

History of Physics Newsletter

VOLUME II, NUMBER 4

FEBRUARY 1986

DIVISION NEWS

ELECTION OF DIVISION OFFICERS

The Ballots are in the center section of this Newsletter. Members of the Division are urged to return their ballots promptly. The following positions are to be filled: Vice-Chairperson (to become Chairperson the following year), Divisional Councilor (3 year term), and two members of the Executive Committee (3 year term.)

MEETINGS

Las Vegas "History of Applied Physics"

April 3rd, 1986 The session is arranged and chaired by *Robert E. Schofield* (Iowa State University). The invited papers are:

"Carnot and the Development of the Heat Engine" - *Cimberis Borisas* (Engineering College Univ. of Mines, Belo Horizonte, Brazil).

"Photo-elasticity from Physics to Material Testing" - *Greg Sanford* (Department of History, Iowa State University).

"Kirchoff's Circuitry Laws and French Telegraphy" - *Andrew Butrica* (The Edison Papers, Rutgers University).

"Toward a Documentary History of the Galileo Affair" - *M. L. Finocchiaro* (University of Nevada, Las Vegas)

Washington, D. C. "Sixty Years of Schroedinger's Equations"

May 1, 1986 The session is arranged and chaired by *Arthur I. Miller* (Harvard University and University of Lowell). The invited papers are:

"Heisenberg and Schroedinger" - *David Cassidy* (Einstein Project).

"Maria Goeppert-Mayer: The Atomic and Molecular Origins of the Nuclear Shell Model" - *Karen E. Johnson* (University of Minnesota).

(Title to be announced.) *Linda Wessels* (Indiana University).

Washington D. C. "Philosophical Issues in the Historical Foundations of Physics"

May 1, 1986 The session is arranged and chaired by *Fritz Rohrlich* (Syracuse University). The papers are:

"Theory and Reality in Poincaré and Einstein" - *Howard*

Stein (University of Chicago).

"Einstein and the Quantum Theory" - *Arthur Fine* (Northwestern University).

"Quantum Properties and Quantum Logic" - *John Stachel* (Boston University).

"The Maximum Entropy Principle and the Interpretation of Probability in Physics" - *Abner Shimony* (Boston University).

Washington D.C. "Business Meeting"

The Annual Business Meeting of the Division is open to all members of the division. It will take place immediately after the afternoon invited papers session of the Division. It is desirable but not essential that members wishing to bring up new business should let the Secretary-Treasurer, A. Wattenberg, know in advance.

Atlanta, Ga. "History of Physics Education"

January 29, 1986 The session was arranged by *Kathryn M. Olesko* (Georgetown University). The invited papers were:

"Textbooks and the Teaching of Relativity" - *Stanley Goldberg* (National Museum of American History)

"Quantum Mechanics, the Stern-Gerlach Experiment, and Exposition" - *John S. Rigden* (University of Missouri, St. Louis).

"Teaching Measurements before Kohlrausch" - *Kathryn M. Olesko* (Georgetown University)

FUNDS FOR HISTORY SESSIONS

Division of the History of Physics will entertain requests for funding from formal or informal organizations who will be holding sessions on the history of physics at their meetings. Interdisciplinary conferences are eligible providing that a minimum of three papers or one session is devoted to the history of physics. The Division has a preference that these funds be used to support graduate student participation through the award of stipends, honoraria, or travel expenses. The total amount of funding remains at \$150 per year unless there is a change in the Division's reserve funds. For further information write to the Division's chairperson, Prof. Robert E. Schofield, Department of History, Iowa State University, Ames, Iowa 50011.

MEETINGS

The American Society for Eighteenth-Century Studies will hold its next annual meeting in Williamsburg, VA March 13-16. It will feature a plenary session (the 1986 Clifford Lectures) on Halley's Comet, with lectures by Norman Thrower, Simon Schaffer, and G. S. Rousseau. The 1987 annual meeting will be in Cincinnati. Those interested in presenting a paper relating to science in the eighteenth century should write Edward Harris, Dept. of German, Univ. of Cincinnati, OH 45221, who is chairperson of the program committee for that session.

Laboratories A symposium on "*Laboratories: The Place of Experiment*," will be held at the Royal Institution Center for the History of Science and Technology, London, England, during September 17-19, 1986. This conference will consider the roles of laboratories in the production and dissemination of scientific and technical knowledge from a variety of disciplinary perspectives. Among the issues to be addressed are those of funding, staffing, and building laboratories, and how these factors affect the style of research work in particular academic, industrial, and government settings. Interested persons are encouraged to contact the organizer, Dr. Frank James, Laboratory Symposium, RICHST, The Royal Institution, 21 Albermarle St. London, W1X 4BS, England.

The British Society for the History of Science and the British Society for the History of Philosophy are jointly sponsoring a meeting during April 11-13, 1986 at Churchill College, Cambridge, on the relation between the history of science and the history of philosophy. The aim of the meeting is to explore the interaction between the natural sciences and philosophical issues in the period of the Scientific Revolution and the nineteenth century. For further details, contact Simon Schaffer, Department of History and Philosophy of Science, Cambridge University, Cambridge CB2 3RH, England.

The University of Maryland and the Smithsonian Institution are planning an international symposium to commemorate the 300th anniversary of Newton's *Principia*. It will be held April 23-25, 1987 in College Park, Maryland and Washington, D.C. In addition to invited papers, there will be one session of contributed research papers selected from those submitted. Some funds for travel expenses will be available. Contact Stephen Brush, IPST, University of Maryland, College Park, MD 20742

Virginia Tech's Science Studies Center in Blacksburg, Virginia is soliciting papers for a conference on *Testing Theories of Scientific Change*. It will be held October 20-22, 1986; the deadline for abstracts of proposed papers is March 15, 1986 and completed papers are due before September 1, 1986. Some financial support for participants will be available. For further information contact Arthur Donovan or Rachel Laudan, Science Studies Center, Price House, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061.

Joint Atlantic Seminar in the History of the Physical Sciences will be held at Harvard University; the tentative dates are April 25-26, 1986. This seminar is particularly useful to graduate students and other young scholars. For further information write to Erwin Hiebert, History of Science Department, Science Center 235, Harvard University, Cambridge, MA 02138.

University of Rochester Tricentennial of Newton's *Principia* A symposium is planned at the University on October 22, 1986, which will include a sequence of lectures by distinguished Newton Scholars and a variety of other events. For further information write to Ted Brown, University of Rochester Department of Physics and Astronomy, River Campus Station, Rochester, NY 14627.

The British Society for the History of Science Newsletter publishes an extensive list of forthcoming meetings and exhibitions and also publishes extensive accounts of meetings that have been held. Subscriptions are available for non-members; write to Dr. Peter Collins, 24 Woodgrange Avenue, Ealing, London W5 3NY.

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 at \$10 per volume (\$5 additional for airmail). Each volume consists of 5 issues; we expect to publish two issues per year. Editor: *Albert Wattenberg*, Department of Physics, University of Illinois, Urbana, IL 61801. Associate Editors: *Stephen G. Brush*, Department of History and Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742, and *Kathryn Olesko*, Department of History, Georgetown University, Washington, D.C. 20057.

SUMMER SEMINARS

NEH Seminar for College Teachers

Prof. Martin J. Klein - Yale

Course title: *Physicists in Historical Context*

Dates: June 16th to August 8th, 1986

This seminar will study several major figures in the history of modern physical science (e.g. Galileo, Newton, Maxwell, Rutherford, Einstein, and Bohr). It will focus on the scientist at work - a particular individual in a definite historical setting facing certain problems with the resources available. Participants will read and discuss the scientists' own works - for instance, Galileo's *Two New Sciences*, Newton's *Principia*, Maxwell's *On Physical Lines of Force*, and Einstein's *Relativity, The Special and the General Theory* - as well as a selection of recent historical scholarship on these subjects, including writings by Paul Forman.

The National Endowment for the Humanities sponsors seminars in a variety of fields each summer. Each year, the summer seminars for college teachers program provides teachers at undergraduate and two year colleges a unique opportunity for study in their own field or in fields related to their interests.

Each of the twelve participants in a seminar will receive a stipend of \$3,000 to help cover travel to and from the seminar location, books, and research and living expenses. For eight weeks during the summer, participants will work together in an area of mutual interest under the direction of a distinguished scholar. Seminar members will have access to the collections of a major library, will discuss a body of common readings with their colleagues in the seminar, and, outside the seminar, will pursue individual research or study projects of their own choosing and design. Seminar topics are broad enough to encompass a wide range of interests while being central to the major ideas, texts, critical concerns, and approaches of the humanities. The application deadline is March 1, 1986.

Prospective applicants should write to: Martin J. Klein, c/o Yale Summer and Special Programs, Box 2145, Yale Station New Haven, CT 96520.

More general information concerning the NEH Summer Seminars for College Teachers can be obtained from the Division of Fellowships and Seminars, Room 316, National Endowment for the Humanities, Washington, D.C. 20506.

Smithsonian/Cambridge Seminar in Aerospace Studies

In cooperation with Cambridge University in England, the Smithsonian's National Air and Space Museum is presenting a program in aerospace studies. The dates (at this time) are uncertain, but last year in July the course consisted of three days at the National Air and Space Museum and two weeks of classes at Cambridge - the latter was entitled "*Cambridge and the History of Astronomy.*" The periods covered in the course ranged from the sixteenth to the twentieth century. For details on this years dates, faculty, and course content, write to V. D. Hardesty, National Air and Space Museum Smithsonian Institution, Washington, D.C. 20560.

The History of Physics Group in the Institute of Physics

Summer School, Oxford

Course title: *The History of Physics for the Physicist*

Dates: July 1st to 4th, 1986

The summer school will discuss and propose suitable projects in the history of physics which could profit from the special skills of the physicist, and it will also examine and illustrate methods and resources appropriate to such research. The meeting is intended chiefly for physicists, physic teachers, and educators. There will be five sessions devoted respectively to: the history of experimentation, instruments, and developmental research; the role of history in the critique and clarification of concepts in physics; methods in traditional and institutional history, and in the social relations of physics; the role of history in physics education; and archives, museums, and libraries as research resources.

Registration forms can be obtained by writing to Dr. John J. Roche, Linacre College, Oxford, OXI 3JA, England.

GRANTS AND FELLOWSHIPS

Note: See the History of Physics Newsletter, September 1985, pp. 39-40 for other information about grants and fellowships.

ACLS Grants and Fellowships

The American Council of Learned Societies has programs of fellowships and grants which are designed to advance research. Competition is not limited to members of the ACLS' constituent societies. Younger scholars and

independent scholars who do not hold academic appointments are strongly urged to apply. The general categories of fellowships and grants include a number of fields of specialization including the history of science. Applicants are required to have the doctorate or its equivalent as of the deadlines that are set. The programs are limited to citizens or permanent residents of the United States.

FELLOWS must devote a minimum of six continuous months (to a maximum of twelve) to full-time work on their proposals. At the time of applying, the applicant will be asked to define a precise period of research between July 1, 1987 and December 31, 1988. The deadline for receipt of applications is in September 1986. Awards do not exceed \$15,000 each; they are intended primarily for the provision of free time. The conditions of the awards should make them of particular interest to scholars whose teaching loads restrict time for research, those whose normal places of work are remote from repositories of research materials, and those independent scholars who have no support for their research and writing.

GRANTS-IN-AID are available; their purpose is to provide funds in support of significant humanistic research. The grant will be available to the recipient immediately following acceptance of the award and should be expended within one year after acceptance. Grants are to be used exclusively to advance specific programs of research in progress by contributing to the scholar's essential personal expenses for that purpose. Stipends will not exceed \$3000. The deadline for receipt of applications is December 15, 1986.

General inquiries and requests for application forms should be addressed to the Office of Fellowships and Grants, ACLS, 228 East 45th Street, New York, N.Y. 10017

AIP Center for History of Physics

The Center is continuing its program of small grants-in-aid for research in the history of 19th and 20th century physics and astronomy and their interaction with society. Grants will be for a maximum of \$1000 each and can be used only to reimburse direct expenses connected with work in these fields. Preference is given to those who need part of the funds for travel to the Center's Niels Bohr Library in New York. For more information write to Spencer Weart, Center for History of Physics, American

Institute of Physics, 335 East 45th Street, New York, NY 10017. The next application deadline is July 1, 1986.

NEH Fellowships

The National Endowment for the Humanities has a basic reference guide to its many programs, "*Overview of Endowment Programs*," which can be obtained from the National Endowment for the Humanities Public Affairs Office, Room 409, 1100 Pennsylvania Ave. NW, Washington, DC 20506.

- FELLOWSHIPS FOR INDEPENDENT STUDY AND RESEARCH grants provide support for scholars, teachers, and others to undertake independent study or research. Write: Fellowships for Independent Study and Research, Room 316
- FELLOWSHIPS FOR COLLEGE TEACHERS-grants provide support for teachers in two-year, four-year, and five-year colleges and universities to undertake full time study and research. Write: Fellowships for College Teachers, Room 316
- TRAVEL TO COLLECTION grants of \$500 are to enable American scholars to travel to libraries, archives, museums, or other repositories to consult materials of fundamental importance for their work. The grant program helps scholars meet the costs of a research trip to consult sources at a specific location, with preference given to those who have no other sources of funds for the travel proposed. Applications are due by September 15, 1986 (for travel after December 1986). Contact the Travel to Collections Program, Room 316. The telephone number for the NEH fellowships and grants is 202-786-0466.

Dudley Observatory - Herbert C. Pollack Award

The Dudley Observatory has a collection of source materials in 19th century astronomy and a *Collection of 15th - 18th Century Rare Books in Astronomy*, now housed in the Schaffer Library at Union College in Schenectady, New York. The Pollack Award is for support of an innovative research project in the history of astronomy or astrophysics by a faculty member, research associate, or post-doctoral student with an institutional association. The award consists of a maximum of \$6,000 to be paid in the year in which the work will be in progress.

Special considerations will be given to proposals that involve the Dudley Collections. There are also lesser Dudley awards as well as the Pollack Award. Interested applicants should contact the Committee for more complete information: Pollack Awards Committee, Dudley Observatory, 69 Union Ave., Schenectady, NY 12308.

NSF

The National Science Foundation has announced revisions in the special classes of awards established in 1981:

1. A Summer Scholars Award consisting of awards up to \$9,000 for partial support of full time summer research and/or related costs;
2. A NSF Scholars Award consisting of awards up to \$30,000 for partial support of one or more semesters of full time and related expenses. These grants are intended to support the needs of historians and philosophers of science for more sustained periods of research.

Proposals may be submitted through normal institutional channels by any qualified faculty member. In cases where the individual has no institutional affiliation, the proposal may be submitted by the researcher. New deadlines of August 15 and January 1 have been established.

For questions about these awards or about the History of Science Program contact: Program Director or Associate, History and Philosophy of Science, National Science Foundation, 1800 G Street, N. W., Washington, D.C. 20550 Phone: 202-357-9677.

Rockefeller Archive Center Grant

The program established by the Rockefeller University, at the Rockefeller Archive Center, awards grants of not more than \$1500 to scholars engaged in projects based substantially on holdings of the Center. Grant applications for research during a given year must be made before December 31st of the previous year. The names of the recipients will be announced in March of the grant year.

The purpose is to foster research in the records of The Rockefeller Foundation, The Rockefeller University, and other collections in the Rockefeller Archive Center. The size of individual grants will be dependent upon the

travel, temporary lodging, and research expenses of the applicant. Grants will be made to applicants of any discipline, usually graduate students or post-doctoral scholars, who are engaged in projects which require substantial use of the collections at the Center.

Inquiries about the program and requests for application forms should be addressed to: Director, Rockefeller Archive Center, Pocantico Hills, North Tarrytown, NY 10591-1598

JOBS

Purdue University

Purdue University would appreciate nominations of suitable candidates for a distinguished professorship in the history and philosophy of science and technology. They have not defined a specific research and teaching area within the broad rubric of the history and philosophy of science and technology, but rather they would like to attract the strongest available scholar to help enhance an already vigorous program. Please send nominations to John J. Contreni, Head of the Department of History, Purdue University, West Lafayette, IN 47907.

University of Pennsylvania

The University of Pennsylvania invites applications for a tenured associate or full professorship in History and Sociology of Science. Candidates must have research and teaching interests in the natural sciences in continental Europe post-1750. The position is available July 30, 1986 or January 1, 1987, subject to funding. Letters of application, including a curriculum vitae and three letters of reference should be sent to the chairman of the search committee, Nathan Sivin, Department of History and Sociology of Science, University of Pennsylvania, Philadelphia, PA 19104. The deadline for application is March 1, 1986.

Stonehill College

Stonehill College is an 1800-student private college. Full-time tenure track opening for the fall of 1986 for an Assistant Professor of the History of Science. A doctorate is expected by September 1986. Send a letter and curriculum vitae to Thomas Gariepy, Program in the History of Science, Stonehill College, North Easton, MA 02357.

AIP-CENTER NEWS

CHP Wins Award The Center for History of Physics of the AIP has won the Distinguished Service Award for 1985 of the Society of American Archivists. The following are excerpts from the announcement of the award.

