History of Physics Newsletter

VOLUME I, NUMBER 1 AUGUST 1982

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 may subscribe; see the form at the end of this issue. We expect to publish 2 or 3 issues each year. HPN will publish news of the Division, including announcements of sessions of papers at APS meetings; notices of positions which might be filled by historians of physics; notes and queries on various topics that might be of interest to readers; information about journals, societies, and projects related to history of physics; and summaries of publications and work in progress. (We do not publish substantive research articles or book reviews.) The Editor welcomes letters, suggestions, summaries, and news items.

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DIVISION NEWS

1983 Sessions

The Division plans to sponsor sessions of invited papers at three APS general meetings in 1983: New York (24-27 January), Baltimore (18-21 April), and San Francisco (20-23 November). At the New York meeting the theme of the session (to be cosponsored by the American Association of Physics Teachers) will be the history of experimental physics. For further information contact Martin J. Klein or Stephen G. Brush; details will be in the next issue of HPN.

Executive Committee

The following were elected to the Executive Committee of the Division in January 1982:

- Chairperson, Martin J. Klein (Yale)
- Vice-Chairperson (to serve as Chairperson in 1983), Laurie M. Brown (Northwestern)
- Secretary-Treasurer, 3-year term, Stephen G. Brush (University of Maryland)
- Divisional Councillor, Max Dresden (SUNY-Stony Brook)
- Members of Executive Committee, 3-year terms, Roger H. Stuewer (University of Minnesota) and Robert R. Wilson (Columbia); 2 year terms, William A. Fowler (Caltech) and Gertrude Scharff-Goldhaber (Brookhaven); 1 year terms, Elizabeth Garber (SUNY-Stony Brook) and Paul Hanle (Air & Space Museum, Smithsonian).

The next election will be held in December 1981. Suggestions for nominations may be sent to the Chairperson or the Secretary-Treasurer, who will transmit them to the Nominating Committee.

Program Committee

The Program Committee has been appointed by the Chairperson, as follows:

- Chairperson, Martin J. Klein; Samuel Devons (Columbia), Paul Hanle, Roger Stuewer, and Albert Wattenberg (Illinois).

The History of the Division of History

by Laurie M. Brown

At the 1982 Spring Meeting in Washington, the Executive Committee of the newest Division of the American Physical Society, the Division of History, met for the first time. I would like to sketch its origins and objectives.

A group of physicists, having dinner after a session of the annual meeting of the History of Science Society in Madison, Wisconsin, in October 1978, recalled that the idea of such an

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APS division has been spoken of from time to time. It was evident that many physicists had a strong interest in the history of their discipline, but were without a means of satisfying or expressing that interest within their own professional society. On the other hand, very few of these people belonged to the History of Science Society or had any other contact with professional historians of science or other students of the broader aspects of scientific culture.

A few months later, a few of us began to obtain signatures on a petition addressed to the APS Council, requesting that body to consider forming an eleventh division of the society, with supporting reasons, among them:

-that important scientific, cultural, and pedagogical values are present in the history of physics;
-that many members of the APS do historical research, writing and lecturing for classes, for APS meetings, and for publication, which includes Physics Today, Reviews of Modern Physics, and The American Journal of Physics.

Several functions that could be served by the proposed division were listed, including:

-the provision of communications between members through meetings and mailings
-the organization and sponsorship of sessions of papers at APS meetings
-the sponsoring of special historical conferences and publications
-support for the AIP Center for History of Physics
-provision for liaison between APS and the history of science sections of other organizations, such as AAPT, American Chemical Society, AAS, AAAS and with the History of Science Society.

After about 200 signatures were collected on the petition, it was presented by Gertrude Scharff-Goldhaber to the APS Council meeting on November 3, 1979. As a result of the Council's decision to go forward on this matter, Lewis Branscomb, the society's president, appointed an ad hoc committee, chaired by Albert Wattenberg, to make a recommendation to the next Council meeting.

By January 1980 a report was ready. The Wattenberg committee discussed the issue that had been raised at the Council concerning whether a Forum or a Division would be more appropriate. Even though history cuts across all the other divisions, the committee felt that a division would better help to encourage high standards of scholarship. The points made in the Wattenberg report that went beyond the original proposal (all of which were accepted) were:

-a newsletter would be desirable
-other organizations involved in history of science had meanwhile expressed support for the new History of Physics Division
-industrial and national laboratories have become increasingly interested in supporting historical research and archival formation
-some contributions to history of physics are too technical (in the physics sense) to be appropriate for sessions of the History of Science Society, but would be entirely appropriate for the APS
-there is no present need apparent for a new journal in the history of physics.

Meanwhile, the other APS divisions were asked to comment on the proposed new division. An organizing committee was formed (combining the ad hoc committee and the original proposers - there was a large overlap of members, anyhow). A set of bylaws began to be composed, circulated, revised, etc.

At the Washington APS meeting in 1980, Stephen G. Brush organized and chaired a short discussion. The bylaws were submitted in August by the Organizing Committee (L. M. Brown, S. G. Brush, M. Dresden, W. A. Fowler, G. Holton, G. Scharff-Goldhaber, R. Stuewer, K. C. Wali, A. Wattenberg). After some negotiation, the Council accepted the bylaws and approved the formation of the division on November 22, 1980. The object is given as "the encouragement of scholarly research in the history of physics and the diffusion of knowledge of this history and its relation to other scholarly disciplines."

The Inaugural Session of the Division of History of Physics was held on April 22, 1981 at the Baltimore Meeting of the APS, and consisted of six presentations on a variety of topics (see below). A symposium to celebrate the 50th anniversary of the discovery of the neutron (cosponsored by AAPT) and a symposium to celebrate the 50th anniversaries of the Lawrence Berkeley Laboratory and the W. K. Kellogg Radiation Laboratory were held at the APS meeting in San Francisco, January 1982 .

A fourth session of invited papers was organized by the Division for the 1982 Washington meeting in April. Elections having been concluded in the meanwhile, the same Washington meeting saw the first meeting of the Executive Committee -- which brings us to the introductory sentence of this article.

HISTORY OF PHYSICS DIVISION MEETINGS

Inaugural Session

The Division's "Inaugural Session" was held at the APS Spring Meeting, Baltimore, MD, 22 April 1981. The following papers were presented:

"The New Division of History of Physics" - Laurie M. Brown, Northwestern.

"Harold Urey and the Origin of the Moon" - Stephen G. Brush, Maryland.

"A. H. Compton and X-Ray Scattering" - Roger H. Stuewer, Minnesota.

"The 50th Anniversary of the Discovery of Deuterium" - F. G. Brickwedde, Pennsylvania State.

"H. A. Kramers and the Role of Courage in Physics" - Max Dresden, SUNY-Stony Brook.

"Chandrasekhar vs. Eddington: An episode in the Annals of Astrophysics" - Kameshwar C. Wali, Syracuse.

Lawrence & Kellogg Labs

A "Symposium to celebrate the 50th Anniversaries of the Lawrence Berkeley Laboratory and the W. K. Kellogg Radiation Laboratory," was held at the APS meeting at San Francisco, 25 January 1982:

"Reminiscences of Ernest Lawrence's Radiation Laboratory" - Luis Alvarez, Lawrence Berkeley Laboratory.

"Neither Horsefarm nor Hospital - The Early Years of Caltech's W. K. Kellogg Radiation Laboratory" - C. H. Holbrow, Colgate.

"Phifty Years of Phun & Physics in the W. K. Kellogg Radiation Laboratory at Caltech" - William Fowler, Caltech.

"Early Researches in BioSciences at the Radiation Laboratory" - Martin Kamen, California.

Neutron and Nucleus

"The Neutron Discovery and the Atomic Nucleus" was the subject of a Joint Symposium with AAPT at the APS meeting at San Francisco, 26 January 1982:

"Nuclear Physics in Rutherford's Laboratory before the Neutron" - Lawrence Badash, California-Santa Barbara.

"Fifty Years of Neutrons; Some Personal Reminiscences" - Maurice Goldhaber, Brookhaven.

"the Impact of the Neutron: Bohr and Heisenberg" - Joan Bromberg.

Theoretical Physics

A symposium on "Mechanics, Relativity, and the Rise of Theoretical Physics" was presented at the APS Spring Meeting, Baltimore, 27 April 1982:

"The History of Physics Division in the American Physical Society" - Martin J. Klein, Yale.

"Mechanics and the Center of German Physics, 1790-1840" - Kathryn Olesko, Georgetown.

"Mathematicians vs. Physicists - Mechanics in the early 19th Century" - I.

Executive Committee

The first meeting of the Executive Committee, was held on 27 April 1982, in Washington, D. C. All members were present. Brush reported that the Division had 1163 members as of 30 March 1982 (see list in APS Membership Directory, Bulletin, Dec. 1981). For comparison, the smallest Division in APS has about 900 members; the largest has about 5100. Total APS membership is 32,500.

The Committee took the following actions:

1. The Division should publish a History of Physics Newsletter, to be distributed free of charge to all members of the Division. Non-members may subscribe at a sufficient to cover the cost of printing and mailing.

Stephen G. Brush was appointed Editor of the Newsletter, for a term concurrent with his term as Secretary-Treasurer of the Division; he will appoint an Associate Editor(s).

2. We should offer free subscriptions to a few historians of physics in foreign countries who are willing to contribute on a regular basis news of meetings held in their countries, and especially to provide English-language summaries of important publications in other languages. A list of these "foreign correspondents" would be published once a year.

3. An early issue of the Newsletter should list history of science societies and journals publishing articles on history of physics.

4. The Division should encourage the writing of popular articles on history of physics for newspapers, as well as articles suitable for Physics Today and The American Journal of Physics. We should encourage interaction with the science writers association to implement the first suggestion. Further discussion of Divisional publications is postponed to next year's meeting; suggestions from members of the Division are welcome.

5. The annual "regular meeting" of the Division, which includes the Annual Business Meeting and the Executive Committee meeting, shall be held in conjunction with the Washington-Baltimore "spring" meeting of APS. The Division shall sponsor at least one session of invited papers at the "annual" meeting of APS in January, poossibly to be arranged in cooperation with AAPT.

6. The Chairperson shall appoint the Program Committee, which shall consist of him/herself, at least one other member of the Executive Committee, and at least two other members of the Division. All members of the Division are encouraged to transmit suggestions for invited papers to the Program Committee.

It was suggested that distinguished physicists be invited to present their recollections, on a theme such as "how do you think now that it was then" as part of the sessions of invited papers; each should be allowed 45 to 60 minutes with ample time for questions, and a tape recording should be made.

No action was taken on a proposal to sponsor sessions of contributed papers, but this may be brough up for consideration at a future Executive Committee meeting.

7. In allocating the Division's funds, the highest priority should be given to publication of the Newsletter; second to grants for non-members invited to speak at sessions; third to grants for officers to attend meetings of the Executive Committee.

The following agenda items were postponed to the next meeting: meetings of the Division separate from APS meetings, with other societies; book prize.

EDITORIALS

Center for History of Physics

The Executive Committee of the History of Physics Division, in approving the establishment of HPN, specified that it would complement rather than compete with the excellent newsletter already being published by the Center for History of Physics. We urge our readers to get on the mailing list for this Newsletter and to support the Center (see below, p. 10).

