Education Outreach Insert

APS NEWS

JANUARY 1998 THE AMERICAN PHYSICAL SOCIETY VOLUME 7, NO 1

Try the enhanced APS News-online: [http://www.aps.org/apsnews]

Langer Chosen as APS Vice-President in 1997 Election

Members of The American Physical Society have elected James S. Langer, a professor of physics at the University of California, Santa Barbara, to be the Society's next vice-president. Langer's term begins on January 1 , when he will succeed Jerome Friedman (Massachusetts Institute of Technology), who will become president-elect. Langer will become APS president in 2000. The 1998 president is Andrew Sessler (Lawrence Berkeley Laboratory) (see interview, page 2).

In other election results, Daniel Kleppner of the Massachusetts Institute of Technology was elected as chair-elect of the Nominating Committee, which will be chaired by Wick Haxton (University of Washington) in 1998. The Nominating Committee selects the slate of candidates for vice-president, general councillors, and its own chair-elect. Its choices are then voted on by the APS membership. Beverly K. Berger (Oakland University), Cynthia McIntyre (George Mason University), Roberto Peccei (University of California, Los Angeles), and Helen Quinn (Stanford Linear Accelerator Center) were elected as general councillors.

Vice-President

James S. Langer was born in Pittsburgh in 1934. He received his Ph.D. in mathematical physics under the supervision of R.E. Peierls at the University of Birmingham, England in 1958. He joined the Physics Department at Carnegie Mellon University in 1958. In 1982, he became professor of physics and a member of the Institute for Theoretical Physics at the University of California, Santa Barbara, serving as its director from 1989 to 1995. The 1997 recipient of the APS Oliver E. Buckley Prize, Langer's research generally has been in the theory of nonequilibrium phenomena in condensed matter. His specific areas of interest have been quantum many-body theory of transport in solids, the kinetics of first-order phase transitions including nucleation and spinodal decomposition, dendritic pattern formation in crystal growth and, most recently, the dynamics of earthquakes and fracture.

Langer's most recent national committee service includes stints as chair of the APS Division of Condensed Matter Physics; chair of the APS Nominating Committee (1995); chair of the Physics Section of the AAAS (1992); and chair of the Panel on Research Opportunities and Needs, Materials Science and Engineering Survey, National Research Council (NRC) (1986-89).

In his candidate's statement, Langer identified three outstanding responsibilities of the APS and its leadership: (1) to continue to play a leading role among U.S. scientific societies in making the case for adequate and stable national investments in research; (2) to maintain the health of the APS meetings and especially its journals, in light of the move towards electronic publications; and (3) to sustain broad-ranging outreach and educational programs to keep the public better informed about physics research, and encourage young students to consider careers in physics.

However, he also emphasized a more important and challenging underlying issue: that of maintaining the vitality of physics as an intellectual discipline, which he believes can be best accomplished by broadening the horizons of physics beyond a fixed set of research topics. In particular, he cited the plethora of physics-based instrumentation and the rapidly increasing power of computers that have given rise to a rich array of fascinating

(Continued on page 4)

Shuttle Physics

Life APS member, Roger K. Crouch, a payload specialist aboard the 83rd flight of the United States Space Shuttle, *Columbia*, volunteered to take with him an APS paperweight commemorating the 100 year anniversary of the electron and 50 year anniversary of the transistor. The framed paperweight and certificate of authenticity (pictured here) as well as a collage of pictures from the mission prepared by NASA were formally presented to APS Executive Officer, Judy Franz, and Treasurer, Thomas McIlrath at the American Center for Physics on November 20, 1997. The momento is on display at APS headquarters in College Park, MD.

Inside...

News

Communication, APS Centennial Are Sessler's Top Priorities in 1998 2
Incoming APS President Andrew Sessler outlines his priorities for the Society in the coming year.

The Sad Story of Heisenberg's Doctoral Oral Exam 3
Heisenberg almost failed his PhD thesis defense.

IN BRIEF 3
The Department of Energy (DOE) announced the team that will operate Brookhaven.

Michels Gains Broader Perspective During Fellowship Year 4
Outgoing APS Congressional Fellow spent the past year learning the ins and outs of Washington politics.

Optical Storage, Atom Traps Featured at Annual Laser Science Meeting 5
Optical and laser scientists from around the world gathered in Long Beach, California, for the ILS-XIII Conference.

Endorsement of Senate NRIA-1998 Bill Culminates Year-Long Efforts By APS 6
The APS officially endorsed a bipartisan Senate Bill that calls for a doubling of federal funding for scientific research over the next decade.

LETTERS TO THE EDITOR 7
Lipkin on nuclear superconductivity.

ZERO GRAVITY 7
The 1997 Darwin Award goes to a high flyer.

FELs, Biological Physics Featured at SESAPS Meeting 7
The highlights of the 63rd Annual APS Southeastern meeting at Vanderbilt University.

Chiral Perturbation Theory, Discrete Symmetries Highlight 1997 Nuclear Physics Meeting 8
The latest research topics featured at the annual fall meeting of the APS DNP.

Two APS Publications to be Discontinued 8
Physical Review B-rapids and Physical Review Abstracts will be discontinued.

APS James C. McGroddy Prize for New Materials 8
The APS Council voted to establish the APS James C. McGroddy Prize for New Materials.

APS Nomination Forms 9
Nomination for APS Fellow/Nomination Ballot

Two Young Physicists to Receive 1998 APS Apker Awards 10
Anna Lopatnikova and Cameron Geddes were named recipients of the 1998 Apker Award for their research achievements as undergraduates.

Announcements 11

The Back Page 12
Bernard Ortiz de Montellano on the problem of post-modern multiculturalism and scientific illiteracy.

SPECIAL EDUCATION INSERT

Three APS Constitutional Amendments Approved

The 1997 ballot also included three constitutional amendments, approved by the APS Council upon recommendation of the APS Committee on Constitution and Bylaws. All three were approved by more than 80% of the votes cast. Specifically, the stated APS objective was amended to better articulate the Society's concern for science education and public affairs and to include activities in those areas. Article II of the Constitution now reads, "In the firm belief that an understanding of the nature of the physical universe will be of benefit to all humanity, the Society shall have as its objective the advancement and diffusion of the knowledge of physics."

The remaining two amendments concerned the value of the variable (X) as it applies to units losing representation on Council. The first (Article VIII) was intended to stabilize the Council representation of several APS units with membership levels that fluctuated near the value of X, which is 3% of the total APS membership. The second (Article IX) applies the same policies to the APS geographical sections. For details see *APS News,* February and June 1997.

FREE Access to Reviews of Modern Physics Online

The APS is pleased to announce that *Reviews of Modern Physics* was released on the World Wide Web on December 8, 1997 and will be accessible to all users free of charge until July 1, 1998. APS members who wish to continue to access *RMP-online* after July 1, 1998 may register a subscription. Pricing information will be announced as it becomes available. Please visit *RMP-online* at **http://rmp.aps.org**. Questions and comments are welcome and should be sent to the APS Associate Publisher at 301-209-3202 (telephone), 301-209-0844 (fax), or assocpub@aps.org (e-mail).

Communication, APS Centennial Are Sessler's Top Priorities in 1998

Andrew Sessler (Lawrence Berkeley Laboratory assumed the APS presidency on January 1st, 1998. In the following interview, he outlines his prevailing concerns and priorities for the Society in the coming year.

Q If you had to pick one over-riding theme to define the underlying common denominator for your priorities as APS president, what would it be?

A First and foremost, I would say communication. By that I mean communication with the general public, with politicians, and with students at all levels of the educational ladder. It's very important that the public become more aware of physics. We have a great story to tell: all the accomplishments of the last century and the exciting prospects for the future.

In addition, we need to foster better communication with our own members. We have so many education and outreach activities in the areas of K-12 education, women and minorities in physics, and public affairs, but very few APS members are aware of what we're doing. We know this from the recently completed membership survey (see *APS News*, October 1997), and I have also experienced it anecdotally. Every time I talk with members about APS activities, they say, "Well, why don't you tell the members?" And I respond, "My God, all we do is tell the members. The members don't listen." Editors note: See insert in this issue; *Educational Outreach*.

Also, although the APS is a volunteer organization, we do have a very large, highly skilled staff of about 200 — operating under the direction of APS Executive Officer Judy Franz, Associate Executive Officer Barrie Ripin, Editor-in-Chief Marty Blume and APS Treasurer Tom McIlrath — that is necessary to carry out all the functions we undertake, but the membership is often not aware of them. Better communication with our members allows then to better communicate APS activities to the general public. This in turn ultimately helps us improve our communication with the general public, which is, after all, one of our primary missions.

Q How has the Society evolved in terms of how it interprets its mission over the last 100 years?

A Over the years the APS has evolved into a society with a social conscience. Until 1972, the Society was primarily concerned with organizing meetings and publishing its journals. That year, the APS organized the Forum on Physics and Society. Later in the decade, this gave rise to the Panel on Public Affairs, which dealt with physics and public affairs. In 1980, we formed the Committee on the International Freedom of Scientists to address human rights issues, since, as Andrei Sakharov has said, "The interests of science must include the defense of members of the scientific community from injustice." Also in the 1980s we formed committees on women and minorities in physics. The Physics Planning Committee was born in 1988 to focus specifically on physics funding. In the 1990s we witnessed the formation of the Committee on Applications of Physics and the Forum on Industrial and Applied Physics (FIAP). And just last year we established the Committee on Careers and Professional Development.

So we've evolved from an organization concerned only with physics, to an organization concerned about the social impact of physics, and finally to an organization concerned about the civil and human rights of physicists in this and other countries, as well as employment opportunities for physicists. I think that's an important element for physics in the coming century. Ilya Ehrenberg, one of the greatest Soviet writers of this century, said in Moscow, in 1966, "A person who has only knowledge but no…conscience, this is not a person, but a half-finished thing. Even if we are talking about a talented physicist…" That's still true in America today.

Q The upcoming APS Centennial celebration in 1999 will undoubtedly require a great deal of planning and effort in the coming year.

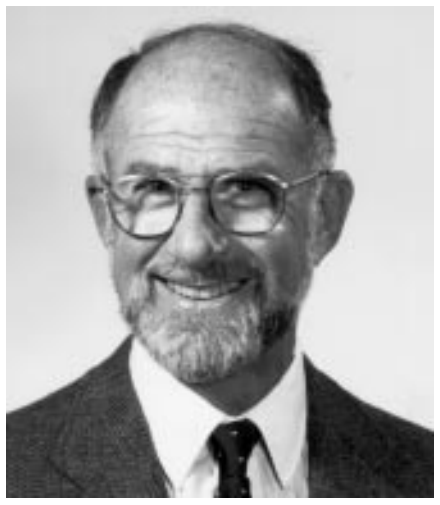
A Absolutely. The Centennial celebration is our number one priority for 1998. We have a team in place now, with Brian Schwartz and Franmarie Kennedy (see *APS News*, December 1997), and we're working on a broad range of projects connected with that. It's going to be a very large, festive affair, and very much an international collaboration. We're expecting more than 40 Nobel laureates to attend, who will be available to interact with the public. We're also developing projects designed to last beyond the Centennial celebration: a special issue of *Reviews of Modern Physics*, outlining the great accomplishments and themes of physics in this century; a 27-foot wall chart depicting physics highlights; a coffee table book for the general public; and a collection of photos of famous physicists from this century.

Also, we've hired a large public relations firm to assist us, not just with the Centennial, but with the whole issue of communication. We, as physicists, have certainly not been very good at communicating, so maybe it's time to go professional. However, this is a long-term objective that cannot be accomplished overnight. We're hoping the Centennial celebration will mark the start of a major new direction for the APS. I feel it is the next logical step in the Society's continuing evolution: from building physics in the U.S., to developing a social conscience, to being concerned about physicists as well as physics. The next step is fostering better communication of physics to the general public.

Q Obviously an important component of communication is education. Is this another top priority for the Society?

A Yes. The recent Campaign for Physics, spearheaded by Nico Bloembergen and Darlene Logan, raised more than $5 million for educational activities. The APS has been focusing a great deal of effort on the Teacher-Scientist Alliance program, headed by Education Director Ramon Lopez, which is a way to encourage scientists to interact with teachers and contribute to public schools. I think it's unclear to most physicists how they can contribute to their local schools. Better communication is needed to get them involved, whether they give a lecture, visit a class room, judge a science fair, or simply be a resource for teachers. I know a Livermore physicist who set up an Email-Net a few years ago with local high school teachers. If they get a question in class that they don't know the answer to, they email him for the answer. I've talked to some high school teachers in this area and they would love to do that with scientists. It is less threatening than having a scientist come into your classroom, and can be quite effective.

The APS Division of Plasma Physics just sponsored a special day for more than 1,000 school children at its meeting last November in Pittsburgh, Pennsylvania, and other APS units have undertaken similar efforts. In addition, many university departments are making substantial outreach efforts in K-12 and general public education. For example, the University of Michigan holds free public lectures on physics every fall on Saturday mornings, given by postdocs. The University of Illinois has a Cyber lab, a Saturday honors program, teacher's workshops, and nearly 6000 children and 200 teachers in Central Illinois and Chicago areas have enjoyed the 63 physics traveling van shows given between the program's conception in 1994 and the spring of 1996. There are also more than 200 hands-on science museums that have sprung up around the country and are very popular. So a lot of effort is being made, and more needs to be made, in education.



Q What is the APS doing to ensure the continued economic health of the physics enterprise?

A There has been substantial effort for the last year to garner support for a bill to double the amount of R&D funding in the U.S., spearheaded by [APS Past President] Allan Bromley (see *APS News*, November 1997) with the assistance of the APS Office of Public Affairs, led by Bob Park and Mike Lubell. This mustn't be an isolated, one-time effort. Politicians need to appreciate that physics is a driving engine to economic wealth, to our quality of life, and especially to advances in medicine. We wouldn't have MRI, PET scans or CAT scans without physics. It's all inter- related and we will need sufficient funding in the future for physics research if this growth is to continue.

The public shouldn't consider physics to be irrelevant. We can accomplish this by communicating the new role of physics, emphasizing that it does have a role in post-Cold-War society, just a different one. For instance, physicists are addressing what is inevitably going to be a significant problem for society in the next 100 years, namely sources of energy, specifically fusion and solar energy.

Q Is there still room in the current tight budgetary climate for less strategically focused research, which many scientists believe is equally necessary for the future of science and technology in this country?

A I think so. After all, beyond the practical benefits of physics research, there are significant intellectual contributions. That's a harder sell these days, but physics still has a lot to contribute in purely intellectual areas. For example, high energy physics is grappling with the question of why there is more matter than antimatter, which is presumably related to the question of CP noninvariance. It's a wonderful question and we're building *B* factories to try to answer it. Another major question is, What is the origin of mass? We simply don't know why some particles, like the proton, are massive, while the electron has almost no mass. So we are engaged in activities like the Large Hadron Collider to try to understand this problem.

These are two very fundamental philosophical questions in which the public

APS News

Coden: ANWSEN ISSN: 1058-8132
Series II, Vol. 7, No. 1 January 1998

Editor: Barrett H. Ripin
Newswriter: Jennifer Ouellette
Production: Elizabeth Buchan-Higgins
Coordinator: Amy Halsted

APS News (ISSN: 1058-8132) is published 11X yearly, monthly, except the August/September issue, by The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, (301) 209-3200. It contains news of the Society and of its Divisions, Topical Groups, Sections and Forums; advance information on meetings of the Society; and reports to the Society by its committees and task forces, as well as opinions.

Letters to the editor are welcomed from the membership. Letters must be signed and should include an address and daytime telephone number. The APS reserves the right to select and to edit for length or clarity. All correspondence regarding *APS News* should be directed to: Editor, *APS News*, One Physics Ellipse, College Park, MD 20749-3844, email: letters@aps.org.

Subscriptions: *APS News* is an on-membership publication delivered by Periodical Mail. Members residing abroad may receive airfreight delivery for a fee of $20. **Nonmembers:** Subscription rates are: domestic $160; Canada, Mexico, Central and South America, and Caribbean $180; Air Freight Europe, Asia, Africa and Oceania $210.

Subscription orders, renewals and address changes should be addressed as follows: **For APS Members**—Membership Department, The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, membership@aps.org. **For Nonmembers**—Circulation and Fulfillment Division, American Institute of Physics, 500 Sunnyside Blvd., Woodbury, NY 11797. Allow at least 6 weeks advance notice. For address changes, please send both the old and new addresses, and, if possible, include a mailing label from a recent issue. Requests from subscribers for missing issues will be honored without charge only if received within 6 months of the issue's actual date of publication.

Periodical Postage Paid at College Park, MD and at additional mailing offices. Postmaster: Send address changes to *APS News*, Membership Department, The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844.

The Sad Story of Heisenberg's Doctoral Oral Exam

by David Cassidy

In May 1923 Werner Heisenberg returned to Munich from Gottingen, where he had been a visiting student, to finish out his last semester while writing his doctoral dissertation. Knowing Heisenberg's reputation for controversial solutions to problems in quantum theory, his Munich mentor, Arnold Sommerfeld, suggested that he write his dissertation in the more traditional field of hydrodynamics.

Heisenberg also had to take the four-hour laboratory course in experimental physics offered by Prof. Willy Wien. Wien insisted that any physicist, including Sommerfeld's brilliant theorists, must be fully prepared in experimental physics. Wien and Sommerfeld both sat on the candidate's final oral exam and both had to agree on a single grade in physics.

While Heisenberg struggled through Wien's lab course (much to Wien's displeasure at the results), Heisenberg prepared his dissertation. He submitted his dissertation, a 59-page calculation titled "On the Stability and Turbulence of Liquid Currents," to the Munich faculty on July 10, 1923. The topic arose from an earlier research contract Sommerfeld had received from a company channeling the Isar River through Munich. The problem was to determine the precise transition of a smoothly flowing liquid (laminar flow) to turbulent flow. It was an extremely difficult mathematical problem; in fact, it was so difficult that Heisenberg offered only an approximate solution. "I would not have proposed a topic of this difficulty as a dissertation to any of my other pupils," wrote Sommerfeld. The faculty accepted the thesis and Wien accepted it for publication in the physics journal he edited, but when the mathematician Fritz Noether raised objections in 1926, the results remained in doubt for nearly a quarter century until they were finally confirmed.

Acceptance of the dissertation brought admission of the candidate to the final orals, where in this case trouble began. The examining committee consisted of Sommerfeld and Wien, along with representatives in Heisenberg's two minor subjects, mathematics and astronomy. Much was at stake, for the only grades a candidate received were those based on the dissertation and final oral: one grade for each subject and one for overall performance. The grades ranged from I (equivalent to an A) to V (an F).

As the 21-year-old Heisenberg appeared before the four professors on July 23, 1923, he easily handled Sommerfeld's questions and those in mathematics, but he began to stumble on astronomy and fell flat on his face on experimental physics. In his laboratory work Heisenberg had to use a Fabry-Perot interferometer, a device for observing the interference of light waves, on which Wien had lectured extensively. But Heisenberg had no idea how to derive the resolving power of the interferometer nor, to Wien's surprise, could he derive the resolving power of such common instruments as the telescope and the microscope. When an angry Wien asked how a storage battery works, the candidate was still lost. Wien saw no reason to pass the young man, no matter how brilliant he was in other fields.

An argument broke out between Sommerfeld and Wien over the relative importance of theory and experiment. The result was that Heisenberg received the lowest of three passing grades in physics and the same overall grade (cum laude) for his doctorate, both of which were an average between Sommerfeld's highest grade and Wien's lowest grade.

Sommerfeld was shocked. Heisenberg was mortified. Accustomed to being always at the top of his class, Heisenberg found it hard to accept the lowest of three passing grades for his doctorate. Sommerfeld held a small party at his home later that evening for the new Dr. Heisenberg, but Heisenberg excused himself early, packed his bag, and took the midnight train to Gottingen, showing up in Max Born's office the next morning. Born had already hired Heisenberg as his teaching assistant for the coming school year. After informing Born of the debacle of his orals, Heisenberg asked sheepishly, "I wonder if you still want to have me."

Photo from the Niels Bohr Library.

Werner Heisenberg (~1927)

Born did not answer until he had gone over the questions Heisenberg had missed. Convincing himself that the questions were "rather tricky," Born let his employment offer stand. But that fall Heisenberg's worried father wrote to the famed Gottingen experimentalist James Franck, asking Franck to teach his boy some experimental physics. Franck did his best, but could not overcome Heisenberg's complete lack of interest and gave up the effort. If Heisenberg was going to survive at all in physics it would be purely as a theorist.

There is an interesting epilogue to this story. When Heisenberg derived the uncertainty relations several years later, he used the resolving power of the microscope to derive the uncertainty relations—and he still had difficulty with it! And again, when Bohr pointed out the error, it led to emotional difficulties for Heisenberg. Likewise, this time a positive result came of the affair: Heisenberg's reaction induced Bohr to formulate his own views on the subject, which ultimately led to the so-called Copenhagen Interpretation of quantum mechanics.

David Cassidy (Hofstra College) is Secretary-Treasurer of the Forum on History of Physics. This article is excerpted from his book, Uncertainty*, pp. 149-154, and may also be viewed at web site [http://www.hofstra.edu/Heisenberg] along with addition material on Heisenberg.*

would be very interested if the facts were presented correctly, along with topics like the significant absence of many solar neutrinos — we're only seeing a fraction of what is theoretically expected — the existence of dark matter, and whether the universe expands forever, or not. That's one reason we hired a public relations firm.

Q Will the APS continue to emphasize the importance of international collaboration?

A I believe international collaborations evolve naturally from the day-to-day interactions of scientists as they go about their work. For example, the Department of Energy has provided $500 million for the Large Hadron Collider, and the plasma physicists for a very long time have had an international collaboration on fusion physics. Another example is that U.S. radio astronomers are designing a millimeter wavelength telescope in Chile, and SLAC has initiated a major collaboration with the Japanese on linear colliders. However, although they arise from the grass roots of the scientific enterprise, these international activities often reach the point where they require formal agreements and discussions at a higher level than that of scientists interacting with scientists. Often, the APS, through the efforts of APS Director of International Scientific Affairs Irving Lerch, can and does play an important role in that regard.

Q What do you feel will be the most pressing issues for the Society as it enters the 21st century?

A The most immediate pressing concern for the future is the transition to electronic publishing. We're undergoing great changes. Nobody knows exactly where we're headed, and it's a very important issue since much of our Society's activities rely on surplus income from publications. So we have to make the transition with care and caution and presumably we will, under the capable direction of Marty Blume and Thomas McIlrath.

I would also hope to see the APS continue to broaden its view of what physics is to accommodate emerging new disciplines and avoid splintering into numerous smaller societies, as has happened in the past. For example, at present more than half of the new PhDs are going into industry, so we have to be sensitive to that. FIAP is now the biggest unit of the APS, and has developed a jobs engine that's quite effective for acquiring positions. The APS must educate professors about what it's like in industry these days, because most of them have never been employed in industry. Those who have worked in that realm did so many decades ago. Educating industry is equally important, because so many industrial employers prefer to hire engineers in instead of physicists. We must convince industry that the new generation of physicists is a different breed with a lot to offer, with a flexibility that just isn't found in people trained in other professional lines.

Andy Sessler At a Glance

- Undergraduate studies in mathematics at Harvard University. PhD in atomic and nuclear structure physics from Columbia University, 1953.
- Worked with Hans Bethe on elementary particle physics before joining faculty of Ohio State University. Research in low-temperature and accelerator physics.
- Moved to Lawrence Berkeley Laboratory in 1962, serving as director from 1973 to 1980. Currently a senior scientist. Also a Trustee of Associated Universities Inc.
- Chaired the Federation of American Scientists from 1989 to 1991. Co-founder of Scientists for Sakharov, Orlov and Sharansky, for which he received the first APS Nicholson Medal for humanitarian service in 1994.
- Extensive APS service over the years includes chairing CIFS, POPA, CAP, and the Division of Physics of Beams. Helped establish the FIAP, CIFS and the PPC, on which he also served.
- Recipient of E.O. Lawrence Award in 1970 and Wilson Award in 1997. Fellow of the APS, AAAS, and the New York Academy of Sciences. Member of the National Academy of Sciences.
- Considers physics to be a "social sport" and enjoys the personal interactions as much as the science.

IN BRIEF

- On November 25, 1997, the Department of Energy (DOE) announced that Brookhaven Science Associates, a team led by the Batelle Memorial Research Institute of Columbus, Ohio, and the State University of New York at Stony Brook, will operate the laboratory. Core universities associated with BSA include Columbia, Cornell, Harvard, MIT, Princeton and Yale. The new team will take over operations in 60 days, with a five-year, $2 billion contract to be awarded in January. It was clear that BSA was favored by most of the laboratory scientists. The presidents of both Stony Brook and Batelle had previously stated that restarting the fast-flux beam reactor would be a high priority if BSA were chosen ("What's New," August 1, 1997). BSA picked John Marburger, a former President of Stony Brook, to be Director. He is highly experienced. During construction of the SSC, Marburger was chair of the Board of Trustees of Universities Research Association, which managed the ill-fated project.

  This action follows termination of the contract with Associated Universities Inc. John Marburger, the laboratory's new director (past president of SUNY-Stony Brook for 14 years) described the four goals of the new management: providing a new leadership team; continuing cutting-edge science; attention to environment, safety, and health issues; and "a solid and productive relationship with the community." "We cannot operate a public facility without public support," he said.

Michels Gains Broader Perspective During Fellowship Year

Grappling with a changing economic climate for science, and seeking to foster bipartisan discussion on controversial science and technology related issues are just a few of the challenges faced by Joseph Michels, who spent the past year learning the ins and outs of Washington politics firsthand as an APS Congressional Fellow. The APS Congressional Fellowship program is intended to provide a public service by making available individuals with scientific knowledge and skills to members of Congress, few of whom have a technical background. In turn, the program enables scientists to broaden their experience through direct involvement with the legislative and political processes.

Michels elected to spend his fellowship year as a legislative assistant in the Congressional office of Senator Joseph Lieberman (D-CT), who has long been active in science and technology issues on Capitol Hill. Lieberman is currently the ranking Democrat on the Acquisitions and Technology Subcommittee of the Senate Armed Services Committee, which oversees nearly all of defense research and helps direct U.S. strategic relationships with other countries. "I wanted to combine my interest in business and trade with an international component," said Michels of his reasons for selecting Lieberman's office. "This was a way to have science and technology integrated into an economic and strategic interest, rather than just to be an isolated fellow working on esoteric issues that really didn't fit into anything else the office was doing."

One of Michels' first activities as a Fellow was to help organize a bipartisan science and technology caucus last February, in conjunction with the offices of Senators Pete Domenici (R-NM), Bill Frist (R-TN) and John Rockefeller (D-WV). "The intent was to advance the debate on federal involvement in science funding from the partisan wars of the 104th Congress, namely, at what point does federal spending constitute corporate welfare, picking winners and losers among competing companies," he said. The three-hour caucus heard from a panel of 11 experts including former Under Secretary for Technology, Dr. Mary Good, IBM Senior Vice President for Research Dr. Paul Horn, and Dr. Charles M. Vest, President of MIT. Several months later, the four Caucus Senators banded together to help resolve Congressional conflict over the Advanced Technology Program (ATP).

According to Michels, the ATP was a relatively obscure program initiated during the Bush Administration, intended to develop an industry-driven national R&D effort by funding research at businesses involved in attacking problems related to manufacturing or production. When President Clinton took office, he touted the program as a new model for federal research and development efforts and sought a sharp increase in funding. With a raised profile, the ATP became the object of bitter partisan strife, with some members of Congress holding it up as an example of the government funneling money to large corporations and interfering in the marketplace.

In order to break the logjam, a 60-day review was requested, and during that period the four senators participating in the February science and technology caucus drafted some suggestions for changes in the ATP that would keep the integrity and goals of the program intact while ensuring that it remained "pre-competitive" by only funding projects before any one company has a proprietary interest in them. Most significantly, grants will only be made to consortia, with the aim of fostering alliances between academia and industry, and large companies are not eligible to be single applicants. The final verdict on the program is still out, but "I think this will prove to be a success story," said Michels. "There are still some senators who are never going to love this program, but it's certainly easier for them to swallow now, as well as being more focused in its mission."

Michels also worked preparing testimony on declining procurement budgets for defense-related R&D for Senator Lieberman to present to the Acquisitions and Technology Subcommittee of the Senate Armed Services Committee. "There didn't seem to be a clear effort within the Department of Defense to support research and industrial collaborations that would help ensure that we retain our lead in semiconductor manufacturing by remaining at the cutting edge of the technology," said Michels.

As an example, he points to the U.S. semiconductor industry, which was bolstered substantially in the early 1980s by DARPA's orchestrated effort with SEMATECH to build a consortium of semiconductor manufacturers and equipment makers. While it didn't single-handedly save the industry, the effort certainly contributed to its current prosperity, as did the previous decades of DOD investment in mathematics, computer science and thin film fabrication, among other areas. But interest has waned at a time when, says Michels, investment is more important than ever to national security, especially as the nature of warfare continues to change. "To succeed in this new environment, we need to dominate information technology," he said.

Michels says he has gained a broader perspective on the scientific enterprise as a result of his fellowship year. Instead of focusing his energies on one small area of research, he was asked to view R&D across the full spectrum of U.S. science and technology efforts, encompassing universities, national laboratories, and industry. While his background in semiconductor physics and entrepreneurial experience certainly served him well, he still had to familiarize himself with the complex area of defense research. "It's a whole different world than civilian research, with a very directed mission, in that it must contribute to the strategic interests of U.S. national security," he said.

He also gained a greater appreciation and understanding of how the context in which the science and technology establishment operates has changed from World War II to the end of the Cold

War. "Today, it's important to view science and technology as contributing to an innovation cycle incorporating America's competitiveness, to its national defense, and to the well-being and high standard of living enjoyed by the American people," he said. "That argument must be made in order to justify the current levels of funding. It must be viewed as an investment, rather than an entitlement."

Michels received his B.S. in physics, with a minor in English, from LaSalle University in 1986, and his D.Phil. in experimental condensed matter physics from Oxford University's Pembroke College in 1994. Prior to his fellowship year, he was employed by the Smithsonian Astrophysical Observatory, which in collaboration with Universita di Firenze in Italy, developed the ultraviolet coronograph spectrometer (UVCS) aboard the Solar and Heliospheric (SOHO) satellite. Based at the NASA Goddard Space Flight Center, Michels helped develop the observing plan for the UVCS instrument, as well as participating in the ongoing research in solar physics by SOHO instruments.

A member of the U.S. team for the 1987 Pan American Games, and a contender for the 1988 and 1992 Olympics in rowing, he also rowed for Oxford in the annual boat race against Cambridge, a national event in England that garners worldwide media attention. Two years before commencing his studies at Oxford, Michels was a founding partner of This Old House Renewed, a self-started and managed renovation firm in Philadelphia.

There is still time to apply for the 1999 APS Congressional Fellowship. The application deadline is JANUARY 15, 1998. See Announcements on page 11.

1997 Election Results *(Continued from page 1)*

fundamental questions in the physical, biological and engineering sciences. "We must include the most vigorous of these emerging areas within our physics laboratories and academic physics departments," he said. "That means that we must make room for new topics and the young scientists who will lead us in new directions."

While acknowledging that there are no easy solutions to these challenges, Langer believes that the APS can play a key role in terms of increasing awareness of these issues by encouraging debate, by emphasizing their importance, by actively seeking out new opportunities, and by devoting a major part of the Society's energy to the task of maintaining the breadth and vitality of physics. "If we fail to take advantage of new opportunities — if we exclude them from our definition of 'physics' — then eventually, but inevitably, physics in the U.S. will contract, and our nation's scientific strength will decline accordingly," he said.

Chair-Elect, Nominating Committee

Kleppner received his Ph.D. from Harvard University in 1959, where he participated in the invention of the hydrogen maser with Norman F. Ramsey. He joined the faculty of M.I.T in 1966, where he is now the Lester Wolfe Professor of Physics and Associate Director of the Research Laboratory of Electronics. A past recipient of the Davisson-Germer Prize and the Lilienfeld Prize of the APS, his research interests are in experimental atomic physics, high precision measurements and quantum optics. Current research includes quantum chaos, studies of hydrogen at extremely low temperatures, and ultra precise spectroscopy. He is the co-author of two textbooks. Within the APS, Kleppner has served as chair of the Division of Atomic, Molecular and Optical Physics, as a Councillor-at-Large, and on several other committees including the Physics Planning Committee, which he joined in 1988 and chaired from 1992-96.

In his candidate's statement, Kleppner praised the Society's strong tradition of leadership by outstanding members from every area of physics, and pledged to guide the APS Nominating Committee in identifying the best potential leaders and encouraging them to run for APS office. "In view of the serious problems currently confronting physics, and indeed all of science, it is vital that we maintain this tradition and continue to draw our leadership from the very best talent in our community," he said.

General Councillors

Berger has been a faculty member at Oakland University since 1977. She received a Ph.D. in physics from the University of Maryland in 1972 and held postdoctoral positions at the University of Colorado (JILA) and Yale University. Berger's research is in the area of theoretical gravitational physics. Recent work includes Monte Carlo simulations for quantum cosmology, chaotic dynamics of Mixmaster universes, and the application of symplectic PDE solvers to the numerical study of cosmological singularities. She is a member of the APS Divisions of Astrophysics, Computational Physics, and Particles and Fields. During the past two years, she founded and served as the first chair of the APS Topical Group in Gravitation. She has also served on organizing committees for international conferences and on an NSF panel on future directions in gravitational physics.

"I believe that society would benefit immensely if everyone had a good grasp of the fundamentals of physics, its quest for objectivity, and the methods it has adopted in its research," Berger said in her candidate's statement. "Regrettably, the infrastructure for scientific discovery that has served us so well in the 20th century may be at risk in the 21st." She believes that the APS can play a pivotal role in re-energizing positive public attitudes towards physics through its lobbying activities for resources, and should continue to provide a forum for connections among physicists — both technical interactions and international collaborations which could prove essential to the future of physics.

McIntyre is a theoretical physicist and a Commonwealth Assistant Professor of physics at George Mason University. Her research focus is on the electronic and optical properties of semiconductor heterostructures. Most recently she has investigated electron-phonon scattering in structurally modified semiconductor heterostructures. She received her Ph.D. in physics from the Massachusetts Institute of Technology in 1990, and was awarded the Chancellor's Postdoctoral Fellowship to study at the University of California, San Diego, and the National

Optical Storage, Atom Traps Featured at Annual Laser Science Meeting

Optical and laser scientists from around the world gathered in Long Beach, California, October 12-17, 1997, for the thirteenth annual Interdisciplinary Laser Science Conference (ILS-XIII), which combined fundamental studies of laser interactions with atoms, molecules, clusters, plasmas and materials with research on emerging applications. The conference serves as the annual meeting of the APS Division of Laser Science, in conjunction with the Optical Society of America (OSA). First held in Dallas, Texas, in 1985, the ILS series was established to survey the core laser science areas, including lasers and their properties, nonlinear optics and ultrafast phenomena, the physics of laser sources, lasers in physics and chemistry, and other applications.

A special plenary session on Monday afternoon featured a keynote address by Carl Wieman (University of Colorado) on new studies in Bose-Einstein condensation, preceded by a ceremonial session marking the presentation of the 1997 Schawlow Prize to Erich Ippen (MIT) and Charles Shank (Lawrence Berkeley Laboratory). The conference also featured four critical review presentations, a feature first introduced in 1995 to highlight exciting new developments in laser science by recognized experts. This year, the four speakers and their topics included Wolfgang Ketterle (MIT) on Bose-Einstein condensation and the atom laser; Nasser Peyghambarian (University of Arizona) on polymer optoelectronics; Daniel Chemla (Lawrence Berkeley National Laboratory) on recent advances in single molecule spectroscopy; and Katherine Hall (MIT) on the progress and outlook for all-topical ultrafast switching.

Optical Storage

Charles Brucker of Eastman Kodak gave a Monday morning tutorial on optical storage materials, reviewing the design, fabrication and performance issues for the deposited thin film layer stacks used in current and potential future generation optical disk storage media. According to Glenn Sincerbox of the University of Arizona, who reported on recent advances in the enabling technologies and materials for holographic data storage, "Holographic storage technology has the potential of providing high capacity, rapid access and fast retrieval of digitally stored information."

In a later tutorial on Monday, Donald Carlin of Sarnoff Corp. summarized several developing optical storage technologies: near-field optical storage; electron-trapping optical memories; two-photon memories; and persistent hole burning. According to Carlin, some of the remaining technical challenges include development of improved storage materials, improved diode lasers, and compact optical systems. In addition, "New technologies must be aimed at consumer products to be pervasive," he said. "An emerging technology must be embraced by a number of major manufacturers worldwide in order to have the hope of being accepted as a standard." The new storage products must also bring overwhelming advantages to users as magnetic storage devices continue to improve.

Atom Traps and Cold Collisions

Using spectroscopy of weakly bound, excited molecules formed by collisions of ultra-cold atoms in an optical field to yield their ground-state atomic scattering properties, new Nobelist William Phillips of NIST reported in a Tuesday morning session on the observance of unambiguous evidence of the effect of radiative retardation on the molecular spectra. Other NIST researchers have developed a new technique for observing collisions at very low relative velocities, which was used to measure rates of spin-polarized Penning ionizing collisions for both fermionic and bosonic isotopes of xenon. The same group has found that the collision rate of atoms arranged in an optical lattice is suppressed by at least a factor of two when it has thermalized, in comparison to atoms in the free state.

Quantum Computation

Several speakers reported on the status of various schemes for quantum computation. A research group at Los Alamos National Laboratory is investigating two proposed quantum computer technologies: nuclear magnetic resonance, in which nuclear spins are used to store quantum information, and trapped ions, in which quantum information is stored in the atomic quantum levels. They recently demonstrated quantum computation with cold, trapped calcium ions. Scientists with the Weapons Science Directorate are investigating the use of electron-nuclear double resonance with laser-pulse induced selection electronic excitation control for quantum computing applications.

In addition, researchers at the California Institute of Technology are developing a scheme by which quantum networks might be realized. According to Hideo Mabuchi, these networks would consist of spatially separated quantum nodes connected by quantum channels. The nodes would generate, process and store quantum information, and consist of the internal states of a collection of atoms. The channels would transport quantum states and distribute entanglement by way of photons.

Hyperpolarized Noble Gas MRI

Researchers at the University of Michigan have used laser optical pumping techniques to enhance the polarization of noble gas isotopes, including helium-3 and xenon-129, for magnetic resonance imaging (MRI). According to Timothy Chupp, although helium-3 is particularly suitable for lung and air space imaging, xenon-129 is of interest because xenon gas crosses the blood-gas barrier, is dissolved in the blood, and is carried to tissue where magnetization can build up and be imaged. Using this approach, scientists at the Universitat Mainz in Germany performed the first clinical survey of he-3 MRI of the lungs of healthy probands, as well as patients suffering from various lung diseases.

Photorefractive Keratectomy and Retinal Physiology

Researchers at Summit Technology, Inc. have developed a next- generation large area excimer laser refractive workstation which uses a unique, patented, single-use laser disc to treat myopia, hyperopia, and both myopic and hyperopic compound astigmatism. The Emphasis LaserDisc contains all the required information that is necessary to impart the desired corneal surface shape transformations to achieve the intended refractive outcome. In a related area, Donald Hood of Columbia University described new techniques that allow the study of single classes of cell, such as rod or cone receptors, and rod onbipolars. Also, a relatively new multi-stimulation technique allows for simultaneous recording from many localized regions. Hood illustrated his techniques with studies of light adaptation of the normal retina, as well as with studies of the abnormal activity of diseased retinas.

Optics in Entertainment

Through advances in plasma tube and optical coating technologies, laser manufacturers have met the ever-increasing demands of the entertainment industry with improved output power, color balance, and packaging of white ion lasers. According to Kurt Klavuhn of Spectra-Physics Lasers, who spoke at a Monday morning session, these advancements provide more flexibility and versatility for further advancing the cutting edge of laser entertainment displays. For example, Robert Martinsen of the Corporation for Laser Optics Research described a new projection display, called Color Visiona. The display uses pulsed, solid state lasers with a modulation technique known as acousto-optic line writing to create images exhibiting a unique combination of brightness, spatial resolution, and chromatic strength, specifically suited for large area displays in bright ambient lighting.

1997 Election Results *(Continued)*

Research Council's Research Associateship Award for postdoctoral study at the Naval Research Laboratory. She has served on the Research Associateship Programs Advisory Committee for the National Research Council, the APS Committee on the Status of Women In Physics, and the American Institute of Physics Advisory Committee on Physics In Two Year Colleges.

McIntyre identified two fundamental issues currently affecting physics research and education in the U.S.: the amount of federal funding for research and development, and the production of physics PhDs at universities. In addition to increasing efforts to further facilitate the employment prospects for young physics, "We must continue to develop new and creative methods to effectively communicate with our nation's executive branch and congressional leaders on the contributions of physics research to society," she said. She specifically suggests that members of Congress or their staff be invited to attend special technical presentations at annual APS meetings for a day, targeted to their interests.

Peccei is Dean of the Division of Physical Sciences of the College of Letters and Science at UCLA, a position he has held since November 1993. He is a particle theorist whose principal interests lie in the area of electroweak interactions and in the interface between particle physics and cosmology. Born in Italy, he completed his secondary school in Argentina, and came to the U.S. in 1958 to pursue his university studies in physics. He obtained a Ph.D. from MIT in 1969. After a brief period of postdoctoral work at the University of Washington, he joined the faculty of Stanford University in 1971. In 1978 he returned to Europe as a staff member of the Max Planck Institute in Munich, Germany. He joined the Deutsches Elektron Synchrotron (DESY) laboratory in Hamburg, Germany, as the Head of the Theoretical Group in 1984 before returning to the U.S. in 1989, joining the faculty of the Department of Physics at UCLA. Within the APS, Peccei served for three years on the Division of Particles and Fields Executive Committee, chairing the unit in 1993.

In his candidate's statement, Peccei noted the changing realities of federal funding for research and the impact on the job market for physicists. To help address the latter, he hopes to foster the organization of more career workshops, as well as other APS activities designed to help raise awareness of physicists about employment issues. Like Langer, he also believes that the physics community will benefit by broadening its borders to incorporate new fields at the edges of exploration, as well as fostering the existing subdisciplines. "In a tight fiscal climate, where choices need to be made, the difficulty is how to maintain the breadth without diminishing the strengths of the individual subfields," he acknowledged, adding that the APS can play a useful role by publicly emphasizing the unity of physics to dampen any partisan squabbles.

Quinn is a theoretical particle physicist at Stanford Linear Accelerator Center, where she also leads the laboratory's education and outreach efforts. She received her PhD from Stanford University in 1967 and held positions at DESY and Harvard University before returning to SLAC in 1977. Her research is focused on understanding the nature of the breaking of CP symmetry in weak interaction processes, as well as the mechanisms that ensure its maintenance in strong interaction processes. She is currently an active participant in the development of the experimental program for the SLAC B factory, designed particularly to study CP violation in the decays of B mesons, where it is expected to manifest itself in a variety of decays and thus provide tests of Standard Model predictions and probes for beyond Standard Model effects. She has served in the APS Division of Particles and Fields Executive Committee and as a member of the Panel on Public Affairs, and is currently on the Executive Committee of the Forum on Education.

According to her candidate's statement, Quinn's interest in serving as an APS Councillor stems from her belief that while the APS is a strong organization, it needs to evolve significantly in the face of current realities. In particular, she is concerned about the impact of electronic publishing on the Society's journals, and a growing desire for smaller, more focused meetings by many APS members. "For many of my colleagues, APS meetings are no longer a prime professional activity, and even divisional meetings are larger and more general than the meetings young scientists prefer to attend," she said. She is also interested in seeking ways to expand the APS role in outreach and education, working in tandem with other professional societies.

APS VIEWS

Endorsement of Senate NRIA-1998 Bill Culminates Year-Long Efforts By APS

In November, the APS Executive Board officially endorsed the bipartisan National Research Investment Act of 1998 (NRIA), a Senate bill (S.1305) that calls for a doubling of federal funding for basic scientific, medical and pre-competitive engineering research over the next decade. The bill was announced at a press conference in October, along with the release of a unified statement endorsed by the APS and 106 other scientific, engineering and math organizations (*APS News*, December 1997). Like the Senate Bill, the statement calls for a doubling of the federal budget for research by the year 2009, although the bill focuses specifically on increases in civilian research.

The event marks the culmination of a series of activities instigated by the APS Office of Public Affairs just over a year ago, with strong support from then-APS President D. Allan Bromley (Yale University), who had made federal support for science a priority of his presidential tenure. According to APS Director of Public Affairs Michael Lubell, in the fall of 1996, when the framework was being set for the FY1998 federal budget, the outlook for science was not good. The most optimistic scenario was a freeze at FY1997 funding levels, with more dire projections from the American Association for the Advancement of Science (AAAS) predicting as much as a 5% cut in funding levels for many science and technology programs.

As word spread throughout the scientific community, two APS divisions in particular — nuclear and high energy physics — sent out a call for action to their members, who in turn began to flood the administration with letters encouraging continued strong federal support of science. This had some effect on the presidential budget request for FY1998 submitted to Congress in February 1997, which asked for small increases for science research, as high as 3% increase for some programs.

In the meantime, Bromley met with the presidents of several other professional societies — including the American Chemical Society (ACS), the American Mathematical Society (AMA), the American Astronomical Society (ASA), and the American Institute of Physics (AIP), among others — with an eye towards organizing a joint effort. The result was a Joint Society Statement released in March, calling for a 7% increase across the board for science funding in FY1998 (*APS News*, April and May 1997).

A key point of the joint statement was that the sciences are interdependent and therefore one had to view federal research investment comprehensively, not just individual disciplines. Furthermore, it maintained that investments in research are critical to a number of national needs, including economic growth, health, national security, and quality of life. "It was a first in terms of a real call for a comprehensive approach to science, and it asked for a specific number, instead of just the usual 'science is good' type of message," said Lubell.

Despite Bromley's appearance on CSPAN plugging the joint statement, along with ACS President Paul Anderson, initial response from Congress was mixed. Rep. George Brown (D-CA), the ranking Democrat on the Science Committee and a long-time supporter of science, was sympathetic, but didn't think it could be done. Science Committee Chair James Sensenbrenner (R-WI) acknowledged the cause was worthy, but initially declined to endorse anything more than a flat budget for FY1998.

However, subsequent press coverage by National Public Radio, the Washington Post, the National Journal, Associated Press, Business Week, and U.S. News and World Report, as well as editorials on the importance of investment in science in the Wall Street Journal and New York Times, kept the issue in the public eye. In addition, by the end of June the number of societies and organizations endorsing the Joint Statement had reached 48, representing a broad-based coalition of 1.5 million scientists, engineers and mathematicians. As budget hearings began in the Senate in May, Sensenbrenner eventually modified his position to accommodate the possibility of a 3% increase in science funding.

Encouraged by the response, the member societies of the joint coalition divided the eight weeks from May 1 to the end of June, which is the key time when appropriations bills are crafted, and took turns alerting their memberships to write letters to Congress. "It was like passing a baton from one society to the next," said Francis Slakey, Assistant Director of APS Public Affairs, of this unique approach. "By staggering the letter-writing campaigns, we made sure that the message of the importance of increasing federal funding for science was pounded out week after week."

As another first, several societies contributed funds to place an ad making the case for science in the June 16th issue of Roll Call. The biweekly publication covers the activities of Congress and parts of the Administration, and is one of the most widely read publications on Capitol Hill. In addition, the Office of Public Affairs approached the mayors of several cities in the districts of key appropriators, persuading about 20 of them to endorse a letter detailing the importance of investment in science to the future of America's cities.

Several society presidents also paid personal visits to key Congressional offices to emphasize the need for the government to look seriously at investing in research. And during the Joint APS/AAPT Spring Meeting in April, the APS Divisions of Laser Science and Atomic, Molecular and Optical physics, in conjunction with Rep. Vernon Ehlers (R-MI), organized a reception on the Hill featuring 12 hands-on science demonstrations. "I think many members of Congress had thought about science primarily as esoteric scratchings on a blackboard," said Slakey of the demos' effectiveness in communicating the message of the benefits of science. "For the first time they were seeing things that grew out of science that were part of their experience, so there was some real contact between science and their daily lives. It wasn't just lecture mode."

This flurry of lobbying activity by the scientific community ultimately yielded impressive results, especially when considered in light of the dire forecasts of 5% cuts being cited one year ago. According to Lubell, while the FY1998 budget doesn't grant a 7% increase for science funding across the board, there are substantial increases for most science and technology programs averaging between 5% and 8%. For example, DOE's basic energy sciences went up 8.6%, the plasma and fusion budget went up 5%, the NIH received a 7.1% increase, the core programs of NIST went up 5.5%, and the NSF budget rose nearly 6%.

The coalition also expended considerable effort to help foster cooperation between Senators Phil Gramm (R-TX) and Joe Lieberman (D-CT) on the development of the new bipartisan NRIA, which makes science a national funding priority. Pete Domenici (R-NM), the chair of the Budget Committee, also threw his support behind the bill, as did Jeff Bingaman (D-NM). In fact, Domenici vowed to make the bill a priority. While there is currently no equivalent bill in the House, Brown is offering an investment budget outlining Democratic priorities for discretionary spending in general that would increase scientific R&D by 5% a year, which is not incompatible with the goal of doubling research in ten years. "I think Brown deserves credit for keeping the flame burning in the House while all this other effort was taking place in the Senate," said Lubell.

Other societies are expected to follow the APS' example in officially endorsing the NRIA. Gramm and Lieberman are confident they can round up the 51 cosponsors needed to ensure passage in the Senate, but they will need the grass-roots lobbying support of the expanded joint coalition representing 3 million mathematicians, engineers and scientists from 106 societies. Thus, the coalition's work is far from over. "Without the confidence that the scientific community is really behind this, this kind of legislation has a way of being tabled," said Lubell.

Among the lessons learned from the past year's activities is that by working together to send a compelling, unified message, scientists can have a much greater impact on science policy than by working individually. Also, the experience proved that members of Congress do listen to scientists and would like to hear from them. "They interpret silence as an indication that there's no problem, or that scientists don't consider their work to be relevant enough for the government to pay attention to it," said Lubell. "If you just expect somebody else to carry the message forward into Congress, it's not going to have any effect."

APS members interested in more information, or participating in current and future efforts on behalf of science funding, should contact Michael Lubell [lubell@aps.org] or Francis Slakey [slakey@aps.org] at the APS Office of Public Affairs, 202-662-8700. The full text of both the Joint Society Statement and the Unified Statement can be found on the APS Web page [www.aps.org].

THE 7 PERCENT SOLUTION

Science & Engineering Fuel the Economy...

"Since World War II, fully half of America's total economic growth has sprung directly from technological innovation… Most of this wealth-creating innovation is a direct result of research that has been underwritten by the federal government."

— *The Washington Times*, January 3, 1997

"Academic research in science has a 'social rate of return' in the form of lower prices, better products, and higher productivity that exceeds 20 percent… serious funding for science is a vital national investment."

— *U.S. News and World Report*, May 19, 1997

But the Public Investment in R&D Is Sinking...

We Must Increase the Public Investment in R&D...

Recently, 1,500 economists were asked: "If the Federal Government wanted to increase long-term economic growth, which one policy would have the most positive impact?" The number one response, beating all other responses by four to one, was "Spend more on Education and Research & Development."

— *Wall Street Journal*, March 6, 1997

"The lag time between basic research and application is often 20 years," says David Gergen, Editor at Large, U.S. News and World Report. The economy is strong, a benefit of past public investments in science and engineering. Cutting the investment cuts future economic growth.

A 7% Increase Keeps America on the Path to a Balanced Budget.

"A 7% increase strikes a balance between the current fiscal pressures and the need to invest in activities that enable long-term economic growth and productivity."

— *Leaders representing 1.5 million Scientists, Mathematicians, and Engineers*, March 4, 1997

"Congress finds that an increased level of investment in basic science is essential to maintaining the position of the U.S. as technological leader of the world. The purpose of this Act is to double the Federal funding for science over 10 years."

— *S. 124, National Research Investment Act of 1997*

LETTERS

Nuclear Superconductivity

The debate in October 1997 *APS News* between John Michael Williams and Stuart Pittel on "Nuclear Superconductivity" has lost sight completely of its basic physics and history. The term was first used by David Pines at the 1957 Rehovot Conference on Nuclear Structure to point out that the new BCS theory, which was at that time far from being accepted, might also apply to nuclei. It suggested that any weak attractive interaction will give rise to coherent many-body states for the particles near the Fermi surface and an energy gap in their excitation spectrum.

At the same 1957 conference Giulio Racah independently described the same physics for atoms and nuclei in group-theoretical language. The bottom line was clearly stated by John Bardeen at that time in explaining the difference between BCS and Bose condensation. Cooper pairs are not bosons; they are overlapping fermion pairs where the size of a given pair is much larger than the mean distance between pairs, and where the Pauli principle is crucial. I used these ideas of Bardeen and Racah in my quantum mechanics book to show the unity of physics between various fields, rather than nitpicking over minor differences, and attempted to urge others to follow the precedent set by David Pines in encouraging communications between different areas.

Harry J. Lipkin
Weizmann Institute of Science
Rehovot, Israel

zero gravity

1997 DARWIN AWARD WINNER

The Darwin Award is presented every year to an individual (or the remains thereof), who has done the most to remove undesirable elements from the human gene pool. The 1995 winner was the fellow who was killed by a Coke machine which toppled over on top of him as he was attempting to tip a free soda out of it. In 1996 the winner was an air force sergeant who attached a JATO (rocket) unit to his car and crashed into a cliff several hundred feet above the roadbed.

The 1997 winner is Larry Waters of Los Angeles — one of the few Darwin winners to survive his award-winning accomplishment. Larry's boyhood dream was to fly. When he graduated from high school, he joined the Air Force in hopes of becoming a pilot. Unfortunately, poor eyesight disqualified him. When he was finally discharged, he had to satisfy himself with watching jets fly over his backyard.

One day, Larry decided to fly. He went to the local Army-Navy surplus store and purchased 45 weather balloons and several tanks of helium. The weather balloons, when fully inflated, would measure more than four feet across. Back home, Larry securely strapped the balloons to his sturdy lawn chair. He anchored the chair to the bumper of his jeep and inflated the balloons with the helium. He climbed on for a test while it was still only a few feet above the ground. Satisfied it would work, Larry packed several sandwiches and a six-pack of beer, loaded his pellet gun— figuring he could pop a few balloons when it was time to descend— and went back to the floating lawn chair.

He tied himself in along with his pellet gun and provisions. Larry's plan was to lazily float up to a height of about 30 feet above his back yard after severing the anchor and in a few hours come back down.

Things didn't quite work out that way. When he cut the cord anchoring the lawn chair to his jeep, he didn't float lazily up to 30 or so feet. Instead he streaked into the LA sky as if shot from a cannon. He didn't level off at 30 feet; he leveled off at 11,000 feet. At that height he couldn't risk shooting any of the balloons, lest he unbalance the load. So he stayed there, drifting, cold and frightened, for more than 14 hours.

Eventually Larry found himself drifting into the primary approach corridor of Los Angeles International Airport. A United pilot first spotted him. He radioed the tower and described how he'd passed a guy in a lawn chair with a gun. Radar confirmed the existence of an object floating 11,000 feet above the airport. LAX emergency procedures swung into full alert and a helicopter was dispatched to investigate. LAX is right on the ocean. Night was falling and the offshore breeze began to flow. It carried Larry out to sea with the helicopter in hot pursuit. Several miles out, the helicopter caught up with him. Once the crew determined that he was not dangerous, they attempted to close in for a rescue but the draft from the blades would push Larry away whenever they neared.

Finally, the helicopter ascended to a position several hundred feet above Larry and lowered a rescue line. Larry snagged the line and was hauled back to shore. The difficult maneuver was flawlessly executed by the helicopter crew. As soon as Larry was hauled to earth, he was arrested by waiting members of the LAPD for violating LAX airspace. As he was led away in handcuffs, a reporter dispatched to cover the daring rescue asked why he had done it. Larry stopped, turned and replied nonchalantly, "A man can't just sit around."

FELs, Biological Physics Featured at SESAPS Meeting

The Southeastern Section of the APS (SESAPS) held its 63rd annual meeting, 6-8 November 1997, at Vanderbilt University in Nashville, Tennessee. Invited speakers covered such topics as materials and biophysics research with free electron lasers, nuclear physics, solids and molecular dynamics, optics, physics teaching, astrophysics, high energy physics, chaos in quantum systems, and computational physics in the physics curricula. In addition, Vanderbilt hosted two one-day workshops prior to the meeting, one on radioactive ion beams, and another on condensed matter/free electron laser physics. The Society of Physics Students organized a session for student papers in conjunction with the SESAPS meeting, presenting the Marsh W. White Award for the best paper given at the session.

APS Associate Executive Officer Barrett Ripin spoke on career opportunities for physicists during an interactive Thursday afternoon session, reviewing the current status of the physics job market and outlining short- and long-term strategies being undertaken by the APS to help improve the employability of physicists in various sectors. Later that evening, scientists from Vanderbilt and three other Southeastern universities staged a physics demonstration program. And Laurie McNeil (University of North Carolina, Chapel Hill), chair of the APS Committee on the Status of Women in physics, led session participants in a panel discussion on the topic of balancing family obligations with a physics career on Friday afternoon.

Physics with Intense Radiation

According to Vanderbilt University's Norman Tolk, who spoke at a Friday afternoon session on physics with intense radiation, the Vanderbilt Free Electron Laser's (FEL) tunability, high intensity and short pulse structure make it ideal for (1) studying the electronic and vibrational structure of small and wide band gap semiconductors, and (2) achieving non-thermal wavelength-selective materials alterations. In the first instance, scientists have been able to verify two-photon absorption measurements in Ge. The FEL has also greatly facilitated internal photoemission heterojunction band discontinuity measurements, without the need for complex modeling. With regard to the latter, Tolk has used the FEL to demonstrate strongly wavelength-selective ablation in chemical vapor deposited diamond.

During the same session, Maurizio Ferconi, also of Vanderbilt, described recent attempts to selectively enhance chemical reactions with infrared radiation, which to date have had limited success. The development of new lasers such as the FEL and ultrafast tabletop lasers, and the potential for materials processing and biomedical applications, have rekindled interest in this area. Ferconi's team is implementing state-of-the art computational techniques — using classical and quantum molecular dynamics — to both molecules and solids under intense infrared radiation.

Finally, scientists at the University of Illinois are using "nanoshocks" — tiny but powerful shock waves measuring 100 micrometers in diameter, with a sample thickness of 1 micrometer and a total volume of a few nanograms — to study anthracene, a model molecular crystal, and myoglobin, a molecular nanomachine. Generated by high power picosecond laser pulses in solids via laser ablation, the nanoshock produces large amplitude displacements from the equilibrium geometry. The subsequent ultrafast material relaxation processes are monitored by ultrafast vibrational or visible spectroscopy.

Biological Physics

The use of physical techniques has become very important in understanding the pathophysiology of sickle cell disease, according to Daniel Kim-Shapiro of Wake Forest University, who spoke on Saturday morning. In particular, light scattering and absorption studies have been used to measure the kinetics of sickle cell hemoglobin polymerization and depolymerization (melting). These have led not only to an increased understanding of the disease, which affects about 1 out of 600 people of African descent in the U.S. alone, but has also led to improved treatment strategies. Kim-Shapiro is currently conducting investigations into the phenomenon of polymer melting in sickle cell hemoglobin, which is key to determining whether polymers that reach the lungs melt before they enter the oxygen deficient tissues. Specifically, he has been exploring the kinetics of oxygen binding to the polymers, using time-resolved linear dichroism, followed by laser photolysis.

Multimedia Tools in Physics Teaching

Several sessions were organized around current issues in, and new approaches to, physics teaching, particularly in the area of new computer and mutlimedia tools. On Friday afternoon, Aaron Titus of North Carolina State University addressed the issue of integrating multimedia and physics problems to enhance students' success at solving problems. In a recent study of students' responses on Web-based homework questions, he found that merely presenting a video of motion described in a given physics problem is not the most effective use of multimedia materials. Rather, multimedia-focused problems, where data relevant to solving the problem is embedded in a video or animation, may be the best use of multimedia in physics problem solving.

According to L.W. Martin of North Park University, the updated software package Mathematica 3.0 features a new interface designed to allow more natural entry of traditional mathematical notation, and the entire documentation is electronically searchable, making it ideal for use in upper-level physics courses for students completing assignments, since the mathematics becomes secondary to the physics. As occurred when calculators became widely available, the question remains as to how to use the new tool most effectively to help students learn physics, without distracting them with the computer, and Martin discussed several possible methods for implementing Mathematica into physics courses.

Chiral Perturbation Theory, Discrete Symmetries Highlight 1997 Nuclear Division Meeting

The latest research results in chiral perturbation theory, discrete symmetries, and weak interactions and spin structure were among the topics featured at the annual fall meeting of the APS Division of Nuclear Physics (DNP), held October 5-8, 1997 in Whistler, British Columbia, Canada. The meeting consisted of a plenary session in memory of Chien-Shiung Wu, five invited sessions, 24 contributed sessions, and four mini-symposia on, respectively, B solar neutrinos, neutral currents in atoms and nuclei, the contribution of quark sea and gluons to nuclear structure, and order and chaos in nuclei.

A town meeting was also held on Tuesday afternoon to provide an opportunity for a large segment of the nuclear science community to contribute to the ongoing discussion regarding future challenges and priorities for the field. On hand to guide the discussion were Peter Rosen, newly appointed associate director of the DOE's Office of High Energy and Nuclear Physics, and Robert Eisenstein, the NSF's assistant director for mathematical and physical sciences. In addition, three parallel workshops were presented prior to, but in conjunction with, the DNP meeting on Sunday, October 5: one on discrete symmetries, another on electromagnetic dynamics of mesons and nucleons, and the third on radioactive beams and nuclear astrophysics.

Plenary Session

Along with a short scientific biography of Wu, the plenary session that kicked off the conference included a presentation by Carl Wieman of the University of Colorado on his recent measurements of atomic parity violation, which has now been observed in numerous atoms such as cesium, particularly the first measurement of a nuclear anapole moment. Brookhaven's Maurice Goldhaber discussed various aspects of the study of neutrinos emitted in weak decay processes, for which work Wu is chiefly known. There is an ongoing investigation in this area of research by the Japan-USA Kamiokande collaboration of atmospheric and solar neutrinos.

Vincent Yuan of Los Alamos National Laboratory closed the session with a talk on compound-nuclear neutron resonances for fundamental and applied physics. According to Yuan, experiments using epithermal neutrons interacting with compound-nuclear resonances serve a wide range of scientific applications. For example, transmission changes correlated to the polarization reversal in incident neutrons have been used to study parity violation in the compound nucleus for many different targets. Neutron resonances can also be used to determine the polarization of neutron beams. Finally, the motion of target atoms results in an observed temperature-dependent Doppler broadening of resonance line widths, which can be used to determine temperatures on a fast time scale of one microsecond or less.

Chiral Perturbation Theory

Several speakers at a Tuesday morning session concentrated on recent developments on applying chiral perturbation theory (CPT) to study nucleon and hyperon properties such as masses, magnetic moments, and weak decays, as well as photo- and electro-production of pions on nucleons near thresholds. For example, according to Norm Kolb of the Saskatchewan Accelerator Laboratory, threshold photoproduction of pions off nucleons is one of the few low-energy phenomena for which QCD-based effective field theories can be formulated and tested. He has used model-independent low-energy theorems, as well as CPT, to predict the leading order terms of the s-wave electric dipole amplitude at threshold for these reactions, which are in good agreement with recent experimental measurements. In addition, measurements of neutral-pion production from the deuteron may soon provide pioneering tests of CPT in a nuclear system.

Electroproduction of pions on nucleons near threshold is one of the experiments for which CPT can make clear predictions, according to Henk Blok of Amsterdam's Vrije Universiteit, who also spoke at the session. In particular, this process represents a very sensitive test of various ingredients of the calculations, since the model-independent term due to the charge of the pion is absent. Data on the proton have been taken at the NIKHEF facility in Amsterdam and at the MAMI facility in Mainz. In both cases, Blok reported, the scattered electron and the residual proton were detected in two high-resolution magnetic spectrometers, which can measure the full angular distribution of electroproduction of pions on nucleons in just a few settings.

Discrete Symmetries

During a Wednesday afternoon session, Shelley Page of the University of Manitoba described an experiment currently underway at TRIUMF which will provide unique information on the weak nucleon-nucleon interaction from a measurement of parity violation in proton-proton scattering at 221 MeV. According to Page, the beam energy is chosen to isolate a single partial wave contribution to the parity-violating asymmetry, thus providing the cleanest possible interpretation of the results, and the first direct measurement of the weak meson-nucleon coupling constant. A second long data run has just been completed at TRIUMF. Because the measurements are sensitive to a wide variety of systemic errors which must be monitored and controlled, the current major focus is on reducing system errors.

Weak Interactions and Spin Structure

Type II supernova and neutron star-star neutron mergers are candidate sites for the production of certain heavy nuclei, according to Gail McLaughlin of INT in Seattle, who spoke on Monday afternoon. In these environments, nucleosynthesis takes place in the presence of a neutrino flux. Depending on the intensity of the flux, neutrino interactions with heavy nuclei can play an important role in determining final abundances. Thus, knowledge of the relevant weak interaction cross sections is an important ingredient in determining the astrophysical site and conditions during which this nucleosynthesis occurs. In addition, nuclear scattering can impact the nuclear flow during nucleosynthesis, and the neutrino flux experienced by a nucleus depends on the hydrodynamic conditions. Therefore, said McLaughlin, "The study of neutrino scattering in a rapidly expanding environment typical of the post-core-bounce supernova helps to discriminate between various outflow scenarios."

The "Other" Giant Dipole Resonance

On Tuesday afternoon, Umesh Garg of the University of Notre Dame reported on an investigation of the ISoscalar Giant Dipole Resonance (ISGDR). An exotic "squeezing" mode of collective nuclear vibration, this resonance is best described as "a hydrodynamical density oscillation in which the volume of the nucleus remains constant and the state can be visualized in the form of a compression wave oscillating back and forth through the nucleus," said Garg, comparing the pressure wave to a sound wave. Since the excitation energy of the ISGDR is directly related to the nuclear compressibility, his team used the K600 spectrometer at the Indiana University Cyclotron Facility to measure inelastic scattering of 200 MeV particles at 0 degrees, where the angular distribution of the ISGDR could be clearly distinguished from that of the nearby high-energy octupole resonance. They also employed the difference-of-spectra technique pioneered in the study of the giant monopole resonance to obtain the clearest evidence yet for the ISGDR.

Intermediate Energy Hadron Probes

Cooler storage rings with internal targets offer excellent possibilities to study threshold production of mesons, according to Hans Calen of Sweden's Uppsala University, who spoke at a Wednesday morning session. The experimental program at the CELSIUS ring of the Svedberg Laboratory in Uppsala has lately focused on n meson production in proton-proton and proton-deuteron collisions, as well as in proton-neutron collisions using deuterium as a target. For these studies, his team developed a detector setup with the capability to detect forward-moving charged particles together with photons from neutral meson decays. It also allows for a kinematically complete determination of the meson production events in most cases, and has enabled measurements very close to threshold.

Two APS Publications to be Discontinued

Due to drastically decreased demand for the print version of *Physical Review Abstracts*, the publication will be discontinued as of January 1, 1999. The last issue of *PR Abstracts* to be printed will be the December 15, 1998 issue so that the American Physical Society may fulfill its obligations to nonmember subscribers. Demand for the print version of *PR Abstracts* decreased sharply soon after the APS made *PR Abstracts* available online free of charge. (Please visit this URL: http://publish.aps.org/DLO/abs.html.) The severe drop in print subscription has made it economically unfeasible to continue print production. The APS will not be accepting any new or renewed member subscriptions to *PR Abstracts* as of January 1, 1998.

With the July 1, 1997, release of *Physical Review B Online*, which covers the full contents of *PRB1, PRB15,* and *PRB-Rapid Communications*, the APS accomplished one of its more important goals, which is to distribute the largest component of *Physical Review* on the World Wide Web. As an attempt to make at least one small part of *PRB* available to APS members on the Web as soon as possible, *Physical Review B-Rapid Communications Online* was released on July 1, 1996 and was made available to members only. Because of the current duplicate coverage of *PRB-Rapid Communications* articles in both online offerings, *PRB-Rapid Communications* as a separate publication will be discontinued as of July 1, 1998. The APS is no longer accepting any new or renewed subscriptions to *PRB-Rapid Communications*.

The APS would like to emphasize that it is discontinuing *PRB-Rapid Communications* as a separate publication only because of duplicate coverage and that it has no intentions to alter the availability of any of its online journals. The APS is committed to bringing to its membership and to the scientific community at large quality physics research at affordable prices, and the electronic medium is seen as one possible means to achieve that objective.

Questions or comments about member subscriptions should be directed to the APS Membership Department at membership@aps.org (e-mail), 301-209-3280 (telephone), or 301-209-0867 (fax). Questions or comments about nonmember subscriptions should be directed to the APS Associate Publisher at assocpub@aps.org (e-mail), 301-209-3283 (telephone), or 301-209-0844 (fax).

APS James C. McGroddy Prize for New Materials

The APS Council voted unanimously to establish the APS James C. McGroddy Prize for New Materials. The McGroddy Prize endowment was provided through a generous donation by IBM. This prize supercedes the New Materials Prize that was funded by IBM from 1975 through 1994 on a yearly basis.

The purpose of the McGroddy prize is to recognize and encourage outstanding achievement in the science and application of New Materials. This includes the discovery of new classes of materials, the observation of novel phenomena in known materials leading to both fundamentally new applications and scientific insights, and shall also include theoretical and experimental work contributing significantly to the understanding of such phenomena. The award will initially be $5,000, plus a certificate or suitable medal citing the contribution made by the recipient and a travel allowance to attend the meeting of the Society at which the award is bestowed. Nominations are open to scientists of all nationalities irrespective of where their work has been carried out.

The prize is named for James C. McGroddy, Director of the IBM Research Division, who started his career at IBM as a materials physicist, studying the properties of Si, GE, and various III-V compounds. McGroddy received the APS Pake Prize in 1995 for his scientific accomplishments and leadership.

AWARD NOMINATIONS SOUGHT

Please refer to the APS Membership Directory, pages xxi-xxxvi, or the APS home page for complete information regarding rules and eligibility requirements.

1998 AWARD FOR OUTSTANDING DOCTORAL THESIS RESEARCH IN PLASMA PHYSICS

Established in 1985 and now endowed by General Atomic.

Purpose: To provide recognition to exceptional young scientists who have performed original doctoral thesis work of outstanding scientific quality and achievement in the area of plasma physics.

Nature: The annual award consists of $2,000, a certificate citing the accomplishments of the recipient, and an allowance of up to $500 for travel to attend the annual meeting of the Division of Plasma Physics at which the award will be presented.

Send name of proposed candidate and supporting information before 1 April 1998 to: Ronald M. Gilgenbach, Dept of Nucl Engr, Univ of Michigan, Cooley Bldg #N Campus, Ann Arbor MI 48109; Phone: (313) 763-1261; Fax: (313) 763 4540; Email: ronald_gilgenbach@um.cc. umich.edu

1998 JAMES CLERK MAXWELL PRIZE FOR PLASMA PHYSICS

Established in 1975 by Maxwell Technologies, Inc.

Purpose: To recognize outstanding contributions to the field of plasma physics.