"... This is the first time the award has been made to a discipline-based, primarily noncollecting institution. The center richly deserves the honor. It offers a model that has been emulated by other scientific disciplines, and should be a prototype for other subjects and institutions as well.

"The physics center has made scientists, historians and archivists aware of the necessity of documenting the processes and achievements of science and technology. More importantly, it has shown that it is possible to document fields that seemed beyond our ken because of their mystery and complexity, the volumes of records, or the excess of minutia. The center conducted a landmark study of scientific labs for the Department of Energy. ... It has had widespread influence in the archival profession, showing itself applicable to other disciplines and records. The center serves as the repository for records of the AIP and its member societies and has been a leader in the oral history field, but perhaps more importantly educates, encourages and assists many and varied repositories across the nation in preserving the history of science. ... The center for History of Physics may be the finest example of "post-custodial" archives."

Guide to Niels Bohr Library to be Published

The *Guide to the Archival Collections in the Niels Bohr Library of the American Institute of Physics* is scheduled for publication in mid-1986. It will include descriptions of collections, abstracts of oral history interviews, lists of unpublished biographies and autobiographies, and a list of finding aids to major physics and astronomy collections at repositories around the world. More information about the Guide and its contents can be found in the most recent issue of the *Newsletter of the Center for History of Physics*. The Newsletter is sent to the Friends of the AIP Center for History of Physics. One can join by sending a tax-deductible contribution to the Friends of the Center for History of Physics, AIP, 335 East 45th St. New York, NY 10017. Much of the work of the center is made possible only through the generosity of the Friends.

REPORTS

Bohr's Centenary and Bohr's Archives On October 4-7, 1985, the Niels Bohr Centenary Symposium was held in Copenhagen. Speakers from all over the world attended. The topics discussed were "Lesson of Quantum Theory", "Unity of Knowledge", and "Niels Bohr". This last session was chaired by *Victor Weisskopf*, and it included the following historical talks: *M. Klein* - "Great Connections Come Alive: Bohr, Ehrenfest, and Einstein" *M. Gowing* - "Niels Bohr and Nuclear Weapons" *J.A. Wheeler* - "Niels Bohr: The Man and His Legacy" *H.B.G. Casimir* - "Personal Recollections about Niels Bohr" The Centenary symposium was sponsored by: The Niels Bohr Institute, University of Copenhagen,

Royal Danish Academy of Sciences and Letters, and The Danish Physical Society.

As a part of the centennial celebrating the birth of Niels Bohr, **Niels Bohr Archives** was officially founded October 7, 1985. The archives has operated unofficially for several years at the Niels Bohr Institute under a grant from the Carlsberg Foundation. Now it becomes a separately constituted organization funded by the Danish Ministry of Education.

Besides providing a permanent home for the papers of Niels Bohr and several of his collaborators, the archives several years ago embarked on the nine volume publication of Niels Bohr's works. Volume 8 will appear in 1985, and Volume 9 will appear in 1986. Another recent acquisition of the archives is video tapes of the complete Niels Bohr Centenary Symposium.

Additional information on the Niels Bohr Archives can be obtained from Dr. Erik Rudinger, Niels Bohr Archives, Blegdamsvej 17, DK-2100 Copenhagen 0, Denmark.

Meson 50 (by Laurie M. Brown)

On November 17th, 1934, Hideki Yukawa submitted to Proceedings of the Physico-Mathematical Society of Japan an article entitled "On the Interaction of Elementary Particles I." Published in the issue of February 1935, it proposed a new quantum field theory description of the strong and the weak nuclear forces, in which these forces were transmitted by massive, electrically charged quanta. These new particles, of short lifetime, were to be found in the cosmic rays, no terrestrial sources of sufficient energy to produce them being available at the time. Yukawa's paper has, therefore, some legitimate claim to mark the birth of modern elementary particle theory.

The Kyoto International Symposium: The Jubilee of the Meson Theory (Meson 50) was held August 15-17, 1985 in Kyoto to commemorate the publication of Yukawa's meson article. The varied program included, besides ceremonial and historical components, current applications of meson beams in intermediate energy physics, nuclear physics and in cancer therapy, and also modern particle theory and cosmology. For the most part, participants were sensitive to the mixed interests of the audience, so that for once the often-sought, but more often elusive, synthesis was achieved around the "Meson 50" theme.

Proceedings will be published by the Research Institute for Fundamental Physics of Kyoto University, as a special issue of the Supplement of Progress of Theoretical Physics.

Antiprotons: Past, Present, and Future

A two-day symposium was cosponsored by Lawrence Berkeley Laboratory and the University of California at Berkeley on November 15-16, 1985 to commemorate the 30th Anniversary of the Discovery of the Antiproton. The first morning included reports of the recollections of E. Lofgren, C. Weigand, T. Ypsilantis, and O. Piccioni. The comments of Piccioni were repetitions of those

he made following Chamberlains' talk at the Fermilab 1984 Conference on Particle Physics in the 1950's. The remainder of the sessions was devoted to the important roles antiprotons have played in both nuclear physics and elementary particle physics research. The latter were described by the 1984 Nobel Prize winners S. Van der Meer and C. Rubbia. (At this time it is not certain whether the video-cassette recordings of the sessions are of a quality that will make them of interest.)

SLHCT - Latin American History of Science

A Latin American conference, *La Sociedad Latinoamericana de Historia de las Ciencias y la Tecnología*, was held on the history of science and technology in Havana during July 21-25, 1985. The organizer of Physics History is Dr. Shozo Motoyama of the Univ of San Paulo (Brasil); an invited talk commemorating Bohr's centennial was given by Dr. Jose Altschuler of Cuba.

SLHCT was organized at a meeting in Puebla, Mexico in 1982 which was attended by 200 people from 16 countries, and 120 scientific communications were presented. The Society publishes a newsletter, *Boletín Informativo*, three times a year.

"QUIPU", *Revista Latinoamericana de Historia de las Ciencias y la Tecnología* is the first specialized journal of the history of science and technology that is published in Latin America. Its name refers to the system used by Incan People to keep numerical statistics and historical records in knotting ropes. Articles are published in Spanish, Portuguese, French, and English. Three issues a year have been published since 1984. For information write to SLHCT, Apartado Postal 21-873, 04000, Mexico, D.F. Mexico.

Contemporary Scientific Archives Centre

It is planned to move the Centre from Oxford after the retirement of the directors Professor Margaret Gowing and Jeannine Alton. *The British National Committee for the History of Science, Medicine and Technology* accepted an offer from the University of Bath to accommodate the Centre. It will be transferred to Bath in the spring of 1987 as part of the University's Centre for the History of Technology, Science and Society under its Director Dr. R.A. Buchanan.

RECENT & FUTURE ARTICLES

American Journal of Physics Bulletin of Magnetic Resonance The October 1985 issue is a MEMORIAL DEVOTED TO FELIX BLOCH.

The historical articles include:

FELIX BLOCH AND MAGNETIC RESONANCE by E. L. Hahn

FELIX BLOCH - REMINISCENCES OF A GRADUATE STUDENT by M. Packard

EARLY HISTORY OF MAGNETIC RESONANCE by N. F. Ramsey.

Also of interest are an Introduction by E. R. Andrew, excerpts from letters, and some abstracts of commemorative lectures.

Reviews of Modern Physics; April 1986
QUANTUM STATES AND PRECESSIONS; THE TWO DISCOVERIES OF NMR by John S. Rigden.

Nuclear magnetic resonance in bulk matter was discovered independently by Purcell, Torrey, and Pound at Harvard and by Bloch, Hansen, and Packard at Stanford towards the end of 1945. Their experiments were so different that members of neither group were quick to recognize their own experiment in the other. The magnetic resonance phenomenon was conceptualized differently by the two groups, and the design of their experiments differed accordingly.

Physics Today

October 1985 is a

SPECIAL ISSUE: NIELS BOHR CENTENNIAL

The historical articles are:

BOHR'S FIRST THEORIES OF THE ATOM by John L. Heilbron

NIELS BOHR AS FUND RAISER by Finn Aaserud
BRINGING THE NEWS OF FISSION TO AMERICA by Roger H. Stuewer

NIELS BOHR, THE MAN by John A. Wheeler

There is an editorial: NIELS BOHR, THE QUANTUM, AND THE WORLD by Victor F. Weisskopf. Five pages of photographs of Niels Bohr are also included.

Physics Today

VON KARMAN: FLUID DYNAMICS AND OTHER THINGS by William R. Sears (January 1986) Theodore Von Karman was one of several famous Hungarian mathematicians and physicists - along with Von Neuman, Szilard, Teller, and Wigner - who came to the United States in the late 1920s and early 1930s, and who each had an enormous impact on their fields. Von Karman's field was chiefly fluid dynamics, and he is responsible for putting aerodynamic engineering on a scientific basis. Sears, who studied with Von Karman, tells us about some of his contributions as well as many anecdotes about his life.

PERSONAL MEMORIES OF PAULI by Victor F. Weisskopf (December 1985) A disciple of Pauli recalls how Pauli's extreme honesty and directness expedited work on fundamental problems in quantum mechanics and made for unusual human relations.

WERNER HEISENBERG AND THE BEGINNING OF NUCLEAR PHYSICS by Arthur I. Miller (November 1985) Quantum Mechanics radically changed how we visualize microscopic physical phenomena.

ISIS September 1985

ESSAY REVIEW ON JAGDISH MEHRA and HELMUT RECHENBERG'S *Historical Development of Quantum Theory* by John L. Heilbron.

1986 DIVISIONAL ELECTION

INFORMATION ON NOMINEES

For Vice-Chairperson

James T. Cushing

James T. Cushing is a Professor of Physics at the University of Notre Dame. He was born February 4, 1937 in Long Beach, CA and received his Ph.D. in theoretical physics in 1963 at the State University of Iowa. His (NSF) postdoctoral work at Imperial College, London and at Argonne National Laboratory and his published research were concentrated in high energy theoretical physics (especially S-matrix theory) and in mathematical physics until about 7 years ago. He has written a graduate text, "Applied Analytical Mathematics for Physical Scientists" (Wiley, 1975). Since his year as a Lilly Endowment Faculty Fellow (1978-79), his interests have shifted to the history and philosophy of physics, primarily that of the present century with an emphasis on current research in theoretical physics. His earliest work in these areas was "Electromagnetic Mass, Relativity, and the Kaufmann Experiments" ("Am. J. Phys.," 1981) and "Models and Methodologies in Current Theoretical High-Energy Physics" ("Synthese," 1982). His general area of research is concerned with the historical and philosophical mechanisms which produce a convergence of scientific opinion to generally accepted theories and a coherence of these views around a fairly localized position as theories evolve over time ["PSA 1982," Vol. 2 (1983), "PSA 1984," Vol. 1 (1984), and "Stud. Hist. Phil. Sci." (1985)]. He has recently completed a case study of the S-matrix program, beginning with Heisenberg's early suggestions in the 1940s, concentrating on the emergence of the S-matrix theory of the 1960s and early 1970s, and following the developments up through the duality and superstring theories of today. He has also completed a manuscript of a physics text, "Physics: Its Principles, History and Philosophy", for nonscience students, in which the history and philosophy of physics are incorporated in an integral fashion with the physical laws and principles themselves.

Roger H. Stuewer

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

1983-84, Gesellschaft fuer Wissenschaftsgeschichte, 1983, AAAS, 1983. Secretary, History of Science Society, 1972-78; Editor, AAPT/AJP Resource Letters, 1978- present; Member and Chairman, AIP Committee on the History of Physics, 1978-present; Executive Committee, APS Division of History of Physics, 1982-85. Author of "The Compton Effect: Turning Point in Physics" (1975); editor of "Historical and Philosophical Perspectives of Science" (1970) and "Nuclear Physics in Retrospect" (1979); co-editor of "Springs of Scientific Creativity" (1983). Research interests include history of radiation theory, quantum mechanics, and nuclear physics.

For Divisional Councilor

Stephen G. Brush

Stephen G. Brush, Professor in the Institute for Physical Science and Technology and the Department of History at the University of Maryland, College Park. Brush received his A.B. (Physics) from Harvard in 1955 and his D. Phil. (Physics) from Oxford in 1958. After a year at Imperial College London he was employed as a physicist at the Lawrence Livermore laboratory from 1959 to 1965, where he published papers on the properties of matter at high pressures and temperatures and on the history of the kinetic theory of gases. In 1965 he went to Harvard to help develop the Project Physics Course, writing part of the text used by 10 to 15 students in the last 10 years. Since 1968 he has been at Maryland as a historian of science. His book "The Kind of Motion We Call Heat: A History of the Kinetic Theory of Gases in the 19th Century" won the Pfizer Award for the best American book on history of science published in 1976. His current research is on theories of the origin and structure of the solar system in the 19th and 20th centuries. Brush served as the first Secretary-Treasurer of the Division of History of Physics and as founding editor of its "History of Physics Newsletter."

Silvan S. Schweber

Silvan S. Schweber received his Ph.D. from Princeton in 1952. Until the early 70's his research was in quantum field theory and elementary particle physics. Since the mid seventies his interests have shifted to the history of science. He is presently finishing a book on the history of quantum field theory from 1927-1952 which also addresses the wider context. It includes a history of the emergence of the American theoretical physics community from 1919-1952. In recent years he has been very much concerned with the incorporation of the history of science into the undergraduate and graduate curriculum. He has been teaching courses on the history of science in the History Department and a course on the history of physics in the 20th century designed for the graduate students in the Physics Department.

For Executive Committee**Peter Galison**

Peter Galison is an Associate Professor in the Department of Philosophy and an Associate Professor by courtesy in the Department of Physics at Stanford University. He received his Ph.D. in Physics (Theoretical Particle Physics) and History of Science (History of 20th Century Experimental Physics) at Harvard University, and was a Junior Fellow in the Society of Fellows at Harvard University, 1980-83. He was Visiting Assistant Professor of the History of Science at Princeton University in Spring 1985. His work includes "How the First Neutral Current Experiments Ended," *Rev. Mod. Phys.* (1983); "Minkowski's Development of Space-Time," *Hist. Stud. Phys. Sci.* (1979); "The Discovery of the Muon and the Failed Revolution against Quantum Electrodynamics," *Centaurus* (1983); "How Experiments End," (University of Chicago Press, 1985); "Theoretical Predispositions in Experimental Physics: Einstein and the Gyromagnetic Experiments 1915-1925," *Hist. Stud. Phys. Sci.* (1982); "Bubble Chambers and the Experimental Workplace" in Achinstein and Hannaway, eds., "Experiment and Observation in Modern Science" (MIT-Bradford, 1985). He is currently working on a book, "Image and Logic: Two Traditions in Twentieth Century Experimental Physics". This work contrasts the traditions of image-producing devices (cloud chambers, emulsions, and bubble chambers) with that of electronic apparatus (counters, spark chambers, wire chambers). Dr. Galison's work in theoretical high energy physics focuses on model-building and phenomenology, especially in weak interactions.

Jay Orear

Jay Orear, Professor of Physics, Cornell University, received his Ph.D. in 1953 at the University of Chicago

under the direction of Enrico Fermi. He spent 1954 to 1958 at Columbia University and went to Cornell University in 1958 as an Associate Professor in the Laboratory for Nuclear Studies. He has done experimental high energy physics on several of the world's particle accelerators starting with the University of Chicago cyclotron. Presently he is spokesperson for an experiment to determine the total cross section at the Fermilab pp collider. As a graduate student he was active in the Atomic Scientists of Chicago and became chairman of the Federation of American Scientists for 1967-68. He helped organize the Forum of the American Physical Society and was the first editor of the Forum Newsletter. In addition to writing two introductory physics textbooks, he has written articles on arms control for such publications as "Bulletin of the Atomic Scientists", "The Saturday Evening Post", "The Saturday Review", and letters to "The New York Times". He has been a participant in the conference on history of high energy physics held at Fermilab. If elected, he hopes to work closely with the division chairperson-elect who is also at Cornell University.

Sallie A. Watkins

Sallie A. Watkins, Dean, College of Science and Mathematics, and Professor of Physics, University of Southern Colorado. Ph.D., Catholic University of America. Member: History of Science Society, History and Philosophy of Science Section, Southwestern and Rocky Mountain Division, American Association for the Advancement of Science (Vice-Chairman, 1982; Chairman, 1983). Chair, new committee on the History and Philosophy of Physics. American Association of Physics Teachers. The climate of our time is supportive of the efforts of historians and philosophers of science.

Current Research Subject: Lise Meitner

1986 BALLOT FOR OFFICERS OF DIVISION

The Division needs to elect a Vice-Chairperson (one-year term, who becomes Chairperson the following year), a Divisional Councilor, three-year term and TWO members of the Executive Committee (three-year terms). The ballot must be returned by April 1, 1986 to the Secretary-Treasurer of the Division, A. Wattenberg/APS Div. Hist. Phys.; Physics Dept.; University of Illinois; 1110 W. Green St.; Urbana, IL 61801.