Grants

Several government agencies have expressed concern about the decreasing number of proposals for research grants in the past year. This decrease is probably caused by researchers' uncertainty about availability of funds in the light of well-publicized cutbacks in the budgets of the agencies, but in fact it may represent an over-reaction. There are no longer enough good proposals in some areas to use the money which is still available, and this fact may provide justification for further budget cutbacks. History and Philosophy of Science (HPS) is one program at NSF which has avoided this problem for the moment by initiating and publicizing small grants in place of the larger grants available in the past (see below); as a result HPS is one of the handful of programs that have maintained a respectable number of proposals.

History of Science Society

The APS History of Physics Division does not compete with other societies which include history of physics, but wants to cooperate with them. In particular, the History of Science Society has for many years provided the major forum for discussion of current research in history of physics at its Annual Meeting. This year, 20 papers of interest to historians of physics will be presented at the October meeting in Philadelphia (see below, p.6) We urge all members of the Division to join the History of Science Society and participate in its activities; membership includes subscription to Isis and to the Newsletter (see below, p. 12).

ANNOUNCEMENTS

New Book Series
(information from Katherine Sopka)

Tomash Publishers of Los Angeles will soon begin publication of a series of works concerned with the history of physics between 1800 and 1950. Advisory Editors for this undertaking are Gerald Holton and Katherine Sopka. They have been assisted by an Editorial Board composed of Stephen Brush, Roger Stuewer, Spencer Weart and John Wheeler.

The Editors have included works of primary scholarship, contemporary surveys, textbooks, lectures and biographies. Also included are works that focus on social and institutional aspects associated with the growth of physics. The formats include original monographs, anthologies of articles about specific topics, revised and enhanced dissertations and long out-of-print "classic works."

It is expected that these works will be valuable to a variety of readers, including established physicists and newcomers to the field as well as general historians and historians of science and educated laymen concerned with understanding a science that is an integral part of our 20th century culture.

Publication of the first four volumes in this series is anticipated for late 1982. They include a new edition of Alsos by S. A. Goudsmit; a history of the Los Alamos Laboratory written internally in the mid-1940s and now published for the first time in book form; an anthology of articles dealing with the evolution of atomic theory, edited with an Introduction by Mary Jo Nye; and the revised dissertation of Albert Moyer on conceptual shifts in late 19th century physics in America.

Readers wishing further information on this series at this time may contact Adele Clark, Managing Editor, Tomash Publishers, P. O. Box 49613, Los Angeles, CA 90049 or Dr. Katherine R. Sopka, 1611 Forest Avenue, Durango, CO 81301.

Berkeley Papers in History of Science
(information from J. L. Heilbron)

To expedite work in history of science and technology and to stimulate exploration of untended ground, the Office of History of Science and Technology (OHST) publishes the series Berkeley Papers in History of Science (BPHS): bibliographies, inventories, and finding aids to published and unpublished sources. Our current list contains, in addition to the publications of the Inventory of Sources for History of Twentieth-Century Physics, bibliographies on more specialized topics (quantitative studies on science and its history; early modern algebra; correspondence of Laplace), and a continuing series on the nontechnical writings of leading scientists (Planck, W. H. & W. L. Bragg, Rutherford, Heisenberg). The latter class of writings is usually omitted from official bibliographies; we emphasize it as valuable documentation of the routes and methods by which prominent scientists communicate with audiences beyond their fellow specialists. Future bibliographies in this series will treat the nontechnical works of Louis de Broglie, Max von Laue, Erwin Schrodinger, and J. J. Thomson.

Other publications in the series include Literature on the History of Physics in the 20th Century and An Inventory of Published Letters to and From Physicists.

The books we publish are composed by us using equipment for computer typesetting available through the University of California. Considerable savings are realized in comparison to conventional publishing practices. We shall be pleased to consider for publication any competent work suitable to our program of bibliography and documentation. Interested authors are urged to write to the director of OHST, J. L. Heilbron, (Office for History of Science and Technology, 470 Stephens Hall, University of California, Berkeley, CA 94720) before completing their final texts.

Essay Prize

The St. Louis Journal of Philosophy offers a $50 prize for the winning essay on the philosophical problems of scientific knowledge. Topics can include both contemporary issues and figures, as well as historical problems. Papers should not exceed 20 typed, double-spaced pages. Two copies must be submitted by Sept. 30, 1982, to the Editor, Department of Philosophy, St. Louis University, St. Louis, Missouri 63103. For purposes of blind reviewing, author's name and institution should appear only on a detachable cover sheet.

Smithsonian Exhibits

(information from Paul Forman)

A small exhibit on "The Fall of Parity" opened this spring in the Smithsonian's National Museum of American History (formerly Museum of History and Technology) for the 25th anniversary of the discovery that parity is not conserved in weak interactions. The centerpiece of the exhibit is the original apparatus of Wu, Ambler, Hayward, Hoppes, and Hudson, to observe the asymmetric beta decay of polarized nuclei, as recently restored at the National Bureau of Standards. The text and illustrations accompanying the apparatus have been assembled as an article in the May 1982 issue of The Physics Teacher (pp. 281-88).

An exhibit on the historical development of atomic clocks is in preparation in the same museum, and will open early in December. A "preview" was presented by the curator for physics, Paul Forman, to the Annual Symposium on Frequency Control on June 3rd, and a brief account will appear in its Proceedings, published by the Electronic Industries Association, 2001 Eye Street, Washington, DC 20006.

CONFERENCES

History of Science Society

A joint meeting of the History of Science Society, the Philosophy of Science Association, the Society for the History of Technology, and the Society for Social Studies of Science will be held in Philadelphia, October 27-31.The program of the History of Science Society includes the following papers:

Lindberg, David (Wisconsin) "Johannes Kepler and the Medieval Optical Tradition"
Osler, Margaret (Calgary) "Gassendi, Descartes, and the Foundations of the Mechanical Philosophy"
Hatfield, Gary (Johns Hopkins), "First Philosophy and Natural Philosophy in Descartes"
Garber, Daniel "Descartes, Leibniz, and the Metaphysical Foundations of Mechanism"
Guerrini, Anita (Indiana) "Keill, Freind, and the Theory of Matter in the early 18th Century"
Heilbron, John (California, Berkeley) "Writing the History of Modern Physics from Both Ends"
Hofmann, James (Pittsburgh) "Ampere's Early Discoveries in Electrodynamics"
Good, Gregory (Smithsonian) "Geomagnetics and Scientific Institutions in Antebellum America"
Hunt, Bruce (Johns Hopkins) "The Maxwellians"
Channel, David (Texas, Dallas), "Energetics as a Model for 19th-Century Engineering Science"
Rosenberg, Robert (Johns Hopkins) "Physicists and Engineers at the Birth of a Discipline: Electrical Engineering Education"
Kline, Ronald (Wisconsin) "Science and the Engineer: The Work of Charles Proteus Steinmetz"
Brattain, James (Georgia Institute of Technology) "The Alexanderson Alternator: an Encounter between Radio Physics and Electrical Power Engineering"
Klein, Martin (Yale) "Lives in Science"
Friedman, Robert (Oslo, Norway), "Experimentalism and Resistance to Theory: Swedish Physics and the Early Nobel Prizes"
Crawford, Elisabeth (EHESS-CNRS, Paris), "Atomic Hypotheses and the Nobel Prizes before the First World War"
Hufbauer, Karl (California, Irvine),"Astrophysics: From Observational Program to Interpretative Subdiscipline"
Rabkin, Yakov (Montreal) "Infrared Spectroscopy and Technological Innovation in Science"
Henriksen, Paul (Illinois) "The MIT Radiation Laboratory and Solid State Physics, 1940-45"
Szymborski, Krzystof (Illinois) "Imperfect Crystals and the Development of Solid State Physics"

For further information see the History of Science Society Newsletter, July 1982, or contact the Secretary of the Society, Dr. Audrey Davis, National Museum of Natural History, room 5000, Smithsonian Institution, Washington, DC 20560 (202-357-2274).

Public Policy

The Committee on Education of the History of Science Society will sponsor a session on "History of Science and Public Policy at the annual meeting in Philadelphia. The session is arranged and chaired by Stanley Goldberg (Hampshire College). Participants will explore the import of and prospects for the recent marriage of programs in the history of science with disciplines such as sociology, political science, and government. Do these developments herald a new age of relevance for the history of science or are they simply old wine in new bottles?

Participants include Seymour Mauskopf (Duke), Abbe Mowshowitz (RPI), Bill Wimsatt (Chicago). and Theodore Brown (Rochester).

The session is scheduled for Friday 4 p.m., October 29. For further information contact Stanley Goldberg, Hampshire College, Amherst, MA 01002 (413/549-4600 ext. 396).

Joint Atlantic Seminar

The next meeting of the Joint Atlantic Seminar in the History of Physical Sciences is tentatively scheduled to be held jointly at the Smithsonian Institution and Georgetown University in Washington, D. C., on April 8 and 9, 1983. For information contact one of the following: Marc Rothenberg, Joseph Henry Papers, Smithsonian Institution, Washington, D. C. 20560; Kathryn Olesko, Dept. of History, Georgetown University, Washington, D. C. 20057.

Geology

The History of Geology Division of the Geological Society of America is organizing a symposium on the "Evolution of Geological Concepts in the Northeast," to be held at Kiamesha Lake, New York, March 23-25, 1983. For information contact William M. Jordan, Department of Earth Sciences, Millersville State College, Millersville, PA 17551.

GRANTS AND FELLOWSHIPS

A comprehensive listing has recently been published by Lisa Buchholz and Melinda Thomas, "Guide to Fellowships and Awards in Science and the Humanities," Science, Technology & Human Values, No. 39 (Spring 1982), pp. 44-62. Copies may be ordered from Melinda Thomas, Production Editor, STHV, Room E51-008, Massachusetts Institute of Technology, Cambridge, MA 02139. In this section of HPN we will mention only a few examples of grants and fellowships available for research in history of physics.

American Council of Learned Societies

Fellowships and Grants awarded by the American Council of Learned Societies in June 1982 included the following:
Kargon, Robert H. (Johns Hopkins), "Lord Kelvin's Baltimore Lectures and the discipline of physics in America"
Peterson, Willard J. (Princeton), "Chinese knowledge of the physical world in the 16th and 17th centuries"

National Science Foundation

The History and Philosophy of Science Program in the National Science Foundation has initiated two new classes of awards:

1. A Summer Scholars Award consisting of awards up to $6000 for partial support of full time summer research and/or related costs;
2. A NSF Scholars Award consisting of awards up to $25,000 for partial support of one or more semesters of full time academic year release time and related expenses.

Funds may be used to defray any normally allowable costs of the research; indirect costs may be recovered at the option of the grantee. Awards will be made on a fixed amount basis subject to the conditions of the grant instrument; they are not subject to Federal cost principles, e. g. OMB Circular A-21.

For further information contact Dr. Ronald J. Overmann, Program Director, History and Philosophy of Science, National Science Foundation, 1800 G Street, N. W., Washington, D. C. 20550. Tel. (202) 357-9677.