Nature: The prize consists of $5,000 and a certificate citing the contributions made by the recipient

Rules and Eligibility: The prize shall be for outstanding contributions to the advancement and diffusion of the knowledge of properties of highly ionized gases of natural or laboratory origin. The prize shall ordinarily be awarded to one person but a prize may be shared when all the recipients have contributed to the same accomplishments. Nominations are active for three years.

Send name of proposed candidate and supporting information by 1 April, 1998 to: Robert James Goldston, PPPL, Princeton Univ, PO Box 451, Princeton NJ 08543-0451; Phone: (609) 243-3172; Fax: (609) 243 2100; Email: goldston@pppl.gov

1998 EXCELLENCE IN PLASMA PHYSICS RESEARCH AWARD

Established in 1981 with support from Friends of the Division of Plasma Physics

Purpose: To recognize a particular recent outstanding achievement in plasma physics research.

Nature: The award consists of $5,000 to be divided equally in the case of multiple winners, and includes a certificate citing the contributions made by the recipient or recipients, to be presented at an award ceremony at the Division of Plasma Physics Annual Meeting Banquet.

Rules and Eligibility: Nominations are open to scientists of all nationalities regardless of the geographical site at which the work was done. It may be a given to a set of individuals as well as to individual scientists, as appropriate, to honor those who make essential contributions to the cited research achievement. Nominations are active for three years.

Send name of proposed candidate and supporting information by 1 April, 1998 to: Bruce A. Remington, L-473 LLNL, UCL, PO Box 808, Livermore CA 94551; Phone: (510) 423-2712; Fax: (510) 422 8395; Email: remington@llnl.gov

1998 NICHOLSON MEDAL FOR HUMANITARIAN SERVICE

Established in 1994 by the Division of Plasma Physics and the Forum on Physics and Society and is sponsored by the friends of Dwight Nicholson.

Purpose: To recognize the humanitarian aspect of physics and physicists.

Nature: The honor consists of the Nicholson Medal and a certificate which includes the citation for which the recipient has been recognized.

Send name of proposed candidate and supporting information before 1 April 1998 to: Arnold Kritz, Physics Department, Lehigh Univ., 16 Memorial Dr. E, Bethlehem, PA 18015; Phone: (610) 758-3930; Fax: (610) 758-5730; Email: kritz@plasma.physics.lehigh.edu.

Washington, DC Area APS Fellows Reception Held November 12th.

Among the one-hundred or so APS Fellows attending the Washington, DC region reception were William Phillips (NIST, 1997 Nobel Prize) on the left shaking hands with a fellow, Ramon Lopez (Director, APS Education Department) and Jerome Friedman (MIT, APS President-Elect and Program Chair of the reception).

The American Physical Society

Nomination for APS Fellow

To be sent to:
Fellowship Program
The American Physical Society
One Physics Ellipse, College Park, MD 20740-3844
If space is inadequate, please use separate sheet to answer and attach to form.

Name in full of person nominated: _____
(First Name) (Middle Name) (Last Name)

Address: _____

_____

Date nominee became a member of the APS: _____

Appropriate division(s) to assess nomination: _____

Supporting Data

Nominee's Academic Background

College/University	Location	Major Field	Degree	Year Awarded

Professional Honors _____
_____
_____

Nominee's Employment Background
(please specify under "Duties" whether academic, administrative, or research)

Position	Employed By	Duties	Dates of Employment

(Continued on Reverse)

The American Physical Society

This form is also available at: http://www.aps.org/exec.nomform.html

NOMINATION BALLOT

Council and Committee Positions

(To be Completed by Members of the Society Only)

Please Attach Appropriate Supporting Biographical Documentation

For Vice-President

Nominee: _____ **Affiliation:** _____
_____ _____
_____ _____
_____ _____

For General Councillor

Nominee: _____ **Affiliation:** _____
_____ _____
_____ _____
_____ _____
_____ _____

For Chairperson-Elect, Nominating Committee

Nominee: _____ **Affiliation:** _____
_____ _____
_____ _____
_____ _____

For Membership on the Nominating Committee

Nominee: _____ **Affiliation:** _____
_____ _____
_____ _____
_____ _____
_____ _____

(Continued on Reverse)

Two Young Physicists to Receive 1998 APS Apker Awards

Two promising young physicists have been named by the APS as recipients of the 1998 Apker Award for their research achievements as undergraduates. Anna Lopatnikova and Cameron G. Geddes will each receive a $3000 stipend, a certificate, and a travel allowance to attend the 1998 Joint APS/AAPT Spring Meeting in Cincinnati, Ohio, in April, where the award will be presented. They will also be invited to present papers at an appropriate technical session during the meeting. The committee generally tries to select two winners each year, one from a PhD-granting institution and one from a predominantly undergraduate institution.

Anna Lopatnikova

Cameron G. Geddes

Lopatnikova graduated from MIT in 1997 and is being honored for her thesis entitled, "Renormalization-Group Theory of Superfluidity and Phase Separation of Helium Mixtures Immersed in Aerogel." Her work reproduced and explained several new experimental features, such as a phase separation between two superfluid phases, a critical point imbedded within superfluidity, and the occurrences of a superfluid phase with very low ^{4}He concentrations. This resulted in the publication of one paper in *Physical Review B*, as well as a follow-up paper recently submitted, and has suggested new experimental directions. She has been awarded fellowships from both the NSF and Bell Laboratories to pursue graduate studies in physics.

Specifically, Lopatnikova's work on the renormalization group theory for helium-mixture phase transitions immersed in a disordered porous medium involved the coupled mappings of bulk and surface probability distributions of quenched disorder in the system, and the mastery of the random-field and random-bond problems of critical phenomena. She successfully completed this very difficult calculation that only a few full-time condensed matter physicists in the world can do, since it requires taking into account subtle physical effects, factorizing and then interlacing superfluidity and criticality with the connectivity, tenuousness and randomness properties of aerogel. Since then, she has obtained results in the question of the existence or non-existence of a gap in the excitation spectrum of quantum magnetic systems, with relevance to high-temperature superconductivity.

Geddes graduated from Swathmore College in 1997 with a degree in physics and high honors, the latter received in part because of his excellent thesis research in plasma physics, entitled, "Spheromak Equilibrium Studies on SSX." In fact, he was awarded the William C. Elmore Prize as the top physics graduate at the college. His thesis is based on some of the initial experiments performed on the Swarthmore Spheromak Experiment at the school's new Magnetofluids Laboratory.

The experiment's ultimate goal is to simulate conditions in solar flares (100,000 degrees C) for a very short time (100 millionths of a second) in order to study fundamental magnetofluid processes. Using techniques borrowed from magnetic confinement fusion, the team is able to generate a hot ring of magnetized plasma called a spheromak. Geddes characterized the magnetic structure of these spheromaks using arrays of magnetic probes of his own construction, and using his own analysis, fit the data to various models. He also made presentations of this work to members of the Swathmore Board of Trustees, and at the 1996 APS Division of Plasma Physics Meeting in Denver, Colorado.

Apker selection dinner – Committee members (rear,left to right): Steven Ralph (Emory), June Matthews (MIT), Harry Lustig (APS), Kumar Patel (UCLA), Barrie Ripin (APS) and Finalists (front, right to left): Scott Hill, David Ginger, Stuart Norton, Julie Hoff, and Cameron Geddes. Finalist Anna Lopatnikova and selection committee members Robert Schrieffer (Florida State) and Laurence Marshall (Gettysburg College) are missing from the photo.

NOMINATION BALLOT

Council and Committee Positions *(continued)*

For Chairperson-Elect, Panel on Public Affairs

Nominee: _____ **Affiliation:** _____

For Membership on the Panel on Public Affairs

Nominee: _____ **Affiliation:** _____

Signature and Address of Nominator

_____

_____

_____

Please send your nominations to:
The American Physical Society
One Physics Ellipse
College Park, MD 20740-3844
Attn: Amy Halsted
(301) 209-3266
fax: (301) 209-0865
email: halsted@aps.org

The deadline is 31 January 1998.

Nomination for APS Fellowship

(continued)

Nominee's most significant contributions and principal publications (list four publications):

_____

_____

Suggested Citation to Appear on Fellowship Certificate if Nomination is Approved (30 words or less):

_____

_____

_____

_____

Supporting Paragraph Enlarging on the Citation and Indicating the Originality and Significance of the Contributions Cited: _____

_____

_____

_____

Sponsor's Data (Each nominee must have two sponsors who are members of the APS.) **(PLEASE PRINT):**

1 Sponsor's Name: _____ Signature: _____
Sponsor's Address: _____
Sponsor's Recommendation: _____
_____
_____

2 Sponsor's Name: _____ Signature: _____
Sponsor's Address: _____
Sponsor's Recommendation: _____
_____
_____

3 Additional Information Recommended: (a) Curriculum Vitae _____ Date
or Biographical Information
(b) Supporting Letters

PLEASE NOTE: To facilitate this nomination, be sure you have answered every question. Enclose original and duplicate of nomination form.

For information on deadline dates for specific units consult the APS WWW home page (http://aps.org) under the Prize, Awards & Fellowship button, or call the APS Honors office at (301) 209-3268.

Announcements

March Meeting Electronic Abstract System Problem

The APS Meetings Department wishes to thank everyone for their patience with the unfortunate computer problems we experienced during the March98 abstract deadline in December. We have made every attempt to notify abstract authors whose abstracts were lost, to resubmit. We apologize for any inconvenience this may have caused our members, and assure you that we are working diligently to implement safeguards against future system failures. If you have any questions about your abstract, contact abs-help@aps.org or call 301-209-3290.

The March program will be posted to the web on or about January 8. At the time we post the program to the web, notification will be sent to authors informing them of their session assignment. Please check the program on the web to ascertain that your abstract is included, and let us know immediately if it is not.

Now Appearing in RMP…

***Reviews of Modern Physics* is a quarterly journal featuring review articles and colloquia on a wide range of topics in physics. Titles and brief descriptions of the articles in the January 1998 issue are provided below.**

Instability, turbulence, and enhanced transport in accretion disks
Steven A. Balbus and *John F. Hawley* examine the dynamics of accretion disks, which are ubiquitous in astrophysics as engines for consolidation of mass. A major new advance is the appreciation of the important role played by magnetic fields in the disk dynamics.

Theoretical methods for the atomic many-body problem
J. Sapirstein reviews the highest-accuracy calculation methods in the theory of multielectron atoms, with a view to applications in subatomic physics.

Quantum tunneling in nuclear fusion
Nuclear fusion below the Coulomb barrier exhibits quantum tunneling in a many-dimensional space, and this review by *Akif Baha Balantekin* and *Noburu Takigawa* discusses both the theory and experimental aspects of this phenomenon.

The quantum-jump approach to dissipative dynamics in quantum optics
The present capability in quantum optics to monitor the state of individual atoms calls for more versatile theoretical tools than have traditionally been used in this area. *Martin Plenio* and *Peter Knight* describe formalisms that have been recently developed for this purpose, to replace the older density-matrix formalism.

Nonlinear optical response of semiconductor and molecular nanostructures
Volrath M. Axt and *Shaul Mukamel* present a formalism for describing the electromagnetic excitation of condensed systems. Using a particle-hole representation, they derive well-known models that are used in semiconductor and molecular physics.

Application of superconducting quantum interference devices to nuclear magnetic resonance
Yakov S. Greenberg describes the unique properties of SQUIDs as detectors in NMR studies, and he reviews the applications that have been made to date.

Stochastic resonance
The enhancement of weak signals by noise is called stochastic resonance. *Luca Gammaitoni, Peter Hänggi, Peter Jung* and *Fabio Marchesoni* review the experimental phenomena and the corresponding theoretical understanding.

If you would like to subscribe to RMP, please add it to your invoice or contact

The American Physical Society
Attn: Membership Department
One Physics Ellipse
College Park, MD 20740-3844
Phone: (301) 209-3280
Email: membership@aps.org

❑ Domestic, $50 ❑ Foreign Surface, $60 ❑ Optional Air Freight, $82

Science and Technology Centers

DEADLINE FOR PREPROPOSALS: FEBRUARY 12, 1998

The National Science Foundation (NSF) announces that the new program solicitation for Science and Technology Centers (STC) Integrative Partnerships is now available. This solicitation will only be available on the NSF home page. The web address where the solicitation can be found is: http://www.nsf.gov/od/osti

The NSF established the Science and Technology Centers (STC) Program in 1987 to fund important basic research and education activities and to encourage technology transfer and innovative approaches to interdisciplinary program. The centers have the opportunity to explore new areas and build bridges among disciplines, institutions, and other sectors. They offer the basic research community a significant mechanism to take a longer term view of science and explore better and more effective ways to educate students.

Major Research Instrumentation

DEADLINE FOR PROPOSALS: JANUARY 30, 1998

The National Science Foundation (NSF) announces the electronic publication of the solicitation for the Major Research Instrumentation (MRI) Program. This publication will only be available on the NSF home page and will not be made available in hard copy. The MRI solicitation can be found at: http://www.nsf.gov/od/osti

Experience has proven that this is an excellent opportunity for NSF to partner with academic institutions for the acquisition of state-of-the-art, high-cost, research instrumentation and for the development of the next-generation research instrumentation. This instrumentation must be accessible for both research and research training purposes thus fostering NSF's core strategy of integrating research and education.

NEW

Distinguished Traveling Lecturers in Laser Science

The Division of Laser Science announces the appointment of three new Distinguished Traveling Lecturers in Laser Science and their talk titles:

- Lee Casperson, Portland State University, *Instabilities and chaos in lasers, waterfalls, and other physical systems;*
- Wolfgang Ketterle, Massachusetts Institute of Technology, *Atom cooling and trapping, Bose-Einstein condensation, and atom lasers;*
- Carlos Stroud, University of Rochester, *Electronic wave packets in atoms, Schrodinger cat-like states, and fractional dynamical revivals.*

They join the continuing DTLs:
- Philip Bucksbaum, Univ. of Michigan, *High-Field Laser Physics;*
- Geraldine Richmond, Univ. of Oregon, *Surface Non-Linear Optics;*
- Jagdeep Shah, AT&T Bell Laboratories, *Semiconductor Quantum Optics.*

The DLS invites applications from host schools for awards for the Distinguished Traveling Lecturer Program. The DTL Awards are intended to bring distinguished laser scientists to predominantly undergraduate colleges and universities for two-day visits, which generally include lectures and informal meetings with faculty and students. Details about the program and the application procedure may be found on the DLS Web Site at http://www.physics.wm.edu/~cooke/dls/p_dtl.html

DEADLINES DATES FOR APPLICATIONS ARE JANUARY 15 AND JUNE 15, 1998.

January 15 Deadlines

1998-1999 APS/AIP Congressional Science Fellowships

The American Physical Society and The American Institute of Physics are currently accepting applications for their 1998-1999 Congressional Science Fellowship Programs. Fellows serve one year on the staff of a senator, representative, or congressional committee.

For information and/or applications:
APS/AIP Congressional Science Fellowship Programs
529 14th Street, NW, Suite 1050
Washington, DC 20045
(202) 662-8700 • email: opa@aps.org
See the December issue of *APS News* or APS and AIP home pages: www.aps.org and www.aip.org for details about the program and application procedure.

APS Mass Media Fellowship Program - Summer 1998

For information and/or applications:
APS Mass Media Fellowship Program
529 14th Street, NW, Suite 1050
Washington DC 20045
(202) 662-8700 • email: opa@aps.org
http://aps.org/public_affairs/Media.html (includes PDF application forms)
See the December issue of *APS News* or APS home page (www.aps.org) for details about the program and application procedures.

CAUGHT IN THE WEB

Notable additions to the APS Web Server. The APS Web Server can be found at http://www.aps.org

APS News Online latest edition

APS Committees and Governance
- Career Directions section added to Career Employment page
- Career/Employment page redesigned
- International Affairs: Committee on International Freedom Scientist workshop on What the Physics Community Can Do and Is Doing

Units
- Topical Group on Magnetism pages updated
- Forum on International Physics Elections page updated

Meetings
- Meetings homepage redesigned
- Meeting Calendar updates

THE BACK PAGE

Post-Modern Multiculturalism and Scientific Illiteracy

by Bernard Ortiz de Montellano

Postmodernists and adherents of the "social studies of science" school claim that science is in crisis because it can no longer claim to be an objective or accurate reflection of the real world. These criticisms have been shown to be fallacious and to stem from a serious lack of scientific knowledge by P.R. Gross and N. Levitt, who quote and refute numerous postmodern gurus, such as Jacques Derrida, in *Higher Superstition* (Baltimore: Johns Hopkins Press, 1994). This lack of knowledge was also shown in the gullible publication of Allan Sokal's parody as a serious article in a leading cultural studies journal, *Social Text*. As Sokal has pointed out, the editors published an article "which any competent physicist or mathematician would realize… was a spoof" because it critiques science as hegemonic, culturally determined and subjective. Both Gross and Levitt's book and Sokal's article have provoked much comment.

The interaction of postmodernism with multiculturalism has not drawn as much attention, but it can have serious consequences, because proponents of postmodernist approaches are heavily involved in K-12 education. Claims made include (1) other "ways of knowing" are as valid or better than science; (2) "Euro-science" is motivated by capitalism and imperialism; (3) people of color are more spiritual and moral than Europeans; (4) the paranormal is a valid scientifically proven fact; and (5) myths are valid explanations of natural phenomena. The end result of a wide adoption of these ideas would be to decrease an already deplorably small participation of minorities in science.

Feminist philosophers of science and postmodern critics argue that science is a set of conventions produced by the particular culture of the West at a particular historical period, rather than a testable body of knowledge describing the "real" world. They claim that the agenda, methodology, and conclusions of science are determined by the interests of the male-dominated capitalist system. Postmodernists state that because science is just a "situated" mode of discourse and not reflective of the real world, other modes of discourse (such as those that include intuition, magic and religion) are comparable to, and may even be superior to, "Western" science. These critiques claim that the advent of quantum physics, and particularly the Heisenberg uncertainty principle, has shown that physics can no longer provide reliable information about the world and has lost its claim to objectivity. Similarly, the term "chaos theory" is used to convince the scientifically naive that science can no longer make reliable or accurate predictions.

Hunter Havelin Adams, the author of the "Portland Baseline Essay in Science," a text used by teachers in numerous large urban schools, makes the same claims in a widely used text in Afrocentric science: "Nobody has a monopoly on truth.... There is no one correct way of knowing: There are ways of knowing. And Western conceptual methodology cannot discover any more basic truths to explain the mysteries of creation than can a symbolic/intuitive methodology." The thesis is that Western science is inferior to that of people of color because it proceeds from evil motivations. Adams continues that Western science "has as its main concern, nonethical considerations such as cost effectiveness." Multiculturalists also claim that Western science is methodologically inferior because it is materialistic and relies only on natural law, neglecting the supernatural. Says Adams, "For the ancient Egyptians, as well as contemporary Africans worldwide, there is no distinction and thus no separation between science and religion."

A common thread that runs through much of multicultural literature is that people of color are more spiritual than whites. Among Afrocentrics, a group called melanists attribute this to higher levels of melanin. A few of the properties attributed to melanin include superconductivity, electromagnetic absorption at all frequencies, extremely sensitive magnetic susceptibility, and the ability to function as a microcomputer and process information. Melanin is supposed to regulate all physiological and psychological processes in humans. Black athletes supposedly have superior coordination and reflexes because of their melanin. Melanin is also responsible for the superior intelligence, the potential extra-sensory ability, and the greater spirituality of Black people.

Postmodern multiculturalists emphasize spirituality by claiming that it is really an "alternative scientific paradigm." A similar strategy is to claim that myths are accurate eyewitness testimonies about reality. For many years, religious (mythic) explanations were the basis on which people explained the world. Even in the West, religion was the prime explanatory source for both natural and supernatural phenomena. The success of science and technology, and subsequent disillusionment with religion, have lead to an acceptance of science as an explanatory source, as a validation mechanism and perhaps even as a source of truth. Science has in fact become the secular religion of the West, in a very particular sense.

However, scientific illiteracy is rampant. The rate of scientific illiteracy in the U.S. was found to be 95% in a study by William Hively [*American Scientist*, Sept/Oct 1988], with similar results in other developed countries. Thus, although many people believe in "science" as an explanatory mechanism, they believe in it religiously — that is, by faith — not because they understand scientific principles. Such people can be victimized or deluded by others who take advantage of their illiteracy and claim the "prestige" of science using scientific language to support their fictitious claims. Much of the New Age mantra consists of putting old wine (mediums, chi, chakras) into the new bottles of pseudoscience: channeling, energy flows and the laws of thermodynamics, and "technobabble."

One of the possible consequences of believing that myths are as true, or truer, than science is an adherence to catastrophism and Young Earth Creationism. Both fundamentalist creationists and postmodern multiculturalists are forced to deny the validity of most scientific disciplines. A prime example of this is a 1995 book by Vine Deloria, entitled *Red Earth White Lies*, which claims, among other things, that the earth is very young, that the Biblical flood actually occurred, and that there was single Ice Age.

According to Deloria, the Earth's prehistory is described by the following scenario. Prior to the flood, the earth was covered by a thick water vapor canopy and there was no rain; therefore, rivers in North America were dug out by rapid glacier melting. Also before the flood, there was a much higher concentration of CO_2 in the atmosphere than at present. This had a number of consequences. First, higher carbon dioxide concentrations led to gigantism and to longevity, thus validating both Biblical and Indian myths about giants and people living hundreds or years. Then, a comet or meteor composed almost wholly of ice and water collided with the Earth, dumping ice in massive amounts on the magnetic poles and precipitating an ungodly amount of rain on temperate regions. This catastrophe caused both the Flood and the Ice Age. The cold water dissolved much of the carbon dioxide, reducing it to its present levels.

After this, Deloria makes numerous outlandish claims, such as that Indian petroglyphs are eyewitness images of dinosaurs such as Stegosaurus, and that Indians were eyewitnesses to the explosion of the volcano, Mount Multnomah, which geologists date to the Miocene Era, 25 to 27 million years ago. To do this,

Deloria rejects fundamental principles of geology, such as erosion, plate tectonics and radioactive dating. He also denies the validity of most of modern biology, physics and astronomy. Regretfully, this book has received laudatory reviews in the leading anthropological journal [Mohawk 1996) and by the magazine of the American Indian Science and Engineering Society (Pierce 1995).

Postmodern multiculturalist pseudoscience has consequences that should concern us. Adams' Portland Baseline Essay is widely used in urban school districts with large African-American populations. Deloria is active in the Indian science education movement. The tragedy is that not only are minorities greatly under-represented in science, but that their children are being exposed to pseudoscience in the classroom. Postmodernism is not just an academic parlor game in this case. As scientists, we should make clear our opposition to pseudoscience in any guise. We should ensure that at a minimum, schools are not engaged in disseminating pseudo-science.

I am very sympathetic to the plight of educators in large poor urban districts, and agree with their goals to improve the self-esteem and achievement of their students. The idea that Africans are biologically superior to whites, for example, is attractive to teachers in these districts who lack the scientific knowledge to properly judge pseudoscientific claims.

However, worthy goals cannot be achieved through improper means. Teaching pseudoscience, regardless of motive, will only further impair the ability of minority students to succeed in society. We should also urge that children in large poor urban districts, who are most in need of it, benefit from the systemic reform of science education. Rigorous and accurate multicultural science teaching is possible. We do not have to settle for magic and religion parading in the guise of science.

Bernard Ortiz de Montellano is in the Anthropology Department at Wayne State University. A longer version of this article, with bibliography, appeared in the October 1997 issue of the APS Forum on Physics and Society's newsletter.

"Claims made include (1) other "ways of knowing" are as valid or better than science; (2) "Euro- science" is motivated by capitalism and imperialism; (3) people of color are more spiritual and moral than Europeans; (4) the paranormal is a valid scientifically proven fact; and (5) myths are valid explanations of natural phenomena."

The Back Page is intended as a forum to foster discussion on topics of interest to the scientific community. Opinions expressed are not necessarily those of the APS, its elected officers, or staff. APS News *welcomes and encourages letters and submissions from its members responding to these and other issues.*