Vice-Chairperson - Vote for ONE

- JAMES T. CUSHING
 ROGER H. STUEWER

Divisional Councilor - Vote for ONE

- STEPHEN G. BRUSH
 SILVAN S. SCHWEBER

Executive Committee - Vote for TWO

- PETER GALISON
 JAY OREAR
 SALLIE A. WATKINS

BOOK PUBLISHERS

In this category we are trying to limit announcements to books that are recently published or about to be published, and whose contents directly relate to the History of: Physics, Physicists, Laboratories, and Associated Institutions.

American Institute of Physics

Spencer Weart and Melba Phillips - History of Physics This collection of reprinted articles from *Physics Today* includes seven Nobel Prize winners as authors. (The complete list of authors is given in HPN Vol. II number 3 page 42.)

Write to American Institute of Physics Marketing Service
335 East 45th St. New York, NY 10017

Cambridge University Press

Malcolm S. Longair - Theoretical Concepts in Physics An Alternative View of Theoretical Reasoning in Physics. *Thomas L. Hankins - Science and the Enlightenment* (General history of eighteenth century science) *John Ziman - An Introduction to Science Studies* The Philosophical and Social Aspects of Science and Technology. *Leonard S. Reich - The Making of American Industrial Research* Science and Business at GE and Bell, 1876-1926.

For further information write to Cambridge University Press
32 East 57th Street New York, NY 10022

University of Chicago Press

Albert Van Helden - Measuring the Universe Cosmic Dimensions from Aristarchus to Halley. *Pierre Duhem - Medieval Cosmology* Theories of Infinity, Place, Time, Void, and the Plurality of Worlds. *Jed Z. Buchwald - From Maxwell to Microphysics* Aspects of Electromagnetic Theory in the Last Quarter of the Nineteenth Century *Andrew Pickering - Constructing Quarks* A Sociological History of Particle Physics *Langdon Winner - The Whale and the Reactor* A Search for Limits in the Age of High Technology *Jungnickel and Russell McCormack - Intellectual Mastery of Nature* Theoretical Physics from Ohm to Einstein Volume I: The Torch of Mathematics, 1800-1870, analyzes the state of German physics within the new physics of the early nineteenth century. (available April 1986) Volume II; The Now Mighty Theoretical Physics, 1870-1925.

For further information write to The University of Chicago Press
5801 S. Ellis Ave. Chicago, IL 60637. The U of C Press has usually had a booth at the meetings of

the APS and the History of Science Society. They have offered a discount on their books at the meetings.

Garland Publishing

Stephen G. Brush and Lanfranco Belloni - The History of Modern Physics This is an International Bibliography which selects significant articles and books on the history of twentieth century physics since the discovery of X-Rays in 1895. The publishers are offering a special 20% discount to members of the Division of History of the APS.

For further information write to Garland Publishing Inc.
136 Madison Ave. New York, NY 10016.

Adam Hilger

Lesley Murdin - Under Newton's Shadow Astronomical Practices in the Seventeenth Century.

Write to Adam Hilger P.O.Box 230 Accord, MA 02018.

The MIT Press

Ruth Moore - Niels Bohr - The Man, His Science, and the World They Changed - This paperback biography is reported to be a good introduction to twentieth century physics for the non-scientists. *James Elliot and Richard Kerr - Rings: - Discoveries from Galileo to Voyager.*

For information write to The MIT Press
28 Carleton St. Cambridge, MA 02142.

North-Holland Physics Publishing

J. Kalckar - Foundations of Quantum Physics I (1926-1932) Niels Bohr - Collected Works vol. 6 deals with the birth of the complementarity argument and its subsequent development. - *Foundations of Quantum Physics II* Niels Bohr - Collected Works vol.7 continues with the extension and refinement of the complementarity argument up to Bohr's death. *H. J. Folse - The Framework of Complementarity* This is an interpretation of the Philosophy of Niels Bohr. *Martin J. Klein - Paul Ehrenfest Volume I - The Making of a Theoretical Physics.* This new paperback reprint covers Ehrenfest's life and work up to 1920.

For further information write to North-Holland Physics Publishing
Elsevier Science Publishing Co. 52 Vanderbilt Ave. New York, NY 10017

Princeton University Press

Rudolph Peierls - Bird of Passage - Recollections of a Physicist is Peierls' autobiography.

Write to Princeton University Press
41 Williams St. Princeton, NJ 08540.

SUMMARIES

Authors of books and articles on the history of physics are invited to send summaries for publication in this section. Maximum lengths: 75 words for articles, 150 words for books. (Longer summaries may be published of papers presented at Division symposia.) 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. Publication will be expedited if each summary is typed, on a separate sheet, in the format of the examples below.

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

19TH CENTURY
TEACHING

Hulin, Nicole. Une epreuve d'histoire des sciences aux agregations scientifiques dans la deuxieme moitie du XIXe siecle. Revue de Synthese, IIIe S, n 109: janvier-mars, 1983, p.53-73.

During the Second Empire, V. Duruy specialized the aggregation of sciences into three separate aggregations and introduced history of science in the examination. The influence of a report of Louis Pasteur on the usefulness of the historical method in teaching science seems likely. The paper brings to light the existence of history of science in the scientific aggregation and chiefly deals with the aggregation in physical science whose subjects are collected thanks to manuscript documents.

Author's address: N. Hulin, Centre Alexandre Koyre, 12 rue Colbert, 75002 Paris, France.

THEORY AND EXPERIMENT

Pickering, Andy. Against Putting the Phenomena First: The Discovery of the Weak Neutral Current. Studies in History and Philosophy of Science, 1984, 15: 85-117.

In 1973 the neutral current was discovered by particle physicists at CERN and Fermilab. The discovery entailed radical departures from precedent in the performance and interpretation of neutrino experiments. These departures can be related to the growing enthusiasm for electroweak gauge theory, which predicted the existence of the new phenomenon. Thus, the discovery of the neutral current was a product of the social symbiosis of theoretical and experimental practice in particle physics.

Author's address: Dept. of Sociology and Program in STS, University of Illinois, 326 Lincoln Hall, 702 S. Wright St., Urbana, IL 61801.

ORESME'S IMPETUS

Caroti, Stefano. "Ordo universalis" a "impetus" nel "Quodlibeta" di Nicole Oresme. Archives Internationales d'Histoire des Sciences, 1983, 111: 213-233.

Oresme's references to "ordo universalis" in his Quodlibeta are considered as an interesting, though hypothetical, effort to explain apparently unnatural phenomena. A Maier's censure of Oresme's impetus theory in his Quodlibeta is also discussed. A comparison with his analysis of impetus in his *Questiones super de celo* reveals an undeniable coherence in Oresme's position. His use of impetus is larger than usually supposed and not necessarily confined to accelerated motions.

Author's address: Stefano Caroti, Istituto di Storia della Scienza, Piazza dei Guidici 1, I -50122 Firenze, Italy.

EINSTEIN'S PHILOSOPHY

De Rita, R. and Guccione, S. Albert Einstein: The Scientific Monism Fundamenta Scientiae, 1984, 5, No. 2: 103-115.

In this paper we analyze some philosophical views which are deeply grounded in Einstein's work. In particular we argue that a specific and original character of Einstein's approach concerning physical theory consists in the reduction of a purely metaphysical notion -- namely, monism -- to an epistemological notion -- namely, completeness in physics -- which, translated into notions totally internal to physical science, puts constraints on the elaboration of a scientific theory.

Author's address: Istituto di Fisica Teorica, Mostra d'Oltremare Pad. 19, 80125, Napoli, Italy.

PRICE IN JAPAN

Yagi, Eri. Derek J. DeSolla Price. Personal Reminiscences (1922-1983). Historia Scientiarum (History of Science Society of Japan), 1984, No. 26: 115-117.

Being Professor Price's first Japanese graduate student at Yale (1960-63), she recalls their close cooperation, including the statistical studies on the development of physics in Japan. This cooperation resulted in the presentation of the experimental graph illustrating the origins and structure of the 'home-grown physicists process' in Japan, and how this could be applied to developing countries. Dr. Price referred to this work in his book *Little Science, Big Science*.

Author's address: Institute of Physics, Faculty of Engineering, Tokyo University, Kawagoe-shi, Saitama 350 Japan.

FASHIONABLE
PHYSICS

Kirchner, H.O. Fashions in Physics. Interdisciplinary Science Reviews, 1984, 9(2): 160-171.

The rise and fall of physical theories may have common features with the appearances and the disappearances of fashion, their political and economic roots. The history and philosophy of scientific methodology form the background to the consideration of big physics, accelerator research, and of small physics carried out with electronic equipment. The first is fashionable, the second not yet. It is concluded that science is a perpetual race, enjoyable for scientists to run.

Author's address: Institute of Solid State Physics, University of Vienna, Boltzmanngasse 5, A1090 Vienna, Austria and Department of Mechanical Engineering, MIT, Cambridge, MA 02139, USA.

HISTORY OF SECRECY

Whitrow, Magda. Editor. *isis* cumulative bibliography. Volumes 4 and 5. Civilizations and Periods. Volume 4. Prehistory to Middle Ages. xvii, 457 p. Volume 5. 15th to 19th centuries. xi, 593 p. London: Mansell in conjunction with the History of Science Society, 1982.

These volumes, like their predecessors, contain material published originally in the *isis* Critical Bibliographies 1-90, covering the years 1913-1965, dealing with a particular period or civilization up to and including the nineteenth century, entries dealing with the twentieth century or covering the general history of subjects having already been included in Volume 3. Volume 4 contains references to prehistory in general, including the prehistory and early civilizations in: Europe, Near East and Mediterranean, Asia, Australia and New Zealand, Africa, and of North and Latin America. All material on medieval Latin Europe is included in the main section on the Middle Ages. There are subdivisions on Byzantium, Armenia, Islam, and Jewish medieval culture in the Islamic world. Volume 5 contains sections on the Renaissance, the seventeenth, eighteenth and nineteenth centuries. Extensive references are made in both volumes to material in Volumes 1 and 2 (Personalities and Institutions) and entries on very specific subjects have been repeated. Volume 5, which also contains addenda to Volumes 1-3, concludes with a detailed subject index.

ISIS BIBLIOGRAPHIES

McMullin, Ernan. *Openness and Secrecy in Science: Some notes on early history Science, Technology and Human Values*, 1985, 10: 14-23.

There has been a tension between openness and secrecy in the history of science right from the beginning. The notion of science as publicly verifiable (Plato, Aristotle) was at odds with that of science as occult, as a source of power (Pythagoras). Technology was unrelated to science. Craft knowledge conferred advantage and was passed in a restricted way from father to son, from master to apprentice. In the Middle Ages, the notion of science as a universal human possession came to dominate, but the "occult" conceptions regained popularity in the Renaissance. Galileo used scientific innovation as a means to personal advancement, and tried to protect priority by means of anagrams. Bacon described a mythical "Solomon's House," a research establishment where invention is rewarded and secrecy is tight. This was also the age in which the "patenting" of new technologies first became widespread. When science is seen as a means of power or advancement, the ancient ideal of openness is inevitably threatened.

Author's address: Department of Philosophy, University of Notre Dame, Notre Dame, Indiana 46556.

BRIDGMAN
POSTHUMOUSLY

Bridgman, Percy W. *A Sophisticate's Primer of Relativity*, 2nd ed., 172 pp. Introduction by ARTHUR I. MILLER, xiviii. Wesleyan University Press, Middleton, CT, 1983, \$9.95 (pb).

Sophisticate's Primer exhibits a quest for clarity in foundations in the style of Ernest Mach and Henri Poincaré, in whose philosophical lineage Bridgman placed himself in his first book on the philosophy of science, *"The Logic of Modern Physics"* (1927). Bridgman's profound and far-reaching analysis of space, time, causality, clock synchronization, the nature of light, and the concept of the observer in *"Sophisticate's Primer"* is presented on a level that is basic enough to be appreciated by a wide spectrum of readers. Miller's Introduction compares Bridgman's unpublished manuscripts, on deposit at the Harvard University Archives, with his published philosophical writings during 1924-1959 in order to trace the development of these notions into their form in this posthumously published book.

MEDIEVAL
OPTICS

Lindberg, David C. *Studies in the History of Medieval Optics*. 302 pp. London: Variorum Publication, 1983. £26.

A collection of David Lindberg's articles on medieval optics, including studies of visual theory, the rainbow, the cause of refraction, the theory of radiation through small apertures, and the applicability of mathematics to nature. Also an analysis of the "optical community" of the thirteenth century and a survey of medieval optical thought. Major figures treated are the Muslims Alkindi, Avicenna, Alhazen and Averroes; and the Westerners Robert Grosseteste, Roger Bacon, Witelo, John Pecham, Henry of Langenstein, and Eliasius of Parma. These articles help to dispel the impression of the Middle Ages as a dormant period in the history of optics.

ENTROPY

Bierhalter, Günter. *Die v.Helmholtzschen Monozyklus-Analogieen zur Thermodynamik und das Clausiussche Disgregationskonzept*. *Archive for History of Exact Sciences*, 1983, 29(1): 95-100.

The paper is a study of the relationship between entropy and disgregation. These thermodynamic functions were introduced by the German physicist R. Clausius. The study is based on a mechanical analogy, which was established by H.v.Helmholtz.

Author's address: G. Bierhalter, Rudolf-Pöhler-Allee 8, D-7530 Pforzheim, Federal Republic of Germany.

REFLECTION OF COLD

Evans, T. and Popp, B. *Pictet's Experiment: The apparent radiation and reflection of cold*. *Am. J. Phys.* 53 (8), 1985.

Towards the end of the eighteenth century it was discovered by Marc-Auguste Pictet of Geneva that cold emanations from a flask of snow could be reflected and focused by mirrors in the same way as the emanations from a heated object. Pictet's discovery had an invigorating effect on research on radiant heat. We sketch the scientific milieu in which Pictet worked; describe the line of investigation that led him to his discovery, and summarize the theoretical explanations offered by Pictet and his contemporaries for this and related experiments. A simple qualitative explanation in modern terms is offered for the apparent radiation and reflection of cold. Finally, detailed directions are provided for replicating the experiment as a demonstration for the lecture hall.

Author's address: (Evans) Department of Physics, University of Puget Sound, Tacoma, Washington 98416. (Popp) Department of Physics FM-15, University of Washington, Seattle, Washington 98195.

VAN ALLEN

Van Allen, James A., *Origins of Magnetospheric Physics*. Smithsonian Institution Press, 144 pp. Washington, DC 20560 (1983) \$19.95 ISBN 0-87474-940-9

The subject matter of this monograph is centered on the discovery of the radiation belts of the earth in early 1958 with equipment on the earth satellites Explorers I and III, on the prompt confirmations of this discovery, and on its extensions to form the basis of the now well-developed discipline of magnetospheric physics.

The first five chapters describe the scientific heritage of the discovery and the 1946-57 observational work with equipment on high altitude rockets that provided the technical foundations for the conduct of investigative work with artificial satellites of the earth. The next five chapters deal with the discovery itself, with confirmatory work by subsequent U. S. and Soviet satellites, and with the production and observation of artificial radiation belts. The final chapter reviews second generation investigations and advances in physical interpretation up to the early 1960's.

The author's account has an autobiographical thread and depends on his large collection of: personal journals, notebooks, correspondence, unwritten recollections, and other unpublished material. Full citations of papers are given in an extensive bibliography.

PHYSICS EDUCATION

OLSKO E.M., Georgetown University. Abstract for an invited paper for the Atlanta meeting of the American Physical Society, 27-30 January 1986.

The publication in 1870 of Friedrich Kohlrausch's Introduction to Physical Measurements is generally regarded as a landmark in the history of German physics education. Striking a responsive chord in a society whose government was itself becoming increasingly interested in the political and economic usefulness of precision measurement, Kohlrausch's textbook was extremely successful, going through many editions until well into the twentieth century when even a pocket-sized version was issued for those who did not intend to become practicing physicists. But far from inaugurating a revolution in physics education, Kohlrausch's textbook was in fact the culmination of a strong tradition in the teaching of physics at German, and especially Prussian, secondary schools and universities. Even before Kohlrausch's birth in 1840, techniques of measurement, error analysis, and instrument modification were taught in some physics classes in Germany, especially at Göttingen and Königsberg where the influence of, respectively, the astronomers Gauss and Bessel was decisive in the introduction of precision techniques and data reduction into physics. This paper will focus on the principal features of this "practical physics" as it was taught at Königsberg under Franz Neumann and on the transmission of the techniques of practical physics into Prussian secondary schools by Königsberg-educated students.

RELATIVISM

Jaki, Stanley L., "The Absolute beneath the Relative: Reflections on Einstein's Theories" The Intercollegiate Review Vol. 20 No. 3 Spring/Summer 1985 pp. 29-38.

Relativism; -- philosophical, ethical and cultural -- is not a 20th-century phenomenon, but has, in this century, become greatly strengthened by references to Einstein's Relativity Theory. Contrary to the prevailing accounts, it is the most absolutist theory ever proposed in the history of science. Its absolutist character is displayed in the postulate of Special Relativity according to which, owing to their perfection or "beauty," the basic laws of physics (especially Maxwell's equations) must remain invariant regardless of the frame of reference. In General Relativity, the non-relativist view is further strengthened by its ability to deal scientifically with the totality of gravitationally interacting things, or the universe. Being a totality, such a universe cannot be relative to anything else. Its expansion has for some time been recognized as a non-relativistic frame of reference.

Author's address: P.O. Box 167, Princeton, New Jersey 08542

PRIESTLEY

Crosland, Maurice. Priestley memorial Lecture: A practical perspective on Joseph Priestley as a pneumatic chemist. British Journal for the History of Science, 1983, 16: 223-38.

It has never been satisfactorily explained how Priestley, the successful author of the History of Electricity, was transformed into one of the major figures in eighteenth-century chemistry. Not only did this mark a change of subject matter but a change of approach. Priestley's new chemical research was gleaned not from expensive books but from inexpensive apparatus. An economic reason is therefore advanced for the change. Priestley's new research was markedly more original, representing the transition from the literary to the experimental.

Author's address: Dr. M.P. Crosland, Unit for History of Science, Physics Laboratory, University of Kent, Canterbury, Kent. CT2 7NR, England. Unfortunately offprint stock exhausted.

WEAPONS POLICY

Dowling, John. Influence or Impotence? Scientists and Nuclear Weapons Policy. Presented at the 45 Annual Meeting, Blacksburg, Virginia, November, 1983. pp. 23.

Scientists wield considerable influence in developing and executing nuclear weapons policy. This paper examines three important issues and discusses the impact scientists have had on the Comprehensive Test Ban Treaty, the Freeze Movement, and the Strategic Defense Initiative.

Author's address: Copies free from John Dowling, Dept. of Physics & Astronomy, Michigan State University, E. Lansing, Michigan 48824.

DUTCH SEMICONDUCTOR RESEARCH

Schopman, Joop. Determinants of Research: A Study of the Factors which determined the development of the Dutch Semiconductor-research. Presented at the 45 meeting at Blacksburg, Virginia, Nov. 1983.

In the period (1930-1957) the Dutch semiconductor-research appeared to have been restricted to the N.V. Philips Gloeilampen Fabrieken, i.e. to an industrial context. The paper focuses on the determinants of the research. It takes the historical development as frame and points to the different determinants when they appear most clearly.

Author's address: Central Interfaculty, Heidelberglaan 2, 3508 TC Utrecht, The Netherlands.

OPPENHEIMER AND HEISENBERG

Molton, Gerald. "Success Sanctifies the Means": Heisenberg, Oppenheimer, and the Transition to Modern Physics" in Transformation and Tradition in the Sciences edited by E. Mandelson, (New York: Cambridge Univ. Press, 1984 pp. 155-73.

Contrasting the differences of scientific styles of Oppenheimer and Heisenberg, as well as their styles of leadership as the respective heads of the rival atomic weapons programs. Some insight into these differences can be found in looking into their personal histories of scientific apprenticeship, and into differences in the educational systems of their home countries.

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

HIGH-POLYMER DIVISION

Wood, Lawrence A. "The Founding of the Division: Reminiscences of the 1940's" Invited paper presented at the 40th anniversary meeting of the APS Division of High-Polymer Physics, Detroit, Michigan, March 27, 1984.

The APS Division of High-Polymer Physics, founded in 1943 is the second oldest Division of the Society. Following a Symposium on the Physics of Rubber at an APS meeting in Evanston, Illinois arranged by Warren Busse, an organizing committee of the society, including Busse, Dabye, Dillon, Lyons, and Wood, prepared an inaugural meeting in Rochester in 1944. The author recalls the detailed history of the founding and presents reminiscences of the other founders.

Author's address: For a copy of the unpublished manuscript (about 15 pages) write to Lawrence A. Wood, Polymers Division, National Bureau of Standards, Gaithersburg, Maryland 20899.

PHILOSOPHY TO POLITICS

Molton, Gerald. Do Scientists Need a Philosophy? Times Literary Supplement, 2 November 1984 (also in Le Débat [Paris], Number 35, May 1985, with added footnotes and references).

Case examples are used to show that during the past few decades there has been a striking shift away from the star scientists' earlier preoccupation with explicit philosophical problems. In their place we now find implicit ones (though hidden beneath the avowal of complete pragmatism), and a rising interest of the scientific community in ethical-political concern.

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

YUKAWA'S MESON

Brown, Laurie M. How Yukawa Arrived at the Meson Theory. 14 pages. Paper presented at Kyoto International Symposium: The Jubilee of the Meson Theory, Kyoto 15-17 August, 1985. Preprint MPI-PAE/PT 43/85 of the Max-Planck-Institut fuer Physik und Astrophysik, Werner-Heisenberg-Institut fuer Physik, 8000 Muenchen 40, Fed. Rep. of Germany.

From a study of unpublished manuscripts of Hideki Yukawa in the Yukawa Hall Archival Library at Kyoto University, the steps are reconstructed by which Yukawa arrived at his pathbreaking meson theory of nuclear forces.

Author's address: Department of Physics and Astronomy, Northwestern University, Evanston, IL 60201. For free preprints, please write to the Max-Planck-Institut at the address given above.

DIRAC & HEISENBERG

Brown, Laurie M. and Rechenberg, Helmut. Paul Dirac and Werner Heisenberg--A Partnership in Science. 54 pages. To be published in a memorial volume for P.A.M. Dirac. Preprint of Max-Planck-Institut fuer Physik und Astrophysik, Werner-Heisenberg-Institut fuer Physik, 8000 Muenchen 40, Fed. Rep. of Germany.

The fruitful scientific and personal relationship of Dirac and Heisenberg over a period of nearly fifty years is reviewed, with particular attention to their exchanges of letters and a trip around the world in 1929. Three periods are emphasized: 1925-27 (discovery and completion of quantum mechanics), 1928-32 (relativistic electron equation and quantum electrodynamics), and 1935-76 (quantum fields and elementary particles).

For free preprints, write to Helmut Rechenberg of the Max-Planck-Institut, at the address above.

SECOND LAW

Bierhalter, Günter. Die mechanischen Entropie- und Disgregationskonzepte aus dem 19. Jahrhundert: ihre Grundlagen, ihr Versagen und ihr Entstehungshintergrund. Archive for History of Exact Sciences, 1985, 32(1): 17-41.

This study deals with the question whether Hamilton's principle explains the 2nd law of thermodynamics in its form $dQ = T ds$. Such attempts were started by L. Boltzmann, R. Clausius and C. Szily. The paper also points out the relationship between the 2nd law and the principles of Maupertuis and Fermat.

Author's address: G. Bierhalter, Rudolf-Pöhler-Allee 8, D-7530 Pforzheim, Federal Republic of Germany.

NEWTON'S RAINBOW

Epstein, Julia L. and Greenberg, Mark L. Decomposing Newton's Rainbow. Journal of the History of Ideas, 1984, 45: 115-40.

The pervasive presence of Sir Isaac Newton in the poetry written during the hundred years following his death in 1727 raises fundamental questions about the impact of scientific discovery on the production and reception of literature. This article traces the history of the rainbow, as object of optical study and as aesthetic crux, to demonstrate how an image from science was appropriated by writers, translated into poetry, and transformed by the poetic process.

Authors' address: Department of Humanities and Communications, Drexel University, Philadelphia, PA 19104.

NEUTRONS IN ROME

Amaldi, E. Neutron work in Rome in 1934-36 and the discovery of fission. Rivista di Storia della Scienza: (1984) 1:1-24.

The discovery by E. Fermi of artificial radioactivity induced by neutrons (March 1934) was followed by a systematic investigation that lead to: (a) the production of many new radionuclides by (n,p) , (n,α) and (n,γ) processes; (b) the discovery of slow neutrons; (c) the discovery of anomalously large cross sections for a number of (n,γ) processes due to slow neutrons (1935); (d) the existence of slow neutron resonances in medium and heavy nuclei (1936); (e) the interpretation of some of the results obtained in uranium in terms of transuranic elements (1934). The interpretation of the results (d) required the compound nucleus model of N. Bohr and the one-level-formula of Breit and Wigner (1936). The further investigation of point (e) lead to the discovery of fission by Hahn and Strassmann.

For reprint write to Prof. E. Amaldi, Dipartimento di Fisica, Università degli Studi di Roma "La Sapienza," 00185 Roma, Piazzale Aldo Moro 2, Italy.

FIELD THEORY IN THE U.S.

PICKERING, ANDY. From Field Theory to Phenomenology: The History of Dispersion Relations. To appear in Proceedings of the International Symposium on Particle Physics in the 1950's: Pions to Quarks, Fermi National Accelerator Laboratory, 1-4 May, 1985. Pp.45.

History of the development and application of dispersion relations in elementary-particle theory in the 1950's. Analyzes the decline of quantum field theory in favour of pragmatic, phenomenological theorising, especially in the US.

Copies available from the author of Dept: of Sociology and Program in STS, University of Illinois, 225 Lincoln Hall, 702 S. Wright St. Urbana, IL 61801.

THE OTHER EINSTEIN

Barris, Timothy. The Other Einstein. Science 83, October, 1983, 35-40.

Humanist as well as scientist, Einstein wrote that "humanity has every reason to place the proclaimers of high moral standards and values above the discoverers of objective truth." A substantial portion of his writings, especially in his later years, dealt with peace, justice, and related ethical and religious questions. He persisted in advocating world government and decrying the evils of nationalism and militarism despite stringent opposition.

Copies of the October issue \$2 from Science 86, 1333 H St., NW, Washington 20005.

WAVE MECHANICS

Tagliaferri, Guido. Storia della fisica Quantistica, Dalle origini alla Meccanica Ondulatoria, Franco Angeli, Milano, Italy: 1985, 448 pp.

History of physics textbook for third-fourth year physics majors focusing on the history of quantum physics both theoretical and experimental in the first quarter of this century.

EMIGRES IN AMERICA

Stuewer, Roger H. Nuclear Physicist in a New World. The Emigrés of the 1930's in America. Berichte zur Wissenschaftsgeschichte.

Among the large number of refugees from Nazism and Fascism entering the United States between 1933 and 1941 were more than 100 physicists, including some of the most gifted nuclear physicists in the world. By that time physics in America had come of age, and a remarkable and multifaceted symbiosis occurred between the emigré and nativeborn nuclear physicists as they pursued the many avenues of research opened up by the discoveries and inventions of 1932 (neutron, deuterium, positron, Cockcroft-Walton accelerator, cyclotron). Of particular importance for the consolidation and development of the entire field of nuclear physics was the publication in 1936-37 of the three articles in the Reviews of Modern Physics known as the "Bethe Bible". With the discovery of nuclear fission in 1938 and the outbreak of war in Europe in 1939, the fear that a nuclear weapon might fall into Hitler's hands served as a powerful unifying force among nuclear physicists in America, emigrés and non-emigrés alike, and most placed their talents in the service of the United States.

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

ACOUSTICS

Ulimann, Dieter. Chladni und die Entwicklung der experimentellen Akustik um 1800. Archive for History of Exact Sciences, 1984, 31: 35-52.

After the description of Chladni's roots for his interest in experimental acoustics, his most important papers and books on acoustical questions are demonstrated. The great influence of Chladni's ideas on the scientific findings in acoustics in the first half of the 19th century is shown.

Author's address: D.Ulimann, Akademie der Wissenschaften der DDR, Institut für Mechanik, Rudower Chaussee 5, DDR-1199 Berlin, German Democratic Republic.

BKS THEORY

Konno, H. Slater's Evidence for the Genesis of the Bohr-Kramers-Slater Theory. Historia Scientiarum, 1983, 25: 39-52

Concerning the genesis of the Bohr-Kramers-Slater theory, Slater's reminiscences have been the only available sources. Recently, however, Slater's unpublished primary documents have become accessible. By exploiting these archives, this paper reexamines the genesis of the BKS theory and reveals new evidence on the problem.

Author's address: Kagoshima Immaculate Heart College, 1847 Kamoikecho, Kagoshima 890, Japan.

TECHNOLOGICAL CHANGE

London, Rachel, ed. The Nature of Technological Knowledge. Are Models of Scientific Change Relevant? vii + 145 pp. Dordrecht, Holland and Boston: Reidel, 1984. \$25.00.

Recent work on theories of scientific change deriving from Kuhn's Structure of Scientific Revolutions is used as a source of conceptual categories for understanding cognitive change in technology. Unlike former analysts of technological change who have concentrated on demand-pull or supply-push factors, the authors in this volume attempt to get inside the "black box" and analyze the communities responsible for generating technological knowledge.

"ISOTOPE"

Kaufmann, George B. The Atomic Weight of Lead of Radioactive Origin: A Confirmation of the Concept of Isotopy and the Group Displacement laws. Journal of Chemical Education, 1982, 59:3-8; 119-123.

The development of the concept of isotopy from Hahn's discovery of radiothorium (1905) to Soddy's proposal of the term "isotope" (1913) is presented with brief review of the Fajans-Soddy group displacement laws. The two major predictions of these laws--the origin of actinium and the atomic weight of lead of radioactive origin--were verified by Fajans, Soddy, Hyman, Richards, Lambert, Maurice Curie, Hönigschmid, Horowitz, and others.

Author's address: Department of Chemistry, California State University, Fresno, California 93740

BACON AND LIGHT

Lindberg, David C., Roger Bacon's Philosophy of Nature: A Critical Edition, with English translation, introduction, and notes of De multiplicatione specierum and De speculis comburentibus. lxxxi + 420 pp. Oxford: Clarendon Press, 1983. \$84.

Central to Bacon's philosophy of nature was the doctrine that all natural causation occurs by a process of radiation, of which the radiation of light is a visible instance and therefore the paradigm base. Bacon believed that an investigation of the behavior of light would lead to an understanding of nature's inner workings. De multiplicatione specierum represents Bacon's best and fullest attempt to explore all the implications of this doctrine. The shorter work, De speculis comburentibus explores in detail the modes of propagation of light. The two texts are edited, translated, and prefaced by a lengthy introduction.

SOLAR NEUTRINOS

Finch, Trevor The Social Construction of Experimental Knowledge in Physics, Solar Neutrinos and Oblateness of the Sun. Presented at the 18th Annual Meeting of the Canadian Sociology and Anthropology Association.

A new schema for the analysis of scientific observation is proposed. The concepts of 'externality' and 'evidential' context of observational reports are introduced. The analysis is illustrated by reference to the attempt to detect solar neutrinos and to measure solar oblateness. Some of the consequences of the new schema for the analysis of scientific language, access to experimental data, and black-box instrumentation are developed.

For reprint (and fuller version of the paper) write to: T. Finch, Department of Sociology, University of York, Heslington, York, YO1 5DD, England.

INFRARED BANDS

Fujisaki, C., From Deslandres to Kratzer, Development of the Understanding of the Origin of Infrared Band Spectra, Historia Scientiarum, no. 24 (1983) 53-75; no. 25 (1983) 57-86.

This paper corresponds to the prehistory of formation of quantum chemistry. It is indicated that Drude's theory of dispersion (1904), Einstein's theory of specific heat of solid (1907), Bjerrum's theories of infrared band (1911, 1912), Ehrenfest's theory of rotational energy (1913), Schwarzschild's theory of rotational band (1916), Heurlinger's theory of molecular band (1920), and Lenz's and Dratzer's theories of infrared band (1919, 1920) played very important roles in the development of understanding of infrared band during the period from 1880 to 1920.

Author's address: Div. of Chem., Dep. of General Education, Niigata University, 8050 Ikarashi Nino-cho, Niigata 950-21, Japan

W. H. BRAGG

Howe, R.W. The problem of intellectual isolation in scientific life: W.H. Bragg and the Australian scientific community, 1886-1909. Historical Records of Australian Science, 1984, 6(1): 19-30.

Discusses Bragg's relationships with other members of the tiny group of physical scientists in late 19th and early 20th-century Australia. From them, Bragg obtained encouragement and support as he matured as a physicist. Once he embarked upon his outstanding programme of research on radioactivity, however, the group could no longer provide the kind of detailed informed criticism that Bragg needed. As he progressed to become one of the leading researchers in his field, he came to experience a more particular kind of isolation than before, here referred to as "the isolation of the elite".

Author's address: Department of History & Philosophy of Science, University of Melbourne, Parkville, Vic. 3052, Australia.

EINSTEIN'S 1905

Perrie, Timothy, Einstein's Wonderful Year. Science 84, November, 61-63.

Undistinguished when he celebrated his 26th birthday on March 14, 1905, Einstein managed, before the year was out, to complete six epochal papers. Two of them created a new branch of physics, relativity; a third established part of the foundations of quantum mechanics; and the other three altered the course of statistical mechanics and helped convince scientists of the reality of atoms. In retrospect, Einstein's appetite for unified theory can be seen as a theme running through much of his work, even as early as 1905. The recent advances in approaching a final unified theory of particle interactions suggests that Einstein's dream may be fulfilled prior to 2005, the anniversary of his annus mirabilis.

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HISTORY OF PHYSICS NEWSLETTER

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