NSF-HPS Panel

The NSF History and Philosophy of Science panel subcommittee currently consists of the following members: Ronald N. Giere (Indiana University), Frederic L. Holmes (Yale), David Hull (University of Wisconsin, Milwaukee), Ernan V. McMullin (University of Notre Dame), Charles Rosenberg (University of Pennsylvania), Edith Sylla (North Carolina State University), Bas C. Van Fraassen (Princeton), and Spencer R. Weart (Center for History of Physics).

NSF-HPS FY 81 Grants

The NSF History and Philosophy of Science grants awarded in FY 1981 included the following:

Channell, David F. (Texas at Dallas) "The Development of the Engineering Science of W. J. M. Rankine)
Grant, Edward (Indiana) "Scientific Inertia: A study of Resistance to Theoretical Change in the History of Cosmology"
Heilbron, John L. (California, Berkeley) "Inventory of Sources for the History of 20th Century Physics"
Heilbron, John L. (California, Berkeley) "The Institutionalization of Physics"

Hufbauer, Karl (California, Irvine) "The Stellar -Energy Problem, 1919-1939"
Jenkins, Reese V. (Rutgers) "Thomas A. Edison Papers"
Kochen, Simon (Princeton) "Foundations of Quantum Mechanics"
Lindberg, David C. (Wisconsin, Madison) "Theories of Causation and the Physics of Light"
McGuire, James E. (Pittsburgh) "Metaphysics of Nature: Theories of Space, Time, Matter and Motion"
Sabra, A. I. (Harvard) "The Development of Optics as a Science"
Servos, John W. (Princeton) "A Scientific Discipline in the American context: Physical Chemistry, 1890-1930"
Siegel, Daniel M. (Wisconsin, Madison) "Scientific Journal Articles as Unit Contributions to Specialties and Disciplines: Case studies from the History of Physics, 1938-1960"
Teller, Paul (Illinois, Chicago Circle) "Critical Examination of the Projection Postulate of Quantum Mechanics"
Truesdell, Clifford A. (Johns Hopkins) "Intellectual Foundations of the Science of Hydrostatics and Hydrodynamics"
Wallace, William A. (Catholic University), "Foundations of Modern Science"
Weart, Spencer R. (American Institute of Physics) "A History of Solid State Physics"

Rockefeller Archive Center

The Rockefeller Archive Center offers Grants-in-Aid (maximum $1500) for scholars of any discipline whose research requires them to do substantial research at the Center. The deadline for applying for 1983 grants is December 31, 1982. Requests for application forms and for Archives and Manuscripts in the Rockefeller Archive Center, a brief description of the collections that are open for research, should be addressed to Director, Rockefeller Archive Center, Pocantico Hills, North Tarrytown, NY 10591 (914/631-4505).

Those receiving grants in 1982 included Finn Aaserud (Niels Bohr Institute, Denmark) "Niels Bohr's Institute takes up nuclear physics, circa 1930-1945" and Judith Goodstein (California Institute of Technology), "A History of California Institute of Technology."

Smithsonian

Every year the Smithsonian Institution awards several predoctoral and postdoctoral fellowships for research to be conducted at the National Museum of American History, the Air and Space Museum, Joseph Henry Papers and other museums in Washington, DC, for periods from 6 to 12 months. There are usually 5 or 6 each year in the area of history of science and technology. Deadline for applications is January 15 for fellowships to start after May 1 of the same year. Applicants should write to the Office of Fellowships and Grants, Smithsonian Institution, Washington, DC 20560 (phone 202/287-3271) for details, and should also request a copy of the booklet, Smithsonian Opportunities for Research and Study. Any staff member of the Smithsonian (as listed in this booklet) may then be contacted for information about special facilities available.

JOBS

Amherst

Amherst College seeks to make a tenure-track appointment at the assistant professor level in the History of Science effective in AY 1983-84. Applicants prepared to offer courses in the history of modern science, including its social context, will receive the most favorable consideration. Effectiveness in undergraduate teaching, willingness to participate in departmental and interdepartmental courses and strong scholarly promise are essential. Thesis completion by September 1983 required. Tentative application deadline: Oct. 15, 1982. Contact History of Science Search Committee, Department of History, Amherst College, Amherst, MA 01002.

Bakken Library

The Bakken Library of Electricity in Life, a rare book collection and museum specializing in the history of bioelectricity, seeks a Director with strong experience in library/museum development. The Director is responsible for supervising an annual budget of approximately $350,000 and a full-time staff of three plus part-time employees, developing and promoting the Library's rare book and instrument collection, administering fellowship programs, program development, publicity, and fundraising. Salary negotiable. Send resume and names of at least 3 references to Chairman, Search Committee, Bakken Library of Electricity in Life, 3537 Zenith Avenue South, Minneapolis, MN 55416.

The Library is an independent private operating foundation and an equal opportunity employer.

California, Davis

The University of California at Davis seeks a Visiting Lecturer/Professor in History and Philosophy of Science for the winter and spring quarters, 1983. Ph. D. prior to application required. Appointment will be made at level of Assistant or Associate Professor, depending on candidate's qualifications. Salary range: $7,233-$9,999/quarter. Courses to be taught: history of biological science; history of physical sciences; philosophy of biology; and one course in area of specialty. Apply to W. H. Bossart, Chair, Committee on History and Philosophy of Science, Philosophy Department, University of California, Davis, CA 95616. Deadline: Oct. 1, 1982.

Maryland

The University of Maryland at College Park announces a possible position in the history of technology and/or science, to be funded if a highly-qualified candidate can be found. Requirements include research publications of outstanding quality, and teaching experience in a variety of courses. The appointment would be in the Department of History and would include participation in the graduate program of the Committee on History and Philosophy of Science. Rank, salary, and date of appointment are open. College Park is located within a few miles of the Library of Congress, the Smithsonian Institution, and other major research collections.

The University of Maryland is an Equal Opportunity/Affirmative Action employer. Qualified women and minorities are urged to apply. Contact: Stephen G. Brush, Department of History, University of Maryland, College Park, MD 20742.

Editor's Note: In addition to the usual announcements of positions in history of science, we would like to publicize positions in physics departments where a candidate with a strong background in history of physics would be especially welcome. Chairs of departments and search committees are urged to send notices of such positions.

OBITUARIES

Brown

Sanborn Conner Brown, professor of physics emeritus at MIT, died 28 November 1981. He was known for his research in plasma physics and for his international activities in physics education, and to historians of physics for his work on Count Rumford. In addition to three biographical works he edited the reprint of Rumford's Collected Works.

Nicolson

Marjorie Hope Nicolson, a scholar known for her pioneering works on the relations between science and literature, died 9 March 1981. Of special importance to the history of physics and its cultural influences was her book Newton Demands the Muse: Newton's Opticks and the Eighteenth Century Poets (1946). An Eloge appears in Isis, 1982, 73: 98-99.

PERSONALIA

Fowler

William A. Fowler, Institute Professor of Physics at Caltech and member of the Division's Executive Committee, retired in June 1982; during the past year he has been awarded honorary degrees by the Universite de Liege, the Observatoire de Paris, and Denison University.

The Halls

Marie Boas Hall and A. Rupert Hall, who recently retired from the University of London, were awarded the Sarton Medal for 1981. This medal is awarded annually by the History of Science Society in recognition of the distinguished contributions of an entire career. Among their major publications relating to the history of physics are "The Establishment of the Mechanical Philosophy" by Marie Boas (Hall), Osiris, 1952, 10: 412-541, and From Galileo to Newton 1630-1720 by A. Rupert Hall (1963). In recent years the Halls have pursued a major joint project, an edition of the correspondence of Henry Oldenburg who served as the center of communications among scientists in the 17th century. The citation for the Sarton Medal is in Isis, 1982, 73: 266-68.

Holton

Gerald Holton, Professor of Physics at Harvard and member of the organizing committee of the Division, delivered the Tenth Jefferson Lecture in the Humanities on May 11, 1981, in Washington, DC (also presented in Boston, May 13, 1981). The invitation to give thge Jefferson Lecture is the highest honor that the United States Government confers for achievement in the humanities; Holton was the first natural scientist to receive this honor. An account of the lecture - "Where is Science Taking Us?" - together with a biographical sketch, appeared in the Chronicle of Higher Education, 18 May 1981, pp. 3-4. Holton is also President-Elect of the History of Science Society.

Westfall

Richard S. Westfall, Professor of History of Science at Indiana University, received the 1981 Leo Gershoy Award of the American Historical Association for his book Never at Rest: A Biography of Isaac Newton (Cambridge University Press, 1980). The citation for the award is in the AHA Newsletter, Feb. 1982, 20, no. 2: 12. Reviews have appeared in Isis, 1982, 73: 100-7 and elsewhere.

QUERIES

Book

Please recommend a short introductory book on the history of physics, either for a student or for a physicist with no historical background. Explain in 25 words or less why you recommend the book.

Eddington quote

What is the original source of the following quotation? It (or something like it) is frequently attributed to A. S. Eddington.

"Never trust a fact (or observational result) unless it is supported by a theory."

(Editor's Note: queries and replies to queries are welcome for publication in this section.)

REPORTS

The AIP Center for History of Physics
by Spencer Weart

Until the establishment of the Division of History of Physics, the only institution dedicated exclusively to this area was the Center for History of Physics at the American Institute of Physics. From its location at the AIP headquarters building in New York City, the Center has been working for over twenty years to preserve and make known the record of physics and its relations to society. The Center's Niels Bohr Library contains a fine collection of books on the subject, a file of over 15,000 photographs of physicists and astronomers, and many other materials. However, the Center is perhaps best known for its projects to actively save and make use of original materials.

Oral history interviews are a Center specialty, and it is recognized as a pioneer in such work. Extensive interviews have been tape-recorded with some 400 eminent scientists in such areas as quantum physics, nuclear physics, and astrophysics. Currently such work is underway for solid-state physics, in cooperation with teams in England and in cooperation with teams in England and Germany. Another area where the Center has broken new ground is the preservation of documents, such as correspondence and other unpublished materials. The Center is now in the last stages of a four-year program to help the Department of Energy identify and save the main historical records of its great national laboratories. The Center does not normally gather documents for itself (except copies on microfilm), but aids physicists in preserving them in the most appropriate repository; however, the Niels Bohr Library serves as an archives of last resort, and is itself the most appropriate repository for certain materials, such as the records of the American Physical Society. Besides helping to preserve papers, the Center seeks information on their location. The cardfile National Catalog of Sources for History of Physics and Astronomy is the first place a historian should check to find information on where a given physicist's correspondence may be found.

The Center works actively not only to help scholars and educators, but also on its own, to make the history of physics known. The

travelling Einstein Centennial exhibit, seen by several million people in the United States and abroad, is a recent example. Center staff also conduct historical and archival research, give talks, and publish papers and books.

The Center's core staff is supported by the AIP as a regular division of the Institute. Much of the work, including all special projects, also requires outside funding, and this has often been provided by government foundations and private donors. With the cutbacks in federal spending, an increasingly valuable source of support has been the annual donations from over a thousand Friends of the Center for History of Physics; the Friends have also established a substantial Endowment Fund. Important areas of Center work would be impossible without this help.

The Center publishes a Newsletter twice a year, available free for the asking. Anyone interested in the history of physics is invited to request it. For this and other inquiries address Spencer Weart, Director, or Joan Warnow, Associate Director, Center for History of Physics, American Institute of Physics, 335 East 45 Street, New York, NY 10017.

1982 Joint Atlantic Seminar
by Tom Archibald

The Joint Atlantic Seminar in the History of Physical Sciences was held this year from April 15-17 at the Institute for the History and Philosophy of Science and Technology, University of Toronto. This annual seminar functions as a forum for graduate students and postdoctoral fellows in the history of science. In addition "keynote" addresses are given by invited speakers, who this year were Norton Wise (UCLA) and Erwin Hiebert (Harvard). In all ten speakers gave reports on their recent research, which ranged widely over topics in the history of 19th and 20th century physics and physical chemistry in Europe and North America. The talks varied greatly in historiographic approach, some devoting considerable attention to scientific detail, others concentrating on social or philosophical considerations.

Next year's meeting will be held jointly at the Smithsonian Institution and Georgetown University, and is tentatively scheduled for April 8 and 9, 1983.

Solar-Terrestrial Relationships
by David Stern

A session "History of Research in Solar-Terrestrial Relationships," organized by the Committee on History of Geophysics (see below) was held at the Spring meeting of the American Geophysical Union in Philadelphia, June 2, 1982. James Dungey (Imperial College, London) spoke on "Early History of Magnetic Reconnection," a subject in which he personally played a major part. Magnetic reconnection is the flow of plasma through points or lines at which B=0 and seems to be a key factor in magnetospheric dynamics. Alv Egeland (University of Oslo) spoke about "Kristian Birkeland (1867-1917): Pioneer of Space Physics." He recounted Birkeland's early experiments with electron beams and magnetized terrellas inside vacuum chambers, and his studies of the magnetic perturbations associated with the polar aurora, studies whose full significance was not appreciated until many decades later. Arthur Hundhausen (High Altitude Observatory, Boulder) presented "M regions revisited." He reviewed the long search for sources of recurrent magnetic storms, associated with sunspot-free solar regions, from Chree's statistical studies early in this century to Skylab's observations, which pointed to "coronal holes" as the answer. Kenneth Franklin (Hayden Planetarium, New York), a co-discoverer in 1955 of Jupiter's radio emissions, gave an account of that discovery, and Arthur Few (Rice University, Houston) spoke on "Franklin's legacy to cloud electricity," a subject rather appropriate to the host city. Abstracts and other details appear in EOS, vol. 63, p. 412 (May 4, 1982).

Geophysics

The American Geophysical Union has established a Committee on the History of Geophysics, chaired by David P. Stern (Goddard Space Flight Center, Greenbelt, MD.) The aims and plans of the Committee are described in an Editorial in EOS, Vol. 63, no. 4 (4 May 1982), p. 259. It sponsored a session on "History of Research in Solar-Terrestrial Relationships" at the AGU meeting in Philadelphia, June 2, 1982 (see above item for program). Persons interested in participating in the activities of the Committee should contact its secretary, James R. Heirtzler, Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

History of Earth Sciences Society

The History of Earth Sciences Society (HESS) is currently being formed. The aim of the Society is to fond a worldwide organization of those interested in the history of the earth sciences regardless of their original discipline. Both history and earth sciences are construed broadly. The immediate objective of HESS is to launch a journal. Manuscripts have been received for a first issue to be printed this fall (edited by Gerald M. Friedman, RPI) and it is hoped that in the following years spring and fall issues will be published. President for 1983 will be David B. Kitts (Oklahoma).

Membership dues for HESS are $15.00 and entitle members to the journal; library and institutional subscription rate is $20 annually. Checks may be made payable to HESS and sent to: E. L. Yochelson, E-501, Museum of Natural History, Washington, DC 20560. Arrangements have been made for residents of Canada and the United Kingdom to pay dues in local currency.

Center for History of Chemistry

A Center for the History of Chemistry has been established at the University of Pennsylvania in Philadelphia. It is jointly sponsored by the American Chemical Society and the University of Pennsylvania. Arnold Thackray, a professor of history and sociology of science at the University, has been nominated for the directorship of the Center. For further details see the article by James H. Krieger, "Center for History of Chemistry under way," Chemical and Engineering News, May 10, 1982 (vol. 60, no. 19), pp. 44-48.

Einstein Papers

According to an article by Walter Sullivan in the New York Times, 29 June 1982, pp. C1, C5, "After more than a decade of preparation, controversy and costly litigation, the project to publish all of Albert Einstein's papers in 20 volumes is moving ahead, thanks in part to a $1 million donation from Harold W. McGraw, Jr., chairman and chief executive officer of McGraw-Hill, Inc., the publishers." The first volume of the papers has been prepared for publication by Princeton University Press under the editorship of John J. Stachel.

But, according to an AP dispatch published in the Washington Post, 20 July 1982, p. B2, "Money problems may delay the long-awaited publication" of the papers; a spokesman for Princeton University Press says its funds for the project will run out in November, after which work could slow drastically. A request for $1.4 million has been submitted to the National Science Foundation in order to continue the project. The project was stalled for nearly five years because of a dispute between the executor of Einstein's estate, Otto Nathan, and the Press.

Another Einstein Controversy

According to an item in Nature (16 April 1981, p. 535) "The German Physical Society (Deutsche Physikalische Gesellschaft) has been shaken by a fierce row over an attack on Einstein" by Albrecht Unsoeld, "Albert Einstein — Ein Jahr danach," published in Physikalische Blaetter, the Society's membership journal (vol. 35, pp. 337-39, November 1980). "Unsoeld says that Einstein had run out of new ideas by the age of 45, for which reason he turned his attention to public affairs and in particular to 'Jewish nationalism'... He goes on the urge sympathy for those physicists who stayed behind in Germany after the arrival of Hitler." Following a "torrent of protests" against the article, the president of the DPG, Horst Rollnik, dissociated himself from Unsoeld's views and admitted that the article contained inaccuracies (Phys. Bl., March 1981, 37, nr. 3, p. 65). He promised that the journal would carry an article by an historian of science dealing with Einstein's links with Germany; this promise was presumably fulfilled by the publication of Armin Hermann's article "Einstein und kein Ende," Phys. Bl., Feb. 1982, 38, nr. 2, pp. 36-41.

SUMMARIES

Authors of books and articles on the history of physics are invited to send summaries for publication in this section. Maximum lengths: 100 words for articles, 200 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 publisher, and give the price in U. S. dollars including cost of mailing (if applicable). We can also publish summaries of papers presented at meetings if the author is willing to distribute preprints; otherwise, if copies are not available but the author is willing to correspond with others about the research, a summary may be submitted for the "Work in Progress" section.

The response to our initial request for summaries was so enthusiastic that we have more than there is space to publish in our first issue. Summaries received by August 1982 but not published below will appear in the next issue.

We welcome opinions from readers about this section (is it too long? is the print too small to read? etc.)

Euclid's Optics

BROWNSON, C. D. Euclid's Optics and its Compatibility with Linear Perspective. Archive for History of Exact Sciences, 1981, 24: 165-94.

Euclid's Optics and linear perspective are geometrical systems which give an account of the presentation of appearances to a fixed observation point. An influential tradition holds that Euclid's Optics and linear perspective conflict. In Parts 1-3 of this article, the Definitions, Propositions central to the Optics, and those which diverge, are analyzed in relation to visual perception and linear perspective. In Part 4 Proposition 8, which Panofsky has asserted is in direct conflict with linear perspective, is shown to be compatible with it. Two further types of argument for the incompatibility of the geometries are briefly discussed. The conclusion is that, though these two geometries of appearances are directed toward different applications and so emphasize different aspects of the geometry, they do not conflict.

For reprint write to C. D. Brownson, Department of Philosophy, SUNY, Fredonia, NY 14063.

Free Fall

SARDELIS, D. A. The Law of Free Fall: Myth and Historical Reality. Fundamenta Scientiae, 1981, 2, no. 2: 163-83.

An investigation is made of the way in which the Galilean revolution came about historically by submitting to a critical analysis the two prevailing views on ow the law of free fall was discovered, i. e. the empiricist and the idealistic-rationalistic views. It is thus shown that this so well known discovery is mostly mystified but very little understood. By then re-tracing the essentials of Galileo's early work, also giving some almost-self-evident of its consequences, a very plausible direction is found for solving the problem, and a third viewpoint on scientific discovery, the dialectical one, thus emerges.
For reprint write to D. A. Sardelis, University of Crete, Physics Department, Iraklion, Crete, Greece.

Mach on Galileo

GOE, GEORGE. Concerning a Criticism of Galileo by Mach. Scientia, 1981, 116: 93-99.

In his Discorso intorno a due nuove scienze, Galileo lets Salviati argue a priori against the hypothesis that the velocity of a body falling freely increases in proportion to the distance covered. This argument of Galileo has been repeatedly criticized. In particular, Mach asserts that the hypothesis that Galilei rejects a priori is contrary to experience but not at all selfcontradictory. In the article it is argued that, even though the argument made by Galileo in the Discorsi is defective, the hypothesis that he rejects is selfcontradictory, and a supposition is made on how Galileo may have reached his conclusion.

For reprint write to G. Goe, Facolta di Scienze, 38050 POVO (Trento), Italy.

Galileo on Hydrostatics

DRAKE, STILLMAN. Cause, Experiment, and Science: A Galilean Dialogue... xxix + 237 pp. Chicago: University of Chicago Press, 1981. $20.

Galileo's first book on physics dealt with hydrostatics (1612). In it he derived the Archimedean principle from mechanical postulates and applied it to the anomalous floating of lamina denser than water as well as to the hydrostatic paradox. It is here translated in the setting of an imaginary discussion of the scientific issues by Galileo's friends and opponents and 1613. An introduction provides the contemporary background of philosophical opposition, and an appendix outlines the history of hydrostatics up to Galileo's toime. The translation is set in distinctive type; the accompanying dialogue is based on books published against Galileo's book and his replies, partly edited and published by Benedetto Castelli in 1615. Galileo's design and use of experiments is more prominent in this early work than in his later books on motion and strength of materials.

Galileo on Tides

MERTZ, DONALD W. The Concept of Structure in Galileo: Its Role in the Methods of Proportionality and Ex Suppositione as Applied to the Tides. Studies in History and Philosophy of Science, 1982, 13: 111-31

This paper focuses on the form and integration of Galileo's two methods of proportionality and Ex Suppositione. The latter, though known in general outline, has been disputed in detail. Here I argue for a particular form and its being an application of a causal maxim Galileo accepts as an indubitable principle of "physical logic." The analysis further reveals a generalization arising from Galileo's use of structure as the basis of his efficient and formal causal explanations. Viewed from the perspective of comparing structures, the method of proportionality which I outlined in a previous article (ibid., 1980, 11: 229-42) is here made more perspicuous. I conclude by attempting to point out the implicit role of the concept of structure and a related causal principle in Galileo's understanding of sense qualities.

No reprints available. Author's address: D. W. Mertz, Philosophy Department, Saint Louis MO 53103.

Magnetic Cosmology

BENNETT, J. A. Cosmology and the magnetical philosophy, 1640-1690. Journal for the History of Astronomy, 1981, 12(3): 165-77.

It is argued that in 17th-century England discussion of attractive influences in the cosmos, that derived from the work of William Gilbert, formed an important alternative attitude to material action to that of the mechanical philosophy, and is an important element in the explanatory background to the emergence of Newton's Principia.

For reprint write to J. A. Bennett, Whipple Museum of the History of Science, Free School Lane, Cambridge CB2 3RH, England.

Was Newton Poisoned?

BROAD, WILLIAM J. Sir Isaac Newton: Mad as a Hatter. Science, 1981, 213: 1341-42, 1344.

Historians spin complex theories to explain Newton's year of lunacy, but hairs from his head tell a simpler story: mercury poisoning.

LAKER, MARTIN R. Newton's Malady. Science, 1982, 215: 1185-86.

In response to Leonard Goldwater's letter (ibid., 1981, 214: 72) the author defends the conclusion that Newton suffered from mercury poisoning as suggested by the work reported in Broad's article (above).

Physics & Religion

FORCE, JAMES E. Secularisation, the Language of God and the Royal Society at the Turn of the Seventeenth Century. History of European Ideas, 1981, 2(3): 221-35.

In this paper, the author is not primarily concerned with the history of physics so much as with the process whereby physics, in the late 17th and early 18th centuries, is abstracted from a still potent religious context. By focusing on the free-thinking, deistic opposition, within the Royal Society itself, to the Newtonian synthesis of science and religion at this time, the author seeks to clarify what counts as evidence for secularization in this context while also illustrating the complexity and gradual nature of this change.

For reprint write to J. E. Force, Department of Philosophy, University of Kentucky, Lexington, KY 40506.

18th Century

HEILBRON, JOHN L. Experimental Natural Philosophy. In The Ferment of Knowledge, Studies in the Historiography of 18th Century Science. G. S. Rousseau & R. Porter, Eds. New York: Cambridge University Press, 1980. Pp. 357-87.

After indicating earlier efforts to give a character to 18th-century physics, I adopt as implicit definition the coverage and method of Pieter van Musschenbroek's Introductio ad philsophiam naturalem. Compelling reasons for the choice are given. The proportions of space allotted by Musschenbroek to the several branches of physics differ from the distribution of effort of recent historians, as measured by the subjects of articles on 18th-c physics noticed in the bibliographies of Isis and of the DSB. In particular, we give more attention to electricity than he did. Reasons for the discrepancy are offered. I then recite lessons derived from the study of the history of electricity, suggest extensions to other parts of physics, and list desiderata for further work.

Author's address: J. L. Heilbron, Office for History of Science and Technology, University of California, Berkeley, CA 94720.

Mechanics

GRIGORYAN, A. T. The Chief Stages in the Evolution of Mechanics in Russia. Janus, 1981, 68: 27-32.

Author's address: Institute of the History of Science and Technology, Staropanskii per. 1/5, 103012 Moscow K-12, U.S.S.R.

Ether

CANTOR, G. N.; M. J.S. HODGE (eds). Conceptions of Ether: Studies in the History of Ether Theories, 1740-1900. x + 351 pp. New York: Cambridge University Press, 1981. $55.00

As E. T. Whittaker showed in the first volume of his A History of the Theories of Aether and Electricity (1910), ether theories played an important role in the physical theorising of the 18th and 19th centuries. The present book, consisting of an intrdouction and the previously unpublished essays by different authors, examines the same period in the light of recent historical research. Specific essays concentrate on such issues as Newton's early influence, theories of the electric field before Faraday, early 19th century optical ethers, the ether theories of Thomson and Maxwell, and German concepts of force and ether. Moreover, larger issues such as the increasing mathematisation of ethers in the early 19th century (particularly connected with the rise of the wave theory of light), the connection between ether and matter, and the historical relation between forces, ethers and fields provide recurrent themes in this volume. Several chapters also reflect the recognition that ethers have not only played an important role in physics but also have figured prominently in chemistry and physiology and, more broadly, in theological and philosophical discourse.

The volume, which also contains a select bibliography of secondary works dealing with ethers, was intended for physicists, historians of science and (despite its price) graduate students in the history of science.

18th Century British Ether

HEIMANN, P. M. (now HARMAN). Ether and Imponderables. Pp. 61-83 in G. N. Cantor, M. J. S. Hodge (eds.) Conceptions of Ether. New York: Cambridge Univ. Press, 1981.

This paper provides an account of Newton's ether theory and an analysis of its adoption by natural philosophers in the 1740s. The paper seeks to clarify the manner in which the concept of ether provided the paradigm for the imponderable fluid theories in 18th-century British natural philosophy and chemistry, and to analyse the attempts to formulate a unified theory of ether in which the diversity of phenomena were reduced to the modifications of an ethereal active substance. The paper discusses theories of fire, electricity, phlogiston, light, and heat in terms of the transformation of Newton's theory of ether into the concept of an inherently active substance.

Guerlac Festschrift

WOOLF, HARRY (ed.) The Analytic Spirit, Essays in the History of Science in Honor of Henry Guerlac. Ithaca: Cornell University Press, 1981. 363 pp.

Includes: J. B. Gough, "The Origins of Lavoisier's Theory of the Gaseous State," pp. 15-39; Roger Hahn, "Laplace and the Vanishing Role of God in the Physical Universe," pp. 85-95; David Kubrin, "Newton's Inside Out!: Magic, Class Struggle and the Rise of Mechanism in the West," pp. 96-121. Thomas L. Hankins, "How to Get from Hamilton to Schroedinger with the Least Possible Action: Comments on the Optical-Mechanical Analogy," pp. 295-308; Robert Kargon, "Birth Cries of the Elements: Theory and Experiment along Millikan's Route to Cosmic Rays," pp. 309-25; L. Pearce Williams, "The Supernova of 1054: A Medieval Mystery," pp. 329-49.

Mathematical Physics in France

GRATTAN-GUINNESS, I. Mathematical Physics in France, 1800-1835. In Mathematical Perspectives... Dauben, J. W. (ed.) New York: Academic Press, 1981. Pp. 95-138.

A general introductory survey of the inauguration of the spectrum of subjects known ever since as "mathematical physics." The French were largely responsible for the innovations during this period, when they dominated the scientific world. Attention is given to the educational motivations to some of the innovations; to the division by intellectual interest of the community of about 35 principal figures into two roughly equinumerous groups (the more theoretical, who created most of the new innovations, and most of the the contemporary "mathematical analysis"); and the engineers, anxious to tailor their physics and mathematics to the needs of practical problems.

No reprints available.

GRATTAN-GUINNESS, I. Recent Researches in French mathematical Physics of the early 19th Century. Annals of Science, 1981, 37: 163-90.

A review of six recent books on aspects of French mathematical physics of the period 1800-1830, together with some of the author's own researches based on Paris archival research. Some emphasis is laid on the importance of the polemical atmosphere in which many of the researches were conducted.

For reprint write to I. Grattan-Guinness, Middlesex Polytechnic, Enfield, Middlesex EN3 4SF, England.

Energy

HARMAN, P. M. Energy, Force, and Matter. The Conceptual Development of Nineteenth-Century Physics. ix + 182 pp. Cambridge & New York: Cambridge University Press, 1982.

This book views the period 1800-1900 as a distinctive phase in the conceptual development of physics, bounded by the increasing dominance, from the late 18th century on, of quantification and the search for mathematical laws, together with the emergence of a unified physics based on the programme of mechanical explanation, and by the development in the early 20th century of the quantum and relativity theories. The argument of the book is structured around the major conceptual problems of 19th-century physics: the emergence of energy physics and thermodynamics, the theory of the luminiferous and electromagnetic ether and the concept of the physical field, molecular physics and statistical thermodynamics, and the dominance of the programme of mechanical explanation. Beginning with an account of the transformation in the scope of the science of physics in the first half of the 19th century, this book analyses the key themes that defined the structure of physics in the 19th century, focusing on the status of the concepts of energy, force, and matter in the physics of the period.

Psychosociology of Electromagnetism

CANEVA, KENNETH L. What should we do with the Monster? Electromagnetism and the Psychosociology of Knowledge. Pp. 101-31 in E. Mendelsohn, Y. Elkana (eds.) Sciences and Cultures. Boston: Reidel, 1981.

This paper represents a preliminary attempt at analyzing disparate styles of science into a coherent typology on the basis of two social variables, "group" and "grid." Group refers to the degree to which one's behavior is influenced by the perceived authority of others, grid to the degree of interpersonal role differentiation. These yield four sets of biases corresponding to four distinct styles of science, capturing aspects such as attitude toward abstractness and the handling of anomalies ("monsters"). On the basis of responses to the unexpected discovery of electromagnetism in 1820, the paper identifies four styles of physics in Germany and France and establishes for each a plausible rationale in terms of the social context of the respective scientists as required by group-grid theory.

For reprint write to K. L. Caneva, Department of History, University of North Carolina, Greensboro, NC 27412.

Mathematical Ether

BUCHWALD, JED Z. The quantitative ether in the First Half of the Nineteenth Century. Pp. 215-37 in G. N. Cantor, M. J. S. Hodge (eds.) Conceptions of Ether. New York: Cambridge Univ. Press, 1981.

A brief account of the mathematization by Cauchy and others of Fresnel's model of the ether as a point lattice governed by distance forces.

Author's address: J. Z. Buchwald, IHPST, University of Toronto, Toronto, Ont. Canada M5S 1A1.

Diffusion

KIRSCH, ALBERT S. A Prekinetic explanation of Graham's Law. American Journal of Physics, 1981, 49: 1076.

In the years 1829-1834, Graham's law was first formulated for the velocities of diffusion of two gases into each other; this is the familiar law that the velocities are reciprocally proportional to the square roots of the densities. This law, and its identical companion for the velocities of effusion through a pinhole (verified later), aree often cited as "proof," or at least illustration, of the kinetic-molecular theory. However, as early as 1834, Thomas Thomson offered an explanation of the diffusion law based upon the effusion law predicted from Daniel Bernoulli's hydraulic analogy (not D.B.'s famous kinetic theory) and John Dalton's assumption that "one gas is as a vacuum with respect to another."

Photocopies of the paper, which reproduces Thomson's derivation, are available from A. S. Kirsch, College of Basic Studies, Boston University, Boston, MA 02215.

Clausius on Thermodynamics (1st Law)

YAGI, ERI. The Analytical Approach to Clausius' First Memoir of Mechanical Theory of Heat (1850). Historia Scientiarum, Tokyo, 1981, 20: 77-94.

The first analytical expression for the First Law of Thermodynamics, presented by R. Clausius, is discussed in connection with his conceptual understanding of dQ, heat. It is suggested that Clausius' strong interest in the degree to which dQ differs from a perfect differential, played an important role in his theory.

For reprint write to Prof. Eri Yagi, Institute of Physics, Faculty of Engineering, 2100 Kujirai Kawagoe-shi, 350 Japan.

Clausius on Thermodynamics (2nd Law)

BIERHALTER, GUENTER. Clausius' mechanische Grundlegung des zweiten Hauptsatzes der Waermelehre aus dem Jahre 1871. Archive for History of Exact Sciences, 1981, 24: 207-20.

Den Gegenstand dieser Untersuchung bildet die Clausiussche mechanische Deduktion des zweiten Hauptsatzes der Thermodynamik, zu der Rudolf Clausius durch sein Untersuchungen zum Virialtheorem inspiriert wurde. Dabei wird die bei Clausius zentrale Stellung des von der raeumlichen Anordnung der Molekuele herruehrenden Entropieanteils, der Disgregation, hervorgehoben. Weiterhin ist die von Clausius bei seiner mechanischen Grundlegung des zweiten Hauptsatzes verwendete Variationsmethode eingehender dargestellt. Ein Vergleich der Ausfuehrungen von Clausius mit aehnlichen, von L. Boltzmann 1866 angestellten Ueberlegungen zeigt dann, dass sich die Resultate beider Physiker nahezu decken, soweit sie sich auf die Hypothese eine periodischen Molekularbewegung gruenden. Clausius versucht darueber hinaus zu zeigen, dass auch die Annahme einer innerhalb endlicher Grenzen erfolgenden (stationaeren) Bewegung der Molekuele eine Herleitung des zweiten Waermesatzes gestattet. Es wird jedoch von Bierhalter gezeigt, das diese Hypothese zu keinen eindeutigen Werten fuer Temperatur und Entropie fuehrt.

For reprint write to G. Bierhalter, Rudolf-Poehler-Allee 8, D-7530 Pforzheim, Federal Republic of Germany.

Statistics and Gases

PORTER, THEODORE M. A statistical Survey of Gases: Maxwell's social physics. Historical Studies in the Physical Sciences, 1981, 12: 77-116.

James Clerk Maxwell's application of the normal distribution to the kinetic gas theory, perhaps the first significant use of a probabilistic function to model actual physical processes, was based on a presumption of statistical regularity arising from the writings on social statistics of Quetelet, Buckle, and others. In accordance with this tradition, Maxwell did not conceive in 1859 that his use of mathematical probability implied uncertainty in any of the macroscopic gas law. His later commitment to the view that certain gas laws were only probable developed as a response to the mechanical determinism of certain late-0Victorian spokesmen for science.

For reprint write to T. M. Porter, Division of Humanities and Social Sciences, 228-77, California Institute of Technology, Pasadena, CA 91125.

Recurrence

BRUSH, STEPHEN G. Nietzsche's Recurrence Revisited: The French Connection. Journal of the History of Philosophy, 1981, 19: 235-38.

An understanding of the historical and philosophical significance of Nietzsche's theory of eternal recurrence requires that some attention be paid to contemporary discussions among physicists and mathematicians of the recurrence of states of a mechanical system. Poincare's theorem (1889) was used by Zermelo (1896) to criticize not only the kinetic theory of gases but the mechanical world-view in general. Nietzsche misunderstood the relation between this world-view and the heat death.

For reprint write to S. G. Brush, Institute for Physical Science & Technology, University of Maryland, College Park, MD 20742.

Electrodynamics after Maxwell

BUCHWALD, JED Z. The abandonment of Maxwell electrodynamics. Archives Internationales d'Histoire des Sciences, 1981, 31: 135-80, 373-438.

Based on a reexamination of the mathematical and physical structure of Maxwell's theory, the article examines such developments within it as Poynting's theorem and its basis in Hamilton's principle. It concludes with Larmor's reluctant introduction of the electron, which violated fundamental principles of the theory.

For reprint write to J. Z. Buchwald, IHPST, University of Toronto, Toronto, Ont., Canada M5S 1A1.

Electromagnetic Mass

BATTIMELLI, GIOVANNI. The Electromagnetic Mass of the Electron: A Case Study of a Non-Crucial Experiment. Fundamenta Scientiae, 1981, 2(2): 137-50. ,Submitted 1977.

In the early years of the 20th century, shortly before and shortly after the appearance of the theory of relativity, experimental researches were carried out in order to detect the variation of electron mass with velocity and to discriminate between competing theories giving different predictions on the subject. These researches did not give a definite answer to the problem. The reasons for this failure are discussed, with regard to the different scientific proposals which were presented, and to the expectations they placed on the experiments.

For reprint write to G. Battimelli, Istituto di Fisica "G. Marconi," P. le A. Moro 2, Roma, Italy.

Einstein and Fluctuations

KLEIN, Martin J. Fluctuations and Statistical Physics in Einstein's Early Work. Pp. 39-58 in G. Holton, Y. Elkana (eds.) Albert Einstein: Historical and Cultural Perspectives, Princeton, NJ: Princeton Univ. Press, 1982.

For reprint write to M. J. Klein, History of Science, Yale University, New Haven, CT 06520.

Early 20th-Century Physics

MCCORMMACH, RUSSELL. Night Thoughts of a Classical Physicist. xii + 217 pp. Cambridge, Mass.: Harvard University Press, 1982. $15.00

This book offers a portrait of physics and physicists in Germany in 1918, shortly before the end of World War I, a time of both apprehension and hope. It makes use of an approach from fiction: the organizing principle for the historical materials is a composite physicist, Victor Jacob, who is constructed from real voices and events of the past. Although Jakob is invented, his activities and his outlook on science and on the world belong to many of the real physicists who were his contemporaries. Every detail in the invented physicist's career is based upon the careers of real physicists, and every detail attributed to real physicists comes from the historical record. The documented lives of physicists are refracted through Jakob's consciousness, which consists largely of a selection of episodes from 50 years of physics, presented as his memories in 1918. For readers who want to know more about the subject, the book concludes with a lengthy section of sources and notes.

Relativity

ILLY, JOZSEF. Revolutions in a Revolution. Studies in History and Philosophy of Science, 1981, 12: 175-210.

Contemporary German evidence is invoked in reconstructing the views of the physicist and philosopher community between 1900 and 1920 to prove that the special and, to a lesser extent, the general theory of relativity was considered to be a branch of a revolution of the electromagnetic world view. Doubts in interpreting the history of relativity according to the methodologies of Kuhn or Lakatos-Zahar which require a competition between Einstein and Lorentz point to the need for a deeper analysis of the connection between theories and persons, usually called their authors.

Author's address: J. Illy, Institute of Isotopes of the Hungarian Academy of Sciences, H-1525 Budapest, P.O.B. 77, Hungary.

Einstein Centennial

HOLTON, GERALD; YEHUDA ELKANA (eds.) Albert Einstein. Historical and Cultural Perspectives. xxxii + 439 pp. Princeton, NJ: Princeton Univ. Press, 1982. $35.00

Proceedings of the Jerusalem Einstein Centennial Symposium, 14-23 March 1979. Includes: G. Holton, "Introduction: Einstein and the Shaping of our Imagination"; A. I. Miller, "The Special Relativity Theory: Einstein's Response to the Physics of 1905"; P. G. Bergmann, "The Quest for Unity: General Relativity and Unitary Field Theories"; M. J. Klein, "Fluctuations and Statistical Physics in Einstein's Early Work"; M. Jammer, "Einstein and Quantum Physics"; P A. M. Dirac, "The Early Years of Relativity"; B. Hoffmann, "Some Einstein Anomalies"; L. R. Graham, "The Reception of Einstein's Ideas: Two Examples from Contrasting Political Cultures"; other papers by R. Jakobson, E. H. Erikson, N. Rofenstreich, Y. Elkana, Y. Ezrahi, I. Berlin, Y. Navon, U. Tal, F. Stern, P. Doty, B. T. Feld, B. Schwarz, and E. G. Straus.

Einstein Centennial

KINNON, COLETTE, A. N. KHOLODIN, J. G. RICHARDSON (eds.) The Impact of Modern Scientific Ideas on Society. In Commemoration of Einstein. (Papers presented at the UNESCO Symposium, Munich-Ulm, 18-20 September 1978, and the Addresses Delivered on the Occasion of UNESCO's Celebration of the 100th Anniversary of Einstein's Birth, Paris, May 1979) xiv + 203 pp. Boston: Reidel, 1981. $26.50.

Includes lectures by P. A. M. Dirac, A. Salam, P. L. Kapitza, J. Ehlers, E. N. Hiebert, O. Pedersen, T. F. Nonnenmacher, C. W. Misner, and others.

Einstein Centennial

HEILBRON, J. L. Products of a Centennial. Science, 1982, 216: 846-49.

Essay review of 13 books commemorating the Einstein centennial.

Einstein on Gyromagnetism

GALISON, PETER L. Theoretical Predispositions in Experimental Physics: Einstein and the Gyromagnetic Experiments, 1915-1925. Historical Studies in the Physical Sciences, 1982, 12: 285-323.

For reprint write to P. L. Galison, Lyman Laboratory of Physics 334A, Harvard University, Cambridge, MA 02138.

Millikan

KARGON, ROBERT H. The Rise of Robert Millikan: Portrait of a Life in American Science. 205 pp. Ithaca, NY: Cornell University Press, 1982. $22.50.

Robert Millikan (1868-1953) - the second American physicist to win the Nobel Prize - - was a gifted and influential scientist who gained worldwide fame for his vital contributions to our understanding of the nature and composition of matter. This year he is one of the distinguished Americans to be honored in the Great Americans series of postage stamps. The Millikan stamp was issued on January 26 at Pasadena, CA, the site of the California Institute of Technology, which Millikan headed for a quarter of a century and guided to its place as a preeminent scientific and technical institution.

In this book, the author addresses questions concerning Millikan's character, achievements, and scientific style, as well as those factors that determined the course of his impressive scientific career. By describing Millikan's various roles as teacher, researcher, administrator, entrepreneur, and public figure, he demonstrates how science grew in complexity and became an integral part of our culture. He combines glimpses of the inner man with a description of Millikan's scientific program, providing a systematic discussion of his early research, its relation to his Nobel Prize-winning work on the electron, and his important studies of cosmic rays. With his account of Millikan's later decline as a front-line scientist, the author takes on a subject too often avoided in the history of science. Robert Millikan emerges as not only a many-faceted, often controversial man with doubts and uncertainties even at the height of his fame, but also as an unmistakable force in the development of American science.

Millikan's Oil Drops

FAIRBANK, WILLIAM M., JR.; ALLAN FRANKLIN. Did Millikan observe fractional charges on oil drops? American Journal of Physics, 1982, 50: 394-97.

We have reanalyzed Millikan's 1913 data on oil drops to examine the evidence for charge quantization and for fractional residual charge. We find strong evidence in favor of charge quantization and no convincing evidence for fractional residual charge on the oil drops.

For reprint write to A. D. Franklin, Department of Physics, Campus Box 390, University of Colorado, Boulder, CO 80309.

Millikan's Oil Drops

FRANKLIN, A. Millikan's Published and Unpublished Data on Oil Drops. Historical Studies in the Physical Sciences, 1981, 11: 185-201.

Although Millikan claimed that the 58 drops published in his famous 1913 paper were his entire set of data, this is not, in fact, the case. All of Millikan's oil drop data in the period Oct. 28, 1911 until April 16, 1912, have been reanalyzed to examine whether he selectively analyzed his data. I conclude that he was selective in both his choice of and his analysis of his data, but that the effects were, in general, quite small.

For reprint write to A. D. Franklin, Department of Physics, Campus Box 390, University of Colorado, Boulder, CO 80309.

Fletcher & Millikan's Oil Drops

FLETCHER, HARVEY. My Work with Millikan on the Oil-Drop Experiment. Physics Today, 1982, 35(6): 43-47.

In this personal reminiscence the late author recounts his experiences as a graduate student in the Ryerson laboratory in Chicago and his contribution to the determination of the electron's charge.

Ehrenfest

KLEIN, MARTIN J. Not by Discoveries Alone: The Centennial of Paul Ehrenfest. Physica, 1981, 106A: 3-14.

For reprint write to M. J. Klein, History of Science, Yale University, New Haven, CT 06520.

20th Century America

Physics and Society in Twentieth Century America. Course materials available for lease from the University of Minnesota: $100 for the rights to use the materials for one calendar year. Copies may be ordered at a cost of $21 per copy plus $4 for postage and handling. Included are Study Guide (x + 40 pp) prepared by Roger Stuewer, Study Guide Appendices consisting of reprints of 43 articles (391 pp.), an audio cassette of a lecture by J. Robert Oppenheimer, "Reflections on Science and Culture" (50 min.) and an audio cassette of an informal talk by Richard P. Feynman, "Los Alamos from Below" (65 min.). Order from Department of Independent Study, University of Minnesota, 45 Wesbrook Hall, 77 Pleasant Street, S.E., Minneapolis, MN 55455 (phone 612/373-3836).

Compton effect

STUEWER, ROGER H. A. H. Compton and X-ray scattering. Presented at the Symposium of the Division of History of Physics, Baltimore, 22 April 1981.

The experimental and theoretical work of Arthur Holly Compton between 1916 and 1922 which led him to his discovery of the Compton effect was sketched, based on my book The Compton Effect: Turning Point in Physics (New York: Science History Pubs., 1975). A summary, including some philosophical aspects of Compton's work, also has appeared in my article, "On Compton's Research Program," in R. S. Cohen et al., eds., Essays in Memory of Imre Lakatos, Boston Studies in the Philosophy of Science, vol. 39 (Dordrecht: D. Reidel, 1976).

Author's address: School of Physics & Astronomy, University of Minnesota, Minneapolis, MN 55455.

Bridgman

MILLER, ARTHUR I. Percy W. Bridgman and the Special Theory of Relativity. Presented at the Symposium of the Division of History of Physics, Washington, D. C., 27 April 1982.

On the centennial of P. W. Bridgman's birth it is of interest to discuss his intense life-long deliberations on the special theory of relativity. His early assessments of special relativity reflect basic physical problems circa 1926, and his later unpublished speculations and criticisms turned out to be germane to certain modern-day philosophical analyses of the foundations of relativity. I shall focus on Bridgman's writings on clock synchronization, the nature of light, and the concept of the observer. Comparison of Bridgman's unpublished manuscripts on relativity, on deposit at the Harvard University Archives, with his published philosophical writings during 1924-1959 enable us to study the development of these notions into their form in his posthumously published book entitled A Sophisticate's Primer of Relativity (1st ed. 1962, 2nd ed. 1982, Wesleyan University Press, with an introduction by Arthur I. Miller).

Another version of this paper will appear as a chapter in my forthcoming book, On the Nature of Scientific Discovery (Birkhaeuser Boston Inc., 1983).

Author's address: Department of Physics, Harvard University, Cambridge, Mass. 02138.

Interference

KONNO, HIROYUKI. Some remarks on the interference experiments with faint light. Historia Scientiarum, 1981, 20: 95-105.

In current textbooks on quantum mechanics the interference experiment with weak light is regarded as a "crucial" one to show the dual nature of a photon. This view was obtained after the Copenhagen interpretation settled the wave-particle puzzle. In history, however, when the concept of light quantum was still naive like a classical idea of a particle, there were only two alternative interpretations: if the interference fringes disappear, then it may be assumed light consists of quanta, or if not, then waves. Thus a mere accumulation of faint light experiments did not bring any solution to the perplexity of duality.

For reprint write to H. Konno, Kagoshima Immaculate Heart College, 1847 Kamoike-cho, Kagoshima 890, Japan.

Electron Diffraction

RUSSO, ARTURO. Fundamental Research at Bell Laboratories: The Discovery of Electron Diffraction. Historical Studies in the Physical Sciences, 1981, 12: 117-60.

The discovery of electron diffraction in 1927 is described as a case study in the interaction between science and industry. C. J. Davisson and L. Germer's discovery came as an unexpected result of a research program lasting eight years in which Davisson"s scientific interests and the Corporation's industrial problems intertwined. The role of Born and Franck's research groups in Goettingen and the contemporary discovery of electron diffraction by G. P. Thomson in England are also analyzed.

For reprint write to A. Russo, Istituo di Fisica dell'Universita, Via Archirafi 36, 90123 Palermo, Italy.

Quantum Historiography

HURT, C. D. A Test of Differences in the Literature History of Four Historical Accounts of the Quantum Mechanics Problem. Scientometrics, 1981, 3: 457-66.

This paper examines four historical accounts of the quantum mechanics problem in physics. The purpose is to describe the literature used by the histories quantitatively using frequency of date of publication. Additionally, one of the histories was tested against the other three to determine differences. A Moments Test and a t Test were employed. The results indicated the literature history of quantum mechanics, when plotted as a function of frequency of publiation date, is non-normal, negatively skewed, and is platykurtic. The test for difference between the one history and the cumulative histories was non-significant.

For reprint write to C. D. Hurt, Graduate School of Library Science, McGill University, 3459 McTavish Street, Montreal, PQ, H3A 1Y1, Canada.

Pauli

HENDRY, JOHN. Pauli as Philosopher. British Journal for the Philosophy of Science, 1981, 32: 277-82.

Essay Review of Wolfgang Pauli: Wissenschaftlichen Briefwechsel, Band I, edited by A. Hermann et al.

Dirac's Electron

KRAGH, HELGE. The Genesis of Dirac's relativistic theory of Electrons. Archive for History of Exact Sciences, 1981, 24: 31-67.

The paper outlines the background for the emergence of Dirac's theory of 1928, the discussion concerning the role of relativity and spin in quantum theory. Some of the unsuccessful attempts to formulate a relativistic theory (e.g. Klein, de Broglie, Pauli) are considered. The step's in Dirac's discovery are examined in detail, leading to a historical reconstruction which is compared with Dirac's own account. An attempt is made to answer the question, why was it Dirac who discovered the equation and what were his motives for proceeding as he did?

Author's address: H. Kragh, Magnolievangen, 3450 Allerod, Denmark.

Dirac's Electron

MOYER, DONALD FRANKLIN. Origins of Dirac's Electron, 1925-1928. American Journal of Physics, 1981, 49: 944-48. Evaluations of Dirac's Electron, 1928-1932. Ibid., 1055-62. Vindications of Dirac's Electron, 1932-1934. Ibid., 1120-25.

The first essay in the series describes Dirac's generalizations of quantum mechanics leading to his theory of the electron. The second essay surveys evaluations of Dirac's theory by other physicists, especially by Bohr who used Dirac's speculations about negative energy electrons as evidence for the failure of quantum mechanics at nuclear dimensions. The third essay shows how the material reality of positrons vindicated quantum mechanics and opened new paths for physics.

Author's address: D. F. Moyer, 2025 Sherman Avenue, Evanston, IL 60201.

Quantum Chemistry

RUSSO, ARTURO. Mulliken e Pauling: le due vie della chimica-fisica in America. Testi & Contesti, 1982, 6: 37-59.

"Mulliken and Pauling: the two paths to chemical physics in America." The scientific work of Robert Mulliken and Linus Pauling between 1928 and 1935 are analyzed in detail and the difference between the two approaches to the problems of molecular structures and chemical bonds is discussed both from the conceptual and from the technical standpoint. The roots of Mulliken's method of molecular orbitals can be found in his training as a physicist and in his experimental work in molecular spectroscopy. Pauling's valence-bond method comes from his work in X-ray crystallography and from his idea about the role of quantum mechanics in chemistry.

For reprint write to A. Russo, Istituto di Fisica dell'Universita, Via Archirafi 36, 90123 Palermo, Italy.

Elementary particles

BROMBERG, JOAN. The Impact of the Neutron: Bohr and Heisenberg. Presented at the Symposium of the Division of History of Physics, San Francisco, 26 January 1982. Based on an article published in Historical Studies in the Physical Sciences, 1971, 3: 307-41.

Before 1932, Bohr and Heisenberg shared the view that the nucleus belonged to a circle of problems that included relativistic quantum mechanics and quantum electrodynamics, and that would require new physical laws as radical as energy or charge non-conservation for their proper explanation. When Chadwick announced the discovery of the neutron, Bohr and Heisenberg judged that the neutron too must be outside the scope of ordinary quantum mechanics. This belief in the neutron's mysteriousness allowed Heisenberg to regard it as somehow both elementary and compound at once, and permitted him to achieve his theory of nuclear structure by uniting in a single mathematical formalism both isotopic spin (in analogy to elementary particles) and exchange forces (in analogy to compound systems).

Theories of Cosmic Rays

CASSIDY, DAVID C. Cosmic Ray Showers, High Energy Physics, and Quantum Field Theories: Programmatic Interactions in the 1930s. Historical Studies in the Physical Sciences, 1981, 12: 1-39.

Based on archivval sources, the work explores how theoretical physicists attempted to account for cosmic-ray showers (high-energy particle creation) during the 1930s using quantum field theories that diverged at the high energies in cosmic rays. Three field theories were tried: quantum electrodynamics, Fermi's weak interaction, and various meson fields. Physicists tended to pursue two approaches or "programs": Setting up limits of validity on theory, they extracting data as possible; or associating showers with a future theory applicable beyond the limits of present theory. The former generated the "cascade theory" of showers, the latter "multiple processes."

For reprint write to D. C. Cassidy, Lehrstuhl fuer Wissenschaftsgeschichte, Universitaet Regensburg, D-8400 Regensburg, West Germany.

Yukawa's Meson

BROWN, LAURIE M. Yukawa's prediction of the Meson. Centaurus, 1981, 25: 71-132.

A study is made of the problem situation in nuclear physics that led Hideki Yukawa to propose the meson theory of nuclear forces in 1934 and to suggest the cosmic rays as a place to look for charged particles of intermediate mass. The roles played by Heisenberg's nuclear model and by Fermi's beta decay theory are discussed, as is the cultural puzzle as to why this theory was developed by a young Japanese physicist who had never travelled out of Japan.

Reprints are not available. Author's address: Department of Physics & Astronomy, Northwestern University, Evanston, IL 60201.

Values

GRAHAM, LOREN R. Between Science and Values. 449 pp. New York: Columbia University Press, 1981. $19.95.

A discussion of the relationship between science and values in the 20th century, concentrating on the impact of physics and biology on conceptions of social values. The author studies the views of a number of "authoritative popularizers of science" (e.g., Einstein, Bohr, Heisenberg, Eddington, Monod, Skinner, Lorenz, Wilson) and classifies them either as "Expansionists" or "Restrictionists." Expansionists are people who believe that science can be related, either directly or indirectly, to value questions; restrictionists are people who contend that science and values belong to separate realms. The author analyzes this dichotomy in discussions of a wide range of scientific developments (relativity physics, quantum mechanics, eugenics, sociobiology, genetic engineering) and concludes that Restrictionism is dead as an intellectual option.

In a final section, entitled "What Kind of Expansionism Do We Want?" the author maintains that Expansionism, while superior to Restrictionism as a conceptualization of the relationship of science to values, must be subjected to rigorous criticism in order to avoid the abuse of science for political purposes.

Braun

KURYLO, FRIEDRICH; CHARLES SUSSKIND. Ferdinand Braun: A Life of the Nobel Prizewinner and Inventor of the Cathode-Ray Oscilloscope. With a Preface by Bern Dibner. xviii + 289 pp. Cambridge, MA: MIT Press, 1981. $29.50.

This extensively revised and better documented English version of a biography originally published in 1965 (now out of print) is the result of a collaboration between the German author and an American historian of science and technology, Charles Susskind of Berkeley. Ferdinand Braun (1850-1918) discovered the rectifier effect on which solid-state electronics is based, invented the crt oscilloscope, made imprtant contributions to the concept of free energy and to the understanding of magnetic materials, and became one of the pioneers of radiotelegraphy, work for which he shared the 1909 Nobel Prize for physics with Guglielmo Marconi. Nevertheless, Braun has remained relatively unkown, in part because he died abroad (in New York) during World War I, which also transferred his home base (the University of Strasbourg) to France, so that there was no school to perpetuate his memory. The biography effectively rescues him from obscurity and in the process throws a good deal of light on German turn-of-the-century academic science and on the events that sparked the transformation of electronics from a branch of pure physics to a major technology.

Solids at Bell

HODDESON, LILLIAN. The Entry of the Quantum Theory of Solids into the Bell Telephone Laboratories, 1925-1940: A case-study of the Industrial Application of Fundamental Science. Minerva, 1980, 18 (3): 422-47 (pub. 1982).

The impact of science on industry is explored by examining the implantation of a purely scientific development in a particular industrial department during the 1920s and 1930s, the emergence between 1900 and 1930 of scientific industrial laboratories in America; in particular, in the Bell Telephone Laboratories, the intrinsic nature of the quantum theory of solids, and communication patterns between Bell and other institutions made it possible for the quantum theory of solid to alter the style and quality of research, the research environment and fundamental research policies.

For reprint write to L. Hoddeson, Physics Department, University of Illinois, Urbana, IL 61801.

Astronomy Bibliography

DEVORKIN, DAVID HYAM. The History of Modern Astronomy and Astrophysics, A Selected, Annotated Bibliography. (Bibliographies of the History of Science and Technology, edited by Robert P. Multhauf and Ellen Wells, Volume 1) xxvii + 434 pp. New York: Garland Publishing Co., 1982. $65.

Designed as a guide to secondary literature on the history of modern astronomy from the invention of the telescope to the present but with emphasis on the 19th and 20th centuries. 1417 entries with over 600 detailed cross-references. Every entry is annotated with a content outline, or general coverage information. Reviews of books are indicated, and the degree of documentation employed is noted. An extensive introduction identifies major archival sources of value in the study of the history of modern astronomy. Includes name index with some subject cross-references.

History in Physics Teaching

HULIN, NICOLE; DANIELLE FAUQUE. History of Science and Physics Teaching. CUIDE, Fevrier 1982, no. 21.

The use of history of physics in secondary education has been discussed in France since the 19th century. But a new interest may be noticed nowadays; an historical approach seems particularly suitable for non-science majors. The article presents an experimental physics course including historical subject matter chosen to fit the needs of the physics to be taught. Two examples are proposed, falling bodies and optics, based on detailed documentation. A bibliography of sources in the history of physics is indicated for both teachers and pupils. The authors' six years experience has been that non-science majors are very receptive to historically oriented physics courses.

Copies of the booklet may be purchased for 15 FF; order from Service "CUIDE," Universite Paris 6, Tour 32-22, 3eme etage, 4 Place Jussieu, 75230 Paris Cedex 05, France.

Geophysics

GLEN, WILLIAM. The Road to Jaramillo: Critical Years of the Revolution in Earth Science. Stanford: Stanford University Press, 1982. $37.50

Among the diverse research programs that contributed to the modern revolution in earth science, three, during the decade ending in 1966, appear decisive in launching it. Initially each had been undertaken with modest prospects only, and with no thought of serving the others. The dating of young rocks by the potassium-argon method was implemented by the development of the static-mode mass spectrometer and the evolution of new dating techniques at Berkeley. That dating capability was coupled to magnetic studies of young rocks by a Berkeley-trained group working in Menlo Park, CA, and later by competitors in Canberra, Australia. They showed that worldwide, contemporaneous rocks have the same magnetic polarity and thus proved that the earth's magnetic field has reversed polarity repeatedly. By 1965 they had formulated a series of increasingly refined time scales dating those reversals. The 11th such scale, containing the Jaramillo reversal, in conjunction with a uniquely detailed magnetic anomaly profile from the Pacific seafloor, became the key to a store of newly acquired, oceanic magnetics data at Lamont-Doherty Geological Observatory. The suddenly deciphered magnetics evidence proved the highly speculative Vine-Matthews-Morley hypothesis which joined seafloor spreading theory to reversals of the earth's magnetic field in order to explain a puzzling, zebra-striped, magnetic pattern on the seafloor. The overnight acceptance of the Vine-Matthews-Morley hypothesis in 1966 triggered the plate tectonics revolution.

Solar-Terrestrial Studies

MEADOWS, A. J.; J. E. KENNEDY. The Origin of Solar-Terrestrial Studies. Vistas in Astronomy, 1982, 25: 419-26.

The development and contemporary impact of 19th-century solar-terrestrial studies are examined under the headings: (1) solar variations; (2) magnetic variations; (3) auroral variations; (4) meteorological variations. This paper, which provides a general survey of the topic, will be followed by others dealing with specific aspects.

For reprints write to A. J. Meadows, Department of Astronomy and History of Science, University of Leicester, Leicester, LE1 7RH, England, UK.

WORK IN PROGRESS

Items submitted for this section should be no more than 100 words (200 for book-length projects) plus author's address.

Mechanics

GARBER, ELIZABETH. Mathematicians versus Physicists -Mechanics in the Early 19th Century. Presented at the Symposium of the Division of History of Physics, Washington, DC, 27 April 1982.

The separation of mathematics and physics into distinct professions is accepted as natural, along with the problems of communication and definition. But this classification of the disciplines was not always so, but was created in the early 19th century. Prior to this period, the sciences were classified methodologically rather than conceptually or through the phenomena being studied. The transformation to the modern discipline of physics occurred through internal forces and the external stimulus of mathematicians redefining the discipline of mathematics. The impact of this redefinition can be seen starkly in mechanics where mathematicians deal in entirely different ways with the same problems and present quite different solutions than physicists. Cross-talk between disciplines is minimal in this area until the 20th century.

Author's address: E. W. Garber, History Department, State University of New York, Stony Brook, NY 11794.

Mechanics

OLESKO, KATHRYN M. Mechanics and the Center of German Physics, 1790-1840. Presented at the Symposium of the Division of History of Physics, Washington, D. C., 27 April 1982.

Within German physics, mechanics did not always occupy a central and privileged position. The movement of mechanics from the periphery to the center of what was legitimately considered "physics" in early 19th century German textbooks constitutes a fundamental transition in the intellectual definition and professional status of mechanics vis-a-vis "physics," the conception of mechanics as a branch of mathematics, and the initial rejection of mathematics as the language of physics in German textbooks. Attention is drawn to the key role of the Koenigsberg mathematico-physical seminar under Franz Ernst Neumann and Carl Gustav Jacobi in effecting that transitions. It is concluded that as taught by Neumann, mechanics did not function as the logical foundation of physics, nor as the basis of a reductionist program in physics. Instead, mechanics functioned in an instrumental sense in his course on theoretical physics where it supplied methods and values that contributed to the professionalization of the discipline.

This paper is part of a larger book length project on the Koenigsberg seminar and the students who attended that seminar.

Author's address: Department of History, Georgetown University, Washington, DC 20057.

Work

GRATTAN-GUINNESS, I. Work for the Workers: Advances in Engineering Mechanics and Instruction, 1820-1835. Lecture to the British Society for the History of Science, May 1982.

The concept of work, in various contexts and in different names, appears, rather fitfully, in 18th-century mechanics. It became prominent in the 1820s due to the efforts of various French engineers. The principal father figures were Carnot (machine theory) and Coulomb (ergonomics). Navier gave it some emphasis in his 1819 edition of Belidor's Architecture Hydraulique; and Coriolis and Poncelet individuated it, largely independently, in the 1820s. It also played a role in engineering instruction, in which there were some new imperatives: Poncelet's arrivale at the Ecole du Genie at Metz, and the launching of the Ecole Centrale des Arts et Manufactures and the Association Polytechnique.

Author's address: I. Grattan-Guinness, Middlesex Polytechnic at Enfield, Enfield, Middlesex EN3 4SF, England.

Turbulence

BATTIMELLI, GIOVANNI. Fluid Mechanics and Kinetic Theory: Early Theories of Turbulence. Presented at the Institut d'Histoire et de Sociopolitique des Sciences, Montreal, 2 April 1981.

For further information write to Dr. G. Battimelli, Istituo di Fisica "G. Marconi," P. le A. Moro, 2 Roma, Italy.

Crystals

SZYMBORSKI, KRZYSTOF. Imperfect crystals 1900-1950, Scientific Schools and Scientific Styles.

The physics of the crystalline lattice imperfections emerged as an important subfield of the solid state physics owing to the scattered efforts carried out by a number of research groups (scientific schools) in various countries (first of all Germany, Austria, Russia, Holland, Great Britain, USA, and Japan). These efforts, sometimes competitive, were in most cases supplementing each other, each of the "schools" providing its individual contribution marked by its specific "scientific style." The project under way is an attempt to find out how these "styles" were shaped by different national traditions and by external factors (social, political, and economic) and how, in turn, the nature of the scientific product of each of these schools was influenced by them.

For further information write to K. Szymborski, Department of Physics, University of Illinois, Urbana, IL 61801.

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Work in Progress

Kramers on Dispersion

KONNO, HIROYUKI. The Virtual Field-Oscillator Model and the Dispersion Theory.

This research deals with how and why the Bohr-Kramers-Slater idea of the virtual field-oscillator model worked out in the dispersion theories, although their statistical idea of conservation laws was experimentally denied by Compton and others. A spin-off of this study, "A Preliminary Note on the Formation of Kramers' Dispersion Theory," was presented at the 29th Annual Meeting of the History of Science Society of Japan, Toyama, 30 May 1982. This note asserts that Kramers was the first who used the replacement of a differential by a difference to get the formula, based on Kramers' memorandum, Slater's calculation notes, and other archives.

For English summary of this note write to H. Konno, Kagoshima Immaculate Heart College, 1847 Kamoike-cho, Kagoshima 890, Japan.

Ehrenfest

KLEIN, MARTIN J. Paul Ehrenfest and Theoretical Physics in the United States. Presented at the Symposium of the Division of History of Physics, Washington, DC, 27 April 1982.

This paper is based on a forthcoming book, volume 2 of a biography of Paul Ehrenfest. For further information write to M. J. Klein, History of Science, Yale University, New Haven, CT 06520.

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