his career and includes some of the most significant achievements of twentieth-century physics. The 1904-1905 publications included: the Brownian motion explanation in terms of atoms, the concept of photons, and the theory of special relativity. The address of Princeton University Press is 3175 Princeton Pike, Lawrenceville, NJ 08648.

### Springer-Verlag

*Robert S. Mulliken* - **Life of a Scientist: An Autobiographical Account of the Development of Molecular Orbital Theory**. Robert Mulliken was awarded a Nobel Prize for his work on complex molecular spectra. The book was edited by *Bernard J. Ransil* and it contains an introductory memoir by *Friedrich Hund*. Write to Springer-Verlag NY, 175 Fifth Avenue, New York, NY 10010.

### University of California Press

*J. L. Heilbron and Robert W. Seidel* - **Lawrence and His Laboratory: A History of the Lawrence Berkeley Laboratory, Volume I** The authors are both professional historians. Heilbron has been the director of the Office of History of Science and Technology at the Univ. of California at Berkeley for several decades. This first volume covers the depression years and the difficulties with finances which Lawrence overcame to develop an Accelerator Laboratory which was a major center for nuclear physics and subsequently particle physics as well.

*Maurice A. Finocchiaro*, editor and translator - **The Galileo Affair: A Documentary History** - Finocchiaro selected, translated, and edited the Italian and Latin documents and arranged them into a readable narrative. The address of the University of California Press is 2120 Berkeley Way, Berkeley, CA 94720.

**Sociedad Mexicana de Historia de la Ciencia y de la Tecnología** - *Memorias del Primer Congreso Mexicana de Historia de la Ciencia y de la Tecnología* is available in two volumes by writing to the Sociedad at Apartado Postal 21-873, 04000 México, D.F., México.

## RECENT & FUTURE ARTICLES

### Acta Crystallographica

Volume A45, 581 1989

"The International Union of Crystallography: Its Formation and Early Development" by *Harmke Kamminga*. This article gives a detailed account of the

formation of the Union mainly by physicists such as Bragg and Ewald. International collaborations and the journal predate the Union.

### American Scientist

November-December 1989

"The Invisible Technician" by *Steven Shapin*. Historians of science have shown little inclination to study the roles of technicians and other support personnel involved in making and recording scientific knowledge.

### Astronomy

November 1988 Volume 16

"William Herschel: Pioneer of the Stars" by *B. Jones*. With the biggest telescopes of the eighteenth-century, amateur astronomer William Herschel opened up the stellar universe.

### HSPS - Historical Studies in the Physical and Biological Sciences

Volume 20, Part 1 includes:

"Arthur Schuster, J.J. Thomson, and the Discovery of the Electron" by *Stuart M. Feffer*. "Text, Context, and Quicksand: Method and Understanding in Studying the Nobel Science Prizes" by *Robert Marc Friedman*. "Franck and Hertz versus Townsend: A Study of Two Types of Experimental Error" by *Giora Hon*. "Another Kind of Light: The Work of T. J. Seebeck and his Collaboration with Goethe Part I" by *Keld Nielsen*. Goethe was very proud of his scientific experiments.

### Indian Journal of Pure and Applied Physics

February- March 1988 Volume 26

"Research with Style: The story of Raman's study of light scattering" by *S. Ramaseshan*. Raman perceived that Rayleigh scattering had to be modified to take place in a discontinuous manner because of the quantum nature of light. He launched a series of experiments that culminated in the discovery of the Raman Effect.

### ISIS

September 1989

"The Cambridge Network in Action: The Discovery of Neptune" by *Robert W. Smith*. In 1781 William Herschel serendipitously found Uranus, and the difficulty in understanding the perturbations in its orbit became a major problem for astronomers for half a century. The observational discovery of Neptune was made by German astronomers based on predictions by a French mathematical astronomer, Le Verrier. The British should have found it based on earlier predictions by Adams. The antics of the Cambridge group are very interesting.

"Galileo's Cosmogonical Calculation" by *Eric R. Meyer*. The question that the article is concerned with is whether Galileo's model of circular orbits agreed with his observations and calculations.



## Reviews of Modern Physics

January 1990

"Theories of the Origin of the Solar System" by *Stephen G. Brush*.

Attempts at explaining the origin of the solar system are still not quantitatively successful. Disputed topics include condensation versus accretion, temperature and mixing of the solar nebula, and the importance of a supernova trigger.

## Physics Today

October 1989

"Pathological Science: Certain symptoms seen in studies of 'N-Rays' and other illusive phenomena characterize the science of things that aren't so" by *Irving Langmuir* transcribed and edited by *Robert N. Hall*. Irving Langmuir spent many productive years pursuing Nobel-caliber research. Over the years he also explored the subject of what he called "pathological science." Although he never published his investigations in this area, he gave a talk which was recorded.

December 1989

"George Uhlenbeck and the Discovery of Electron Spin" by *Abraham Pais*. In 1925 George Uhlenbeck and Samuel Goudsmit's work on fine structure in emission spectra led them to hypothesize electron spin. The article features a detailed discussion of the problem that occupied them and the reasoning that led them to postulate electron spin.

January 1990

"Heisenberg, Goudsmit and the Nazis Nuclear Weapons Program" by *Marc Walker*. Contrary to the conclusion reached by Goudsmit, Heisenberg's team was not fundamentally mistaken in the approach it took to making an atomic bomb, and contrary to Heisenberg's claims after the war, the German effort was a weapons program. "Emerging Internationalism in Particle Physics and the Krushchev Detente (1950-1960)" by *Robert Marshak*. The records of the "Rochester Conferences" in the 1950s show the development of Soviet-American cooperation in particle physics.

## GRANTS & FELLOWSHIPS

### American Council of Learned Societies, ACLS

**Fellowships** - The information on ACLS Fellowships is essentially the same as described in last year's issue of this Newsletter, HPN volume III, #5, page 72. The (more senior) Fellowships deadline has been September 30th; the stipend has been \$15,000 maximum. The Fellowships for Recent Recipients of the Ph.D. deadline has been September 30th; the stipend has been \$10,000 maximum. The period for both types: 6-12 months between July 1, 1991, and December 31, 1992. Requests for information and for application forms should be made well in advance of the deadline to the American Council of Learned Societies, 228 East 45th St. New York, NY 10017-3398.

### AIP Center for History of Physics

**Grants-in-Aid** for travel of up to \$2,000 each continue to be available as described on page 10 of the previous issue of this Newsletter. For further information write to Spencer Weart, Center for History of Physics, 335 East 45th Street, New York, NY 10017. Deadlines have been June 30th and December 31st.

### Council for International Exchange of Fellows: the Fulbright Scholar Program

The Council, an affiliate of the ACLS, administers the Fulbright Scholars Program for research and university lecturing abroad in cooperation with the U.S. Information Agency. The awards include about 1,000 grants in research and university lecturing for periods ranging from three months to a full academic year. Fulbright awards are granted in virtually all disciplines, in over 100 countries and to all ranks. Applications are especially encouraged from professionals, retired faculty, and independent scholars. Benefits, which vary by country generally include round trip travel for the grantee and, for most full academic year awards, one dependent. The basic eligibility requirements for a Fulbright award are US citizenship; Ph.D. or comparable professional qualifications, university or college teaching experience; for selected assignments, proficiency in a foreign language. Deadlines depend on the area: June 15th for Australia, and most of Latin America; September 15th for many others including Africa, Asia, Europe, and the Middle East. For information and application forms, correspondence should be addressed to the Council for International Exchange of Scholars, 3400 International Drive, Suite M-500, Washington, DC 20008-3097; telephone (202) 686-7866.

### HSS's Independent Scholars Program

This program was described in the previous issue of this Newsletter on page 10. It provides Grants-in-Aid of up to \$2,000 for research travel and research expenses. For information on how to submit proposals, write to History of Science Society Executive Secretary, 35 Dean Street, Worcester, MA 01609, or call (508)831-5712. The next deadline for submission of a proposal is October 30th.

### The Institute for Advanced Study School of Historical Studies

The awards and programs were described in the October 1989 issue of this Newsletter on page 10. **Visiting Members Awards** are for candidates with a Ph.D. degree, and for these, the deadline last year was October 15th. The **New Membership Program** is for promising young assistant professors, and the deadline last year was November 1st. For details on the material required for submission of an application, write to the Administrative Officer of the School of Historical Studies, Institute for Advanced Study, Olden Lane, Princeton, NJ 08540.



### IEEE Fellowships in Electrical History

There is both a graduate and post-doctoral fellowship available as described in the February 1989 issue of this Newsletter on page 72. Applicants studying the history of science and technology may apply. Write to the Institute of Electrical and Electronics Engineers, History Fellowship Committee, Center for the History of Electrical Engineering, 345 East 47th Street, New York, NY 10017 or telephone (212)705-7501.

### National Endowment for the Humanities

If there is any possibility that you are interested in obtaining support from the NEH, I strongly urge you to get a copy of the NEH "Overview" of Endowment Programs; the most recent edition is dated July 1989. Over 32 pages describe 30 funding opportunities, and it is free. Also in the "Overview":

- How to get application forms
- When to apply (all the way thru 1991)
- Whom to contact for help
- Which project ideas are eligible for NEH funding and which ones are not.

Write or call NEH "Overview," Room 406, 1100 Pennsylvania Ave., N.W. Washington, DC 20506. Telephone: (202) 786-0438.

NEH Divisions seem to be autonomous bodies, and one needs to contact the correct Division or program office in order to obtain information. The Divisions are: Education Programs (room 302), Fellowships and Seminars (316), General Programs (426), Research Programs (318), State Programs (411). There are also the Office of Challenge Grants (429) and the Office of Preservation (429). Some information on these programs is in the previous issue of this Newsletter, Volume IV, #1, pp. 10-11. If you try to contact the Office of Publications and Public Affairs (telephone (202) 786-0438), it is very important that you know the name of the appropriate program. The address of the National Endowment for the Humanities is 1100 Pennsylvania Avenue, N.W. Washington, DC 20506. We have been requested to bring to your attention that the stipends for fellowships and "major grants" were increased last year. These fellowships are for applicants who range from being independent scholars to university faculty at Ph.D. granting institutions. The deadline for applications is June 1st. The Director of the Division of Fellowships and Seminars is Guinevere L. Griest, NEH, room, 316, 1100 Pennsylvania Ave. N.W., Washington, DC 20506. Telephone (202) 786-0466 to get more information and/or to request guidelines and applications. Examples of NEH funded History projects, for 1988, are listed in the HSS Newsletter of October 1989, pgs. 10-12.

**NEH College Teachers Summer Seminars** Although the NEH sends us information on these program early in January, due to the time consumed in preparing, printing, and mail distribution, the information would get to you after March 1st which is the deadline for receipt of applications. If you wish to know about these seminars or the possibility of directing such a seminar, we recommend that you write to NEH College Teacher Seminars Room 406, 1100 Pennsylvania Avenue, N.W.,

Washington, DC 20506 and request that you receive future schedules and lists of seminars.

### National Science Foundation

The National Science Foundation has had a set of programs in **Different Divisions** that are among the best sources of financial support for historians of science. Information on these programs has been given in previous issues of these Newsletters. This issue of the Newsletter is trying to provide information on these programs as succinctly as possible and hopefully will provide contacts within the NSF Divisions who can provide current information on the status and details of NSF programs of interest to historians. (Also see HSS Newsletter of October 1989.)

**Division of Instrumentation and Resources - Ethics and Values Studies in Science, Technology and Society, EVS** is a cross directorate activity at NSF, and they urge interested applicants to send two copies of preliminary proposals (informal) to EVS, Division of Instrumentation and Resources, NSF, 1800 G. Street NW, Room 312, Washington, DC 20550, or discuss your ideas with SSTS program staff at (202)-357-9894; the deadlines are May 1st and November 1st. (See NSF 89-8 and/or last years Newsletter Vol. III, #5, p. 73.) For projects in the History and Philosophy of Science contact Ron Overman. Financial support is available through: **NSF Scholars Awards, Summer Scholar Awards, Post-Doctoral or Professional Development Awards, (HPST) Grants, Grants for Doctoral Dissertation Research Support.**

**NSF Historian** For information on **Historical Monographs** contact George T. Mazuzan, NSF Historian, National Science Foundation, 1800 G. Street NW, Washington, DC 20550; telephone (202) 357-9838.

**Division of Materials Development, Research, and Informal Science Education** has an Instructional Materials Development Program designed to encourage proposals in the History of Science. See the Newsletter of October 1988 Volume III, #4, page 60, and/or telephone (202)-357-7066 (NSF room 635).

## JOBS

### The Historical Electronics Museum

The museum seeks an entry-level curatorial assistant, leading to full administrative responsibility. The successful candidate must be a "self-starter," have interest in and knowledge of electronic historical areas, and have skills in verbal communication, writing, and administration and organization. Desirable qualifications include hands-on exhibit-design skills, an M.A. in museum studies and previous internship or museum experience. The salary range is \$16,000 to \$22,000. Send resume, references, and telephone number to R.I. Dwight, Curator, Historical Electronics Museum, Mail Stop 4610, PO Box 1693, Baltimore, MD 21203; (301) 765-2345. AA/EOE.

## SUMMARIES

Authors of books and articles on the history of physics are invited to send summaries for publication in this section. Maximum length: 75 words for articles, 150 words for books. In addition, for articles, please give author's mailing address and indicate whether reprints are available; for books published outside the U.S., indicate the U.S. distributor (if any) or complete mailing address of the publisher. Publication will be expedited if each summary is typed, on a separate sheet, in the format of the summaries below.

Summaries should be sent to Albert Wattenberg, Department of Physics, University of Illinois, 1110 W. Green Street, Urbana, IL 61801.

### INTERPRETATION OF PLANET OBSERVATIONS

**Sheehan, William**, *Planets and Perception: Telescopic Views and Interpretations, 1609-1909*, xii+ 324 pp., Tucson: University of Arizona Press, 1988.

This book is a history of the origins of planetary astronomy, written from the perspective of perceptual psychology, and briefly discusses the work of Galileo, Huygens, Schröter, Gruithuisen, and Beer and Mädler. The main focus is, however, the discovery of the "canals" of Mars, and the debate about their reality and unreality.

Astronomers, in the days when they peered through their telescopes across the disturbing medium of the Earth's atmosphere, saw the planets clearly for only brief intervals, and under these conditions certain effects occur which are well-known from tachistoscope studies. We have an observer who expects to see something, a stimulus situation which makes it very likely that he will see things, even under good conditions, that are not objectively there. This reinforces and refines his expectations in a continuing process until finally he is seeing an exact, detailed but fictitious picture.

### KOSSEL'S ELECTRON SHELLS

**Berg, G.**, *Walther Kossel's Contribution to the Explanation of the Electron Configuration of the Elements in the Periodic Table*, Leopoldina, 1989, 33: 1987 (In German).

It is shown by means of the original literature that Kossel starting from a voluminous empirical material already in 1916 discerned the importance of the closed configuration of the outer electron shell of rare gases and the unalterability of the inner shells, contrary to Bohr's assumptions from 1913. Only in the beginning of the twenties Bohr developed by means of the correspondence principle a satisfactory model confirming Kossel's most essential ideas.

### ORIGINS OF THE COPERNICAN WORLD

**Blumenberg, Hans**, *The Genesis of the Copernican World*, xviii+772 pp., Cambridge: MIT Press, 1987.

This work, a sequel to the author's *The Legitimacy of the Modern Age*, rethinks the significance of the Copernican revolution for our understanding of modernity. By reinterpreting the relation of Copernicus's work to medieval Nominalism, Renaissance Humanism, and Platonism, the book shows that the genesis of the Copernican world was not a result of "scientific" developments as such, but of systematic changes in the areas of philosophy, religion and metaphor. It also examines the role of Copernicanism in forming the self-understanding of early modern science (Oslander, Rheticus, Bruno, Galileo), and in generating some of the key metaphors (in particular, man's "displacement from the center") by which modernity in general has understood, and also—Blumenberg suggests—misunderstood itself.

### AURORAE

**Schröder, W.**, *Development of Theories of Aurorae*, Gerlands Beiträge Zur Geophysik, 1989, 97, pp. 534-548.

Some developmental phases of the theories on aurorae during the last centuries are considered. The aurora of March 17, 1716, marks a turning point in the history of auroral research. This aurora occurred in an important period in the intellectual development in Europe, at a time when after the long depression of the Middle Ages people were becoming most interested in natural sciences and phenomena relevant for geosciences. In the 19th century a connection between the sunspot cycles and auroral occurrences was realized by several people as for instance FRITZ (1873). Further studies on the nature of aurorae have been done in the 19th century by BIRKELAND, WIECHERT, and ZÖLLNER et al. Resulting from their studies, a strong connection between solar activity and the evolution of aurorae in the upper atmosphere has been discussed. One of the latest

discussions on theories of magnetic storms and aurorae has been published in the papers by CHAPMAN/FERRARO, COWLING/ALFVÉN and ALFVÉN. These phases in the auroral theories are briefly referred to.

### BIBLIOGRAPHY ON NOCTILUCENT CLOUDS

**Gadsden M.; Schröder, W.**, *Noctilucent clouds*, 190 pp., Heidelberg/New York/Tokyo: Springer-Verlag, 1989.

This book brings together what is known about noctilucent clouds from many separate sources to provide a single reference and commentary for researchers. It provides a comprehensive list of published works (1648-1989), from the very earliest times to the present days. In one volume, the dedicated research worker, the interested scientist and historian, as well as the enthusiastic amateur observer, is offered for easy reference a statement of the present-day studies of what is, after all, a beautiful natural phenomenon.

### I. E. TAMM

**Feinberg, E.L.**, *Reminiscences about I.E. Tamm*, 328 pp., Moscow: Nauka Publishers, 1987.

I.E. Tamm (1895-1971), was a theoretical physicist, Nobel prize winner (together with P.A. Cherenkov and I.M. Frank) for the theoretical explanation of Vavilov-Cherenkov radiation of a "superlight electron." His investigations in quantum theory of numerous physical phenomena, in quantum field theory, as well as leading participation (together with A.D. Sakharov) in solving thermonuclear problems, secured him an outstanding position in physics. He organized and for 35 years was the head of the Theory Department in the P.N. Lebedev Physical Institute of the Acad. of Sci. of the USSR (the present Department bears his name). Among his students, later-colleagues in this Department were A.D. Sakharov, V.L. Ginzburg, E.S. Fradkin, E.L. Feinberg, D.A. Kirzhnits and many others. He was a professor of Moscow University and of the Physical Engineering Institute. His re-

markable personality and social activity (struggle against Lysenkoism, participation in peace movement, etc.) made him one of the leading figures in the Soviet scientific community. The book is a collection of papers by his friends, students and collaborators and draws a picture of this man in various aspects. As Sir Rudolph Peierls writes in his contribution, "The world would be a better place if there were more people like Igor Evgenievich." From this book the reader can learn much about situation in science in his country and in his time, about the peculiar way of development of its physics which had almost no special institutions at the beginning of this century and achieved an imposing position in the last decades of Tamm's life.

The book is a translation from Russian (first published in 1981, second edition - 1985).

### HERTZ' RADIO WAVES

**Adawi, I.**, *Centennial of Hertz' Radio Waves*, American Journal of Physics, 1989, 57: 125-127.

A glimpse of the life and work of Heinrich Hertz is given on the occasion of the centennial of his discovery of radio waves (1888). The importance of his work in verifying Maxwell's theory and establishing the electromagnetic wave nature of light is discussed. For reprints: I. Adawi, Dept. of Physics, University of Missouri-Rolla, Rolla, MO 65401.

### RUTHERFORD'S SCATTERING ON HELIUM

**Temmer, G.M.**, *How Rutherford Missed Discovering Quantum Mechanical Identity*, American Journal of Physics, 1989, 57: 235-237.

In his well-known investigations of alpha-particle scattering by nuclei, Rutherford eventually arrived at the scattering of alphas by helium in 1927. In his publication with Chadwick of that year, he was aware of the practical, i.e. classical impossibility of distinguishing the projectiles from the target particles in that case, and he allowed for an additional term in the Rutherford formula. Mott's famous paper discussing the quantum mechanical consequences of the indistinguishability of identical particles was not published until 1930. While studying the scattering at 45 degrees in the laboratory with decreasing bombarding energy, Nature played them a fiendish trick by fortuitously yielding the classically expected value for Coulomb scatter-

ing, at which point the authors stopped their investigations. Mott showed that they should have observed twice the classical value! Had Rutherford measured a little further down in energy, he would presumably have found the correct value, and he would have been very perplexed.

### HELMHOLTZ AND HIS STUDENTS

**Mulligan, Joseph F.**, *Hermann von Helmholtz and His Students*, American Journal of Physics, 1989, 57: 68-74.

During the years 1871-1888, when Hermann von Helmholtz was professor of physics at the University of Berlin, physicists from all over the world flocked to Berlin to study and do research with him. Among these were the German physicists Max Planck, Heinrich Kayser, Eugen Goldstein, Wilhelm Wien, and Heinrich Hertz, and Americans Henry Rowland, A. A. Michelson, and Michael Pupin. Examples of Helmholtz's scientific and personal interactions with these students and research associates show why he is justly considered the outstanding physics mentor of the 19th century. Author's address: Dept. of Physics, University of Maryland Baltimore County, Catonsville, Maryland 21228. Reprints available..

### EINSTEIN IN SPAIN

**Glick, Thomas F.**, *Einstein in Spain: Relativity and the Recovery of Science*, xii+391 pp., Princeton: Princeton University Press, 1988.

Einstein's two week visit to Spain in 1923 set off a relativity boom in the popular press and was preceded by an intense period of activity during which information concerning the scientific theory was discussed by scientists and engineers. The latter, a politically conservative group which usually displayed antipathy to modern values, was exuberantly enthusiastic about both Einstein and his ideas, appropriating them in order to publicize their acceptance of modern science. The reception of relativity in Spain is understood, therefore, as part of the process of modernization, wherein the ability to understand, and especially to teach, relativity became a symbol of the will to modernize. Spanish physics, undergoing renewal at the time, was able to convert Einstein's prestige into support for its own institutionalization.

### HERTZ

**Mulligan, Joseph F.**, *Heinrich Hertz and the Development of Physics*, Physics Today, 1989, 42: 50-57.

During his brief life of 36 years Heinrich Hertz made important contributions to both experimental and theoretical electromagnetism, to mechanics, meteorology, and other fields of classical physics. In addition, his experimental work on cathode-rays and the photoelectric effect turned out to be of considerable importance for the development of modern physics. These varied contributions show Hertz to be the last great classical physicist and the precursor of a new generation of modern physicists. Author's address: Dept. of Physics, University of Maryland Baltimore County, Catonsville, Maryland 21228. Reprints available.

### MICHELSON AND MILLIKAN

**Michel, John L.**, *The Chicago Connection: Michelson and Millikan, 1894-1921*, American Institute of Physics Conference Proceedings, 1988, 179 (The Michelson Era in American Science, 1870-1890): 152-176.

For a quarter of a century, Michelson and Millikan were colleagues in the Physics Department of the University of Chicago. This study examined the relationship between each scientist's teaching and research, in the context of the early institutional development of the University of Chicago. It was found that their two academic lives became enmeshed in a complementary fashion, to their mutual benefit and to the educational advantage of their students.

### EINSTEIN AND MICHELSON'S EXPERIMENT

**Swenson, Loyd S.**, *Michelson-Morley, Einstein, and Interferometry*, American Institute of Physics Conference Proceedings, 1988, 179: 235-245.

This article for the Michelson-Morley Experiment's Centennial in Cleveland in 1987 celebrates over three decades of historical scholarship devoted to analyses of interactions and trustworthy publications on the aether-drift experiments and their relations to special relativity theory. As a memoir paper, it also emphasizes the importance of the works of Dayton C. Miller and of Robert S. Shankland to the character and reputation of the Michelson-Morley experiment. It argues that Michelson's interferometer has

evolved into one of the most ubiquitous and powerful scientific instruments and that the discovery of 3°K background radiation may indeed presage the measurement of something akin to absolute motion. As V.F. Weisskopf asserted in 1983, "The great dream of Michelson and Morley is realized." Author's address: Department of History, University of Houston, Houston, TX 77204.

### QUANTUM PHYSICS IN THE U. S.

**Holton, Gerald**, *On the Hesitant Rise of Quantum Physics in the United States*, American Institute of Physics Conference Proceedings, 1988, 179: 177-205.

This essay aims to determine when, and under what circumstances, original research based on a belief in the usefulness of quantum physics began in the United States. Using newly available archival materials, it is found that this point was reached in 1916—years before A.H. Compton's 1922 announcement—by a doctorate student, Edwin C. Kemble. The two main types of initial responses in the U.S. to the new quantum physics are presented, as is the development within the next few years of the school of American quantum theoreticians. (Note: This material appears also as chapter 5 in G.Holton, *Thematic Origins of Scientific Thought: Kepler to Einstein*, 1988).

### ASTRONOMICAL SOCIETY OF THE PACIFIC

**Bracher, Kathryn**, *The 1889 solar eclipse and the founding of the Astronomical Society of the Pacific*, Bulletin of the American Astronomical Society, 1988, 20: 984.

On January 1, 1889, the sun was totally eclipsed in northern California. Charles Burkhalter of Oakland led members of the Pacific Coast Amateur Photographers' Association to the eclipse path; their resulting photographs were sent to Lick Observatory director Edward S. Holden. Impressed by their success, Holden proposed forming an astronomical society of amateurs and professionals. Forty men joined the Astronomical Society of the Pacific as charter members; 100 years later the Society continues to promote astronomy. Author's address: Department of Astronomy, Whitman College, Walla Walla, WA 99362.

### U.N. SPACE ACTIVITIES

**Haubold, Hans J.**, *Space Activities of the United Nations and International Organizations*, xv+271 pp., Document A/AC.105/358, New York: United Nations, 1987.

Space research and technology have been experimental sciences for about 30 years and the international community became aware of the necessity of broad international co-operation in these fields. This book gives a non-technical account of the existing space activities of the United Nations, specialized agencies, intergovernmental organizations and non-governmental organizations as well their interconnections. It can serve as a reference guide and provides an overview of respective organizations, their past and present activities, current programs and future plans in the peaceful uses of outer space. For copies write to H.J. Haubold, Room S-3260B, Outer Space Division, United Nations, New York, NY 10017, USA.

### HEINRICH HERTZ'S ELECTROMAGNETICS

**Bryant, John H.**, *Heinrich Hertz: The Beginning of Microwaves; Discovery of Electromagnetic Waves and Opening of the Electromagnetic Spectrum in the Years 1886-1892*, 52 pp., Piscataway, New Jersey: IEEE Service Center, 1988.

Hertz's remarkably thorough investigations validated the Faraday/Maxwell theory of electromagnetism, and opened up the radio frequency portion of the electromagnetic spectrum between direct current and light for scientific and practical uses. His results came from a step-by-step learning process, alternating experiments with analysis. In this highly condensed, illustrated book, Hertz's historic experiments in electromagnetics are described in sequential order.

Photographs of the experimental apparatus designed by Hertz and built by a mechanic assistant, and drawings from Hertz's papers, are used to illustrate the experiments. Also identified are numerous items of laboratory apparatus. Although Hertz had photographs, none appeared in his papers because the technical journals of his day could not accommodate them. This book is the first to identify and describe Hertz's apparatus and his experiments in modern terms.

The background to Hertz's work, a brief biography, and extensive references to original sources are

given, along with comments on the legacy of Hertz.

### THE LICK OBSERVATORY

**Osterbrock, Donald E., Gustafson, John R., Unruh, W. J. Shiloh**, *Eye on the Sky: Lick Observatory's First Century*, xii+295 pp., Berkeley: University of California Press, 1988.

Lick Observatory went into operation in 1888 as the first permanent mountain-top observatory and America's first big-science center. Part of the University of California, it was built around the largest refracting telescope in the world, and staffed by a group of outstanding research scientists. This book recounts the history of Lick Observatory in human as well as scientific terms. Donors, advisers, builders, astronomers and astrophysicists appear in the story, as well as the telescopes and spectrographs they used and the planets, stars, nebulae and galaxies they studied. This book begins with James Lick, emphasizes the earliest years of the observatory's existence, and continues down through its hundred years of astronomical research to 1988.

### SCHROEDINGER BIOGRAPHY

**Hey, J. D.**, *Erwin Schrödinger (1887-1961)*, Trans. Roy. Soc S.Africa, 1989, 47 (Part I): pp. 43-79.

In this article, written to commemorate the centenary of Schrödinger's birth, the life and major areas of intellectual activity of one of the giants of twentieth-century physics are reviewed under the following headings: early years, Louis de Broglie, wave mechanics, quantum mechanics, the Nobel Prize, paradoxes, relativity and field theory, contributions to biology, science in relation to ancient thought and philosophy, and the final years.

### HISTORY OF FISSION

**Herrmann, Günter**, *Discovery and Confirmation of Fission*, Nuclear Physics, 1989, A502: 141c-158c.

An outline of the history of fission is presented beginning in 1934, when fission products were first produced by neutron-irradiation of uranium but were attributed to transuranium elements, till December 1938, when fission was discovered with radiochemical techniques

and confirmed in the following weeks with physical methods.

### DISLOCATIONS AND DISCLINATIONS

**Friedel, Jacques.** *Dislocations and Disclinations: Some Personal Views and Reminiscences*, Annual Reviews of Material Sciences, 1988, 18: 1-24.

Dislocations and disclinations, those line defects in translational or rotational order of materials, date back as concepts to the early years of this century. But a remarkable explosion occurred after the last war in the study of these defects in crystals and of their role in plasticity and growth. In the last twenty years, an active transfer has taken place to defects in magnetism, liquid crystals, superfluids, quasicrystals and amorphous matter. The author was in Bristol in the seminal years of the first phase and took part in its development back in Paris. Later, his laboratory in Orsay played an active role in the second phase. A personal account of this development is given.

### PARTICLE PHYSICS

**Brown, Laurie M., Dresden, Max and Hoddeson, Lillian.** *Pions and Quarks: Particle Physics in the 1950's*, xxxii + 734 pp., Cambridge: Cambridge University Press, 1989.

This collection of essays, discussions, and personal reminiscences focusing on the intellectual and social development of elementary particle physics from 1947 to 1963 is based on a three-day international symposium held at Fermilab in May 1985. A broadly balanced picture of the coming of particle physics and its development into "big science" is presented by about fifty particle physicists and professional historians of science. Major topics treated are experiments, theories, the design and construction of accelerators and detectors, and the establishment of major research centers. Discussions cover the range from sociological analysis to axiomatic field theory.

### THE NEUTRON AND BETA-DECAY

**Brown, Laurie M. and Rechenberg, Helmut.** *Nuclear Structure and Beta Decay (1932-1933)*, American Journal of Physics, 1988, 56: 982-988.

Before the neutron and the positron were discovered in 1932, the electron and the proton were thought

to be the only constituents of matter, including the atomic nucleus. Nuclear phenomena, including  $\beta$  decay, appeared to require electrons in the nucleus, which violated other accepted principals. However, the picture changed considerably after the neutron discovery and Fermi's  $\beta$  theory made it possible to build the nucleus out of neutrons and protons alone. For reprints: L.M. Brown, Department of Physics and Astronomy, Northwestern University, Evanston, IL 60208.

### EDUARDO AMALDI

**Belloni, Lanfranco.** *Da Fermi a Rubbia*, 210 pp., Milano: RCS Rizzoli, 1988.

The book deals mainly with the activities of Edoardo Amaldi (1908-1989), the only member of Fermi's group who stayed in Italy. Amaldi played a pivotal role in ensuring the astonishing vitality of the Roman institute of physics, even in the hardships of war-time. After the war was over, Amaldi helped in directing Italian (and possibly also non-Italian) efforts toward European collaborations in high-energy physics. The book covers the gap between the golden era of Fermi in Rome (about which much has been written) and the post-war re-establishment of close ties among the European physics communities. The book also deals with the political reactions to CERN both at the local and national level.

### THE COMPTON-MILLIKAN CONTROVERSY

**De Maria, Michelangelo and Russo, Arturo.** *Cosmic Ray Romancing: The Discovery of the Latitude Effect and the Compton-Millikan Controversy*, Historical Studies in the Physical and Biological Sciences, 1989, 19: 211-266.

The discovery, that the intensity of cosmic rays depends on the geomagnetic latitude, proved that these rays must be charged particles. This discovery added geophysical evidence to the laboratory results obtained by counters and Wilson chambers that also suggested the corpuscular nature of the cosmic radiation. R. Millikan could not accept this conclusion. He had not observed such an effect and the whole of his results confirmed to him that cosmic rays were high energy photons. His theory on the origin of cosmic rays, based on the photon hypothesis, linked together scientific data and religious tenets in the bold conception of a cosmic evolutionary process involving atoms and stars, matter and

energy, the future of the universe and the progress of mankind. When A. H. Compton, by a large scale geographic survey, definitely confirmed in 1932 the existence of the latitude effect already discovered by the Dutch physicist J. Clay, Millikan could not accept the demise of the old theoretical framework and the challenge to his leadership in the field. He opposed Compton, first about data, then about their interpretation, and finally about priority. The controversy between the two leading spokesmen of American physics was amplified by the media and rapidly became a public affair, while religious and ideological implications added interest to the personal and scientific and the ideological and institutional aspects of the controversy. A few reprints are available from A. Russo, Istituto di Fisica, Via Archirafi 36, 90123 Palermo, Italy.

### GRAVITROPISM

**Pilet, Paul-Emile.** *The First Quantitative Researches on Gravitropism: The Publications of Dodart (1700), Astruc (1708) and de la Hire (1708)*, Archives Internationales d'Histoire des Sciences, 1988, 120: 77-85.

Experiments and theories published between 1700 and 1708 by the Academy of Sciences (Paris), are critically summarized and discussed both in relation to the concepts of that time and of today. The first paper, by Denis Dodart, is considered to be a classic. Frequently cited as being the first to report the action of gravity on living organisms, it is, however, very little known. Jean Astruc repeats the experiments made by his colleague but suggests some original explanations. De la Hire limits himself to critical comments on the two preceding articles.

Author's address: Av. Raymondin, 1009 Pully, and Dept. of Biology, Univ., 1015 Lausanne (Switzerland).

### NEWTON'S WORK

**French, A.P.** *Issac Newton: A Passion to Learn and Understand*, AIP Conf. Proc., 1988, 173: 7-29.

The work of Isaac Newton is an enduring tribute to his genius for observation, investigation, and analysis. The purpose of this paper is both to pay homage to Newton, on the tercentenary of the *Principia*, and to describe various examples of his work that can be used in the teaching of physics.

No reprints are available, but the author can supply reprints of a very similar paper, *Issac Newton: Explorer of the Real World* (q.v.).

## DIVISION ELECTION

### Nominees for the 1990 Divisional Election

We need to elect a Vice-Chairperson who will become Chairperson next year, a Divisional Councillor who will serve for three years, and two members of the Executive Committee who

### For Vice-Chairperson

#### Erwin Hiebert

Erwin Hiebert, Professor Emeritus of the History of Science at Harvard University, received his Ph.D. (double major in physical chemistry and history of science) at the University of Wisconsin, Madison in 1954. As Vice-President and President of DHS/IUHPS (1974-86) he has had extensive contacts with scientists, historians, and philosophers in Europe, the Soviet bloc countries and Asia. His historical publications include works on the history of thermodynamics, physical chemistry, nuclear physics, scientists as philosophers of science, and studies on the life and works of Ernst Mach. He currently is working on a volume entitled: Lise Meitner and her Circle.

#### Martin J. Klein

Born in New York City in 1924, Martin J. Klein studied at Columbia University and Massachusetts Institute of Technology, where he received his Ph.D. in Theoretical Physics in 1948. He taught and did research in statistical mechanics in the Physics Department of Case Institute of Technology for eighteen years, during which his interests gradually shifted to the history of science. Since 1967 he has been at Yale where he is Eugene Higgins Professor of History of Physics and Professor of Physics. Klein's historical writings have concentrated on developments in thermodynamics, statistical mechanics and quantum physics, dealing with the work of Einstein, Gibbs, Bohr, Boltzmann, Maxwell, and Carnot. His book, Paul Ehrenfest: The Making of a Theoretical Physicist was published in 1970. Klein has recently been appointed Senior Editor of The Collected Papers of Albert Einstein. A Fellow of the American Physical Society and member of a number of professional societies, he has been elected to several academies including the National Academy of Sciences.

### For Divisional Councillor

#### Roger H. Stuewer

Roger H. Stuewer was born in 1934. Ph.D., University of Wisconsin, 1968; Assistant Professor to Professor, History of Science and Technology, University of Minnesota, with faculty appointments in School of Physics and Astronomy, University of Minnesota Center for Philosophy of Science, Classical Civilizations Program, and American Studies Program, 1967-present. Other appointments at Boston University, 1971-72; Harvard University, 1974-75; Deutsches Museum, Munich, 1981-82; University of Vienna and Graz, 1989. Fellow, American Council of Learned Societies, 1974-75, 1983-84, AAAS, 1983.

Distinguished Service Citation, AAPT, 1990. Secretary, History of Science Society, 1972-78; Editor, AAPT/AJP Resource Letters, 1978-present; Member and Chairman, AIP Committee on the History of Physics, 1978-present; Executive Committee and Chairman, APS Division of History of Physics, 1982-88. Author of "The Compton Effect: Turning Point in Physics" (1975); editor of "Historical and Philosophical Perspectives of Science" (1970) and "Nuclear Physics in Retrospect" (1979); co-editor of "Springs of Scientific Creativity" (1988) and "The Michelson Era in American Science 1870-1930" (1988). Research interests include history of radiation theory, quantum mechanics, and nuclear physics.

#### Albert Wattenberg

He was born in 1917. His M.A. is from Columbia University (1939), his Ph.D. from University of Chicago (1947-neutron physics). He was a member of the Fermi group at Columbia and in Chicago (1942-1946). Positions held: Group Leader (1947-49) and Acting Director of Physics Division at Argonne National Lab (1949-50); Research Physicist at MIT (1951-58); Technical Advisor in Japan for Eisenhower's "Atoms for Peace Program" (1956); University of Illinois Research Professor (1958-88, particle physics); Visiting Professorships: University of Rome (1962-63) and Stanford University (1973, 1980-81). Historical activities include: Co-editor with Amaldi, Anderson, and Segrè of "Collected Papers of Enrico Fermi." Articles on Fermi and/or the first nuclear chain reaction in: *Accad. Nazionale dei Lincei*, 1963 *Quaderno N. 60* (in Italian); "All in Our Time" (Edited by Jane Wilson (1975), *Bulletin of Atomic Scientists* (1982); "Nuclear Chain Reaction-Forty Years Later" (Edited by R.G. Sachs 1984); *European Journal of Physics* (1988, "The Fermi School in the United States").

He was chairman of the APS organizing committee for a Division of History of Physics (1979); Secretary-Treasurer (1985-88) of DHP, and he is the Editor of the *History of Physics Newsletter* (1985-present). Awards include: Fellow of the APS (1949), Bronze Medal of ANS (1962), Nuclear Pioneer Award of the Society of Nuclear Medicine (1977).

### For Executive Committee

#### David C. Cassidy

B.A. and M.S. degrees in physics (nuclear), Rutgers University. Ph.D. (1976), department of Physics, Purdue University, in conjunction with Department of History of Science, University of Wisconsin-Madison. Dissertation topic: "Werner Heisenberg and the Crisis in Quantum Theory, 1920-1925." Post-doctoral research in Office for History of Science and Technology, University of California, Berkeley, and as a Humboldt Foundation fellow in history of science, University of Stuttgart, W. Germany. Assistant Professor, history and philosophy of science, University of Regensburg, W. Germany, 1980-1983. Since 1983, member of the editorial staff of The Collected Papers of Albert Einstein. Currently Associate Professor, Program in Natural Science, Hofstra University, and Adj. Assoc. Professor, Department of History, SUNY Stony Brook.

Publications include forthcoming biography of Werner Heisenberg (W.H. Freeman & Company), a series of articles on Heisenberg's work on quantum mechanics, field theory, and cosmic rays, and several articles on physics in Germany before and during the Third Reich. Present plans include a study of the impact of U.S. policy on West German physical science during the occupation and early cold war, and the further integration of the history of physics into science courses for non-science majors.

**Elizabeth Garber**

Elizabeth Garber received her B.Sc. (1960) and her M.S. (1962) from London University and her Ph.D. in Physics (1966) from Case Western Reserve. She was a lecturer at Notre Dame College, Cleveland, Ohio (1966-67), and an Editorial Assistant to Physical Review (1967-68). Since 1969 she has been an Associate Professor in the History Department at SUNY at Stony Brook.

She has served on various committees of the History of Science Society and was a member of the Council for the APS Section L during its founding. She is currently participating in the History of Science Society's 'Visiting Historians' program and recently became a Fellow of the American Physical Society.

Her research interests have centered upon physics in nineteenth-century Europe, especially upon the work of James Clerk Maxwell. After publishing papers on his kinetic theory and thermodynamics, she is co-editing (with Stephen G. Brush and C.W.F. Everitt) his unpublished letters and notes on Saturn's rings, gas theory, thermodynamics and statistical mechanics. A closely related interest is in the development of new disciplines. Current research is on the transformation of Physics from an eighteenth-century discipline, whose theories were expressed and developed in the vernacular, to one in the mid-nineteenth century, whose theories were developed in the languages of mathematics.

**Stanley Goldberg**

He was born in 1934 and received his Ph.D. from Harvard in 1969. Appointments include: Antioch College (1965-1971), University of Zambia (1968-1970), Hampshire college (1971-1983; Professor 1978), Stanley Goldberg is a consultant to the Department of the History of Science and Technology at the Smithsonian's National Museum of American History. Vis-

iting Professorships University of Maryland Baltimore County: (1988), and John Hopkins (1989). He is a consultant to the Department of the History of Science and Technology at the Smithsonian's National Museum of American History. His book, Understanding Relativity: Origins and Impact of a Scientific Revolution, appeared in 1984. He is co-editor (with Roger Stuewer) of American Science in the Age of Michelson, and principal investigator for the Smithsonian's Video History Program series on the Manhattan Project. Recent articles "Physics, Poetry and Politics: Sam Goudsmit and American Science after World War II," and "Before the Manhattan Project: The Decision to Build the Bomb" will soon be published. He has been responsible for a number of exhibits at the National Museum of American History. He is currently completing the term of Emilio Segrè on the Executive Committee of the Division of History of Physics.

**Heinrich Medicus**

Heinrich A. Medicus, Professor Emeritus of Physics at Rensselaer Polytechnic Institute, received his D. Sc. degree from the Swiss Federal Institute of Technology in Zurich. His field of research was experimental nuclear physics. In later years his interests shifted to the history of twentieth century physics. Presently, he does research on Einstein and some of his Swiss friends. Among his publications are "50 Years of Matter Waves" in Physics Today and "A Comment on the Relations Between Einstein and Hilbert" in Am. J. of Phys. On his suggestion the Division decided to participate in the March meetings of the A.P.S. with a symposium on a topic of interest to condensed matter physicists. He organized and chaired the symposia in 1988 in New Orleans on the history of semiconductor physics and in 1989 in St. Louis on the history of optical properties of condensed matter, which drew audiences of approximately 800 and 700 respectively.

**1990 Ballot**

The Ballot must be returned before April 9th, 1990, to Professor C. Stewart Gillmor, Department of History, Wesleyan University, Middletown, CT 06457.

**Vice-Chairperson--Vote for ONE**

ERWIN HIEBERT

MARTIN J. KLEIN

**VOID**

**Executive Committee--Vote for TWO**

DAVID C. CASSIDY

ELIZABETH GARBER

HEINRICH MEDICUS

STANLEY GOLDBERG

**Division Councillor-- Vote for ONE**

ROGER H. STUEWER

ALBERT WATTENBERG



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