APS NEWS

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Societies Call for 7% Funding increase in Joint Statement on Scientific Research

The APS along with 22 other organizations spanning the scientific and engineering community [see side bar] issued a Joint Statement on Scientific Research calling for an increase in federal research budgets. At a press conference held at the National Press Building in Washington, D.C. in March, APS President D. Allan Bromley joined with other scientific society presidents in calling on Congress and the Clinton Administration "to renew the nation's historical commitment to scientific research and education." Bromley and American Chemical Society President, Paul Anderson amplified the rationale in a nation-wide 15 minute C-Span interview. It is unusual for such a large number of scientific organizations, representing a cross section of scientific and engineering disciplines and about 1.5 million members, to agree to a united position on funding. The text of the Joint Statement on Scientific Research follows:

"As the federal government develops its spending plans for Fiscal Year 1998, we call upon the President and Members of Congress to renew the nation's historical commitment to scientific research and education by providing the requisite funding for the federal agencies charged with these responsibilities. Our call is based upon two fundamental principles that are well accepted by policy makers in both political parties.

- The federal investment in scientific research is vital to four national goals: our economic competitiveness, our medical health, our national security and our quality of life.
- Scientific disciplines are interdependent; therefore, a comprehensive approach to science funding provides the greatest opportunity for reaching these goals.

APS President, D. Allan Bromley addressing press corps.

We strongly believe that for our nation to meet the challenges of the next century, agencies charged with carrying out scientific research and education require increases in their respective research budgets of 7 percent for Fiscal Year 1998. These agencies include, among others, the NSF, NIH, DOE, DOD, and NASA. The increases we call for strike a balance between the current fiscal pressures and the need to invest in activities that enable long-term economic growth and productivity. Such increases would only partially restore the inflationary losses that most of these agencies suffered during the last few years.

Prudent planning argues for strengthening the respective activities of major research agencies, as already recognized in pending legislation. To constrain still further federal spending on their scientific programs would jeopardize the future well-being of our nation."

Scientific Societies that Endorsed Statement*

American Association of Physicists in Medicine
American Astronomical Society
American Chemical Society
American Geological Institute
American Geophysical Union
American Institute of Biological Sciences
American Institute of Physics
American Institute of Professional Geologists
American Mathematical Society
The American Physical Society
American Society of Engineering Education
Association for Women in Mathematics
Association for Women in Science
Astronomical Society of the Pacific
Council on Undergraduate Research
Engineering Deans Council
Federation of Materials Societies
Geological Society of America
The Institute of Electrical and Electronics Engineers, Inc.
Materials Research Society
Mathematical Association of America
Optical Society of America
Society for Industrial & Applied Mathematics

by the Presidents (or the equivalent officer)

Physical Review A Goes Online

Physical Review A, the APS research journal for all areas of atomic, molecular, and optical physics and related fundamental concepts, is the latest addition to the rapidly growing list of APS research journals available on the World Wide Web.

Physical Review A online offers the following features, among others:

- easy and logically designed navigation pathways
- access to each journal issue before the print version becomes available
- browsable and searchable tables of contents for current and previous issues
- advance listing of accepted papers scheduled for upcoming issues
- a PDF file of the full article, enabling users to print articles with the same look and feel as the print version of the journal
- versatile search interface including fielded and Boolean search and advanced search
- flexibility in sorting search results by relevancy ranking, chronological order, or journal title

As an introductory offer, *Physical Review A online* will be available free of charge to all APS members until May 1, 1997, and to all APS members who have a fiscal year 1997 subscription to *Physical Review A* until July 1, 1997. To access *Physical Review A online,* go to http://ojps.aip.org/prao/ and type "apspra" for username and "welcome" for password.

As part of our continuing efforts to provide our members with high-quality service and products, we need to hear from you, so please do not hesitate to drop us a note at assocpub@aps.org.

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IN THIS ISSUE

APS Helps Organize Networking Workshop in Ghana

Along with several other international societies and organizations, the APS contributed to the organization of a three-week advanced networking workshop at the University of Accra, Legon, Ghana, beginning January 31. The course began with a UNIX workshop and was followed by two weeks of intensive training to orient node managers and programming staff with respect to server set-up, router programming, note management and network maintenance. Other students received user training and orientation on the Internet and World Wide Web. Approximately 40 students are being trained in this first course. The Ghanaian National Committee (GNC) will organize additional courses at the conclusion of the current program. The bulk of the students are recruited from the three main universities in Ghana: the University of Accra at Legon, the University of Cape Coast and the Technical University in Kumasi. Not quite two years ago, the UNESCO Informatics Program proposed a telecommunications initiative in Ghana and asked the Ghanaian government to organize a GNC to plan a development program and to prepare proposals for funding. On May 28-29, 1996, a planning workshop was held in Paris to develop an advanced networking workshop similar to ones held in Kiev in September 1995 and St. Petersburg in October 1996.

Attending the workshop in Paris were representatives of UNESCO; the International Telecommunications Union (ITU); the President of the Society of African Physicists and Mathematicians (SAPAM), Francis Allotey; the Chair of the GNC, Christine Kisiedu and Irving Lerch for the American Physical Society; and by phone, representatives of the United Nations Development Program's Sustainable Development Networking Program (UNDP's SDNP). The participants agreed to collaborate on an advanced networking workshop for Ghana to take place in either late 1996 or early 1997.

According to Irving Lerch, APS director of international scientific affairs, the APS and SAPAM agreed to collaborate on the effort and SAPAM subsequently signed a reciprocal society membership agreement with APS. UNDP's SDNP agreed to provide $50,000 for equipment and international instructor support for the training course. UNESCO provided the GNC with support for planning and development and ITU provided support for literature and student subsistence.

Lerch recruited the chief instructor for the program, Brian Candler (UK) who had served as chief instructor in St. Petersburg and had been a senior instructor for the Internet Society's annual developing country training program. Other instructors came from the university and private sector in Ghana and other parts of Africa. Considerable technical support is being provided by the Ghanaian Internet Service Provider, Network Computer Systems, run by Nii Quaynor who developed Ghana's point-of-presence on the Internet.

Physicists to be Honored at 1997 Spring Meeting

Thirteen APS prizes and awards will be presented during a special ceremonial session at the Society's general meeting in Washington, DC, 18-21 April 1997, held in conjunction with the American Association of Physics Teachers. Citations and biographical information for each recipient follows.

1997 TOM W. BONNER PRIZE

The Tom W. Bonner Prize was established in 1964 to recognize and encourage outstanding experimental research in nuclear physics, including the development of a method, technique, or device that significantly contributes in a general way to nuclear physics research.

R.G. Hamish Robertson
University of Washington

Citation: "For his intellectual and experimental leadership in seminal experiments testing charge symmetry and independence, determining fundamental properties of nuclear reactions having cosmological and astrophysical significance, and establishing stringent limits on the mass of the electron antineutrino."

Robertson earned his PhD in nuclear physics from McMaster University in 1971 and received a postdoctoral fellowship at Michigan State University, eventually joining the faculty as a professor of physics. During that time he made the first observation of an isobaric quintet of states in nuclei, and carried out experiments on parity violation and nuclear astrophysics. In 1981 he joined the Los Alamos National Laboratory, where he investigated neutrino mass via tritium beta decay and solar neutrino experiments. In 1994 he became a professor of physics at the University of Washington, where he is continuing his work on neutrinos.

1997 EDWARD A. BOUCHET AWARD

Established in 1994, the Bouchet Award (formerly the Visiting Minority Lectureship) is sponsored by the Research Corporation. It is intended to promote the participation of under-represented minorities in physics by publicizing the lecturer's work and career development to the physics community, especially to young minority physics students.

Larry Donnie Gladney
University of Pennsylvania

Citation: "For his contributions to elementary particle physics and to education, including the first full reconstruction of a B meson at a hadron collider and development of creative and effective educational programs for underprepared university students and science outreach programs for Philadelphia schools."

Gladney received his PhD in physics from Stanford University in 1985. He spent the next three years as a postdoctoral researcher at the University of Pennsylvania before joining the faculty there. He is currently an associate professor of physics and astronomy. His research centers on the elucidation of symmetries among the fundamental particles, focusing on the determination of properties of hadrons containing a bottom quark.

1997 HERBERT P. BROIDA PRIZE

Established in 1979, the prize is intended to recognize and enhance outstanding experimental advancements in the fields of atomic and molecular spectroscopy or chemical physics.

William Happer
Princeton University

Citation: "For his pioneering contributions to atomic and chemical physics, in particular for his development of optical pumping and laser-polarized noble gases whose uses include nuclear targets & magnetic resonance imaging."

Happer received his PhD in physics from Princeton University in 1964 and promptly joined the faculty of Columbia University, where he became a full professor and director of the Columbia Radiation Laboratory. In 1980 he joined the faculty of Princeton University. In 1991 he was appointed Director of Energy Research in the U.S. Department of Energy, returning to Princeton in 1993. He is presently the Eugene Higgins Professor of Physics and Chairman of the University Research Board. Happer is a specialist in modern optics, optical and radiofrequency spectroscopy of atoms and molecules, and spin-polarized atoms and nuclei. He has also had a strong interest in applied physics, serving as a scientific consultant to numerous firms and government agencies, including co-founding Magnetic Imaging Technologies (MITI), which specializes in the use of laser polarized gases for magnetic resonance imaging and microscopy.

1997 FORUM AWARD

Established in 1974 by the Forum on Physics and Society, the Forum Award is intended to recognize outstanding accomplishments in the endeavor to promote public understanding of issues involving the interface between physics and society.

Martin Gardner
Journalist and Writer

Citation: "For his popular columns and books on recreational mathematics which introduced generations of readers to the pleasures and uses of logical thinking; and for his columns and books which exposed pseudoscientific and antiscientific bunk and explained the scientific process to the general public."

Gardner received his BA from the University of Chicago in 1936. His career as a journalist and writer includes stints for the *Tulsa Tribune*, public relations staffer for the University of Chicago, contributing editor to *Humpty Dumpty* magazine from 1952 to 1962, and serving as a writer for the mathematics games department for *Scientific American*. His skill in combining mathematics, science, philosophy and literature has produced more than 30 books, including *In the Name of Science*, an entertaining account of cults and fad sciences in numerous fields. His avocational interests include magic, chess, and playing the musical saw.

1997 JULIUS E. LILIENFELD PRIZE

The Lilienfeld Prize was established in 1988 under the terms of a bequest of Beatrice Lilienfeld in memory of her husband, Julius Edgar Lilienfeld. It is intended to recognize outstanding contributions to physics by an individual who has also demonstrated exceptional skills in lecturing to diverse audiences. The prize includes expenses for three lectures to be given by the recipient at an APS general meeting, a research university, and a predominantly undergraduate institution.

Michael S. Turner
University of Chicago

Citation: "For his pioneering contributions to the field of particle-cosmology, particularly the exploration of non-baryonic dark matter, and for his ability to communicate the excitement of the field."

Turner received his PhD in physics from Stanford University in 1978 and currently holds appointments at the University of Chicago as a professor of physics and of astronomy and astrophysics. He is also a staff scientist at the Fermi National Accelerator Laboratory. His research concerns the earliest history of the universe and the application of elementary particle theory to cosmology.

1997 MARIA GOEPPERT-MAYER AWARD

Established in 1985 by the General Electric Foundation to recognize outstanding achievement by a woman physicist in the early years of her career, the Maria Goeppert-Mayer Award includes a generous travel allowance to provide opportunities for the recipient to present her achievements to others through public lectures at four institutions of her choice.

Margaret Mary Murnane
University of Michigan

Citation: "For her pioneering work in experimental ultrafast optical physics, including the development of sophisticated ultrafast techniques in both x-ray and visible regions of the spectrum. Her work has opened up a new field of high density, high-temperature plasmas created by ultrashort laser pulses."

Murnane received her PhD from the University of California, Berkeley, where she remained for a one-year postdoctoral program before joining the faculty at Washington State University in 1990. In 1996 she and her husband joined the faculty of the University of Michigan and the NSF Center for Ultrafast Optical Science. A past recipient of the APS Simon Ramo Award, Murnane's work has been part of a revolution in ultrafast phenomena. Visible and x-ray pulses can now be simply and reliably generated, and powerful new techniques have been developed for obtaining accurate information on the exact shape of ultrashort pulses. Together with her husband and a team of students, she is developing the next generation of intense lasers for efficient x-ray generation, laser-based particle acceleration, and to explore previously inaccessible extreme states of matter.

1996 DWIGHT NICHOLSON MEDAL

Established in 1993, the Nicholson Medal is intended to honor a physicist who has exhibited extraordinary qualities in such areas as education, the improvement of the quality of life in our society, and fostering international cooperation in physics.

Li-Zhi Fang
University of Arizona

Citation: "For his courageous struggle for democracy and human rights in China over the past four decades; for his continued commitment to teaching and his outstanding leadership in physics research despite difficult circumstances; and for his continuing support and dedication to students, colleagues, and those fighting for human rights."

A native of Beijing, China, Li-Zhi received his diploma from Beijing University in 1956 and immediately joined the Chinese nuclear project as a junior researcher. He was dismissed for speaking out in favor of freedom of thought and expression and transferred to the University of Science and Technology of China (USTC). During the Cultural Revolution (1966 to 1976), he was sentenced to hard labor in the coal mines, but returned to USTC, becoming vice president in 1984. He was dismissed in 1986 for supporting the student democratic movement and moved to the Beijing Astronomical Observatory.

Following the massacre in Tiananmen Square in 1989, Li-Zhi sought refuge in the U.S. Embassy in Beijing. He left China in 1990, and has been a professor of physics and astronomy at the University of Arizona since 1992. His research has covered nuclear physics, laser physics and numerous topics in theoretical astrophysics and cosmology. He has served on many scientific committees and human rights organizations.

1997 W.K.H. PANOFSKY PRIZE

Established in 1985 by the friends of W.K.H. Panofsky and the Division of Particles and Fields, this prize is awarded annually in recognition of outstanding achievements in experimental particle physics.

Yuri Mikhailovich Zaitsev
Moscow Physical Technical Institute

Henning Schröder
University of Dortmund, Germany

Citation: "For their leading role in the first demonstration of mixing in the B^0-$\bar{B}^0$ system. The unexpectedly large value of the mixing parameter provided indirect evidence for a large top quark mass and has greatly enhanced the possibility for studying CP violation in B meson decays. This capability has encouraged a worldwide effort to determine whether the small CP violation in K decay is a reflection of a fundamental parameter characterizing transitions of quarks among the three generations."

Zaitsev graduated from Moscow Engineering Physical Institute in 1960 and earned his PhD in 1968. He has spent most of his career working at the ITEP facility in Moscow, and is also a professor at the Moscow Physical Technical Institute. He has participated in experiments on high-energy particle interactions with nuclei, backward particle production in proton-nuclei interactions, and on the DASP II collaboration. At DESY in Germany, he led the design, creation and operation of muon systems for the ARGUS detector. He is currently working on the HERA-B collaboration as a coordinator of muon systems.

Schröder received his PhD in 1973 from the University of Freiburg, Germany, where he served as a scientific assistant until 1976, and as a postdoctoral fellow at the MPI fur Kernphysik in Heidelberg. Since 1977 he has been a staff member at DESY, and also teaches at the University of Dortmund and the University of Rostock. His early work was in light nuclei and hypernuclei, and he held a leading position with DESY's ARGUS collaboration, investigating quark decays. He is now a member of the HERA-B experiment to study CP violation in beta decays.

1997 I.I RABI PRIZE

Established in 1989, the prize is intended to recognize and encourage outstanding research in atomic, molecular and optical physics.

Eric Allin Cornell
NIST/JILA/Univ. of Colorado
Wolfgang Ketterle
Massachusetts Institute of Technology

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APS News

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Lopez Heads APS Efforts in Science Education Reform

For the last two years, APS involvement in national reform of K-12 science education has been spearheaded by Ramon Lopez, a magnetospheric physicist at the University of Maryland, College Park who concurrently serves as the Society's director of education and outreach programs. As such he is responsible for organizing High School Teacher Days at Society meetings and planning and implementing efforts to involve more research scientists with elementary and high school teachers.

Lopez knew he wanted to be a physicist by the age of 11, when he became fascinated by the notion of atomic structure. He received his PhD in space physics from Rice University in 1985, and spent four months there as a postdoctoral researcher before joining the staff of Applied Research Corporation, on contract to the Johns Hopkins University Applied Physics Laboratory. Desiring to spend more time on educational pursuits, he accepted a part-time research faculty position in the Astronomy Department at the University of Maryland, College Park, in 1992. Since then, he has engaged in a varied and growing number of physics education activities, in addition to his ongoing research. "By remaining active in research, I'm more credible as a scientist concerned with education reform," he said, rather than being labeled primarily as an educator who has left active physics research.

He worked as an long-term consultant with the National Science Resources Center, a joint organization of the National Academy of Science and the Smithsonian Institution, working to improve science teaching nationwide. In this capacity, he has played a significant role in designing workshops for scientists and for school districts.

Other prior education-related activities include service on the Board of Directors of the Space Science Institute in Boulder, Colorado, which explicitly includes pre-college education as part of its mission. With the Institute, he has worked on the development of hands-on investigation modules based on space science for middle school students, and helped develop a major travelling museum exhibit entitled, "Electric Space: Exploring our Plasma Universe," which is currently being exhibited through May at the Maryland Science Center in Baltimore.

Lopez has participated in curriculum review, report preparation, and provided technical assistance to school districts engaged in the systemic reform of elementary science education through a group called National Science Research in Washington, DC. He has also served on education-related committees of the American Geophysical Union and as an independent consultant for the Discovery Channel.

Q What has your focus been in terms of the Society's education activities?

A Most of my time has been spent developing the new Teacher-Scientist Alliance (TSA) program. It's essentially a program for scientists interested in systemic reform of elementary science education. The focus of TSA is hands-on science for all kids in a school district. It's working with scientists and school districts to affect the way that the school district does business overall. So we're not talking about a single teacher or school, but an entire district and its the administrative, budgetary, and professional development structures — all of which are part of helping teachers do quality hands-on integrated science in the classroom.

Q What is the conceptual model for the TSA program?

A There are essentially four components: regional institutes for school districts; one-week institutes for scientists like the one we hosted in Washington in January; one-day local workshops for scientists; and broader-based community information workshops. For our Leadership Institute in January we brought in scientists and other key leaders from places we're working with around the country to give them a one-week intensive overview of issues in the reform of elementary science education. Then with that knowledge, they're able to be much better partners for their school districts. They also become our partners as we go to the next step in recruiting scientists locally.

For example, at last year's Institute, among the participants were three scientists from Tucson who were working with the school district to implement a hands-on kit-based program. By the summer, they were ready to start recruiting scientists. They enlisted 45 scientists and engineers in the Tucson area, and I went there and headed a one-day workshop to illustrate what hands-on science reform is about and how they could help implement the program. They signed up to work with teachers, to visit schools, to be community advocates, to visit the Science Materials Center — a wide range of activities.

That's an archetypical example of how the TSA program is supposed to work. It doesn't always happen that way, but certainly we've had plenty of successful partnerships that have evolved, and we've got a lot of scientists and engineers who have come through our programs and are now working with school districts.

Q What are some specific elements that must be present in a school district to successfully implement reform?

A This is not the first time that hands-on science has been tried in schools. In the late 60's and early 70's many districts bought science kits, but only a few were able to maintain their programs. For that experience we know that school districts that don't have the following pieces in place are not going to be able to build lasting programs. First, they must have top quality materials, not those developed by local teachers, but nationally developed materials with a strong R&D base. Second, they must have a support infrastructure that delivers teaching materials in a ready-to-teach fashion to teachers. If teachers don't have the "stuff" to teach, they're not going to do it. There's a high activation barrier to doing hands-on activities in the classroom if teachers have to go to K-Mart to buy materials beforehand.

But having good materials and delivering them to teachers isn't going to help if teachers don't understand the content of the science in the kits themselves, and if they don't understand how they should be guiding student questions, rather than just lecturing students. So there has to be an ongoing professional development program in the district. That's where we involve a lot of scientists: working with teachers as they are changing their practice in the classroom.

Q Why is the involvement of professional scientists so important?

A Because scientists can be models for scientific inquiry. Set a physicist in front of a bunch of wires and batteries and bulbs and they immediately start playing. That validates the playful nature of science to teachers, who for the most part are intimidated by things like electricity. Elementary teachers don't have a lot of contact with those kinds of content areas, so they will often avoid them. But it becomes less daunting if they have a chance to work with scientists in a friendly, collegial environment.

Q Would you describe this as a grassroots approach to educational reform?

A We focus on working at the school district level. That is really the administrative unit that controls what happens in the classrooms. They're the ones who purchase the materials and do everything else that is necessary for reform. If you're working with individual schools, you could be frustrated because anything a school tries to implement could be undone by larger trends in the district. And individual schools generally do not control all the resources. If you try to work at the state level you will also be frustrated, because it's very amorphous and decisions are being made somewhere else that will work against what you're trying to do at a state level. We try to invest at the strategic level in a school district, working with a few people to build a leadership team in that district. Then those people become our partners for recruiting scientists locally.

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IN BRIEF

- Led by the American Chemical Society, the scientific community has come out strongly for the Chemical Weapons Convention Treaty. In a letter to members of the Senate, APS President Allan Bromley supported the ACS position to ratify the treaty, which was spelled out in a letter from then ACS President, Ronald Breslow. The treaty was signed by President George Bush in 1993 and seemed headed for ratification until Bob Dole raised it as a campaign issue last fall. Jesse Helms (R-NC), the Foreign Relations Committee chair, vows to block the CWC until he gets his way on other legislation, although Majority Leader Trent Lott (R-MS) could decide to overrule Helms.
- In February, President Clinton announced the appointment of a co-chair and 19 members to a new Advisory Committee on High-Performance Computing and Communications, Information Technology, and the Next Generation Internet. The Advisory Committee will provide guidance and advice on all areas of high performance computing, communications and information technologies. Co-chaired by Dr. Kenneth Kennedy, Director of the Center for Research on Parallel Computation at Rice University, the committee members include Larry Smarr, Director of the National Center for Supercomputing Applications and an APS Fellow.
- Two prominent physicists and lifetime APS members who died in February are to be honored with special sessions at the 1997 April APS meeting. Chien-Shung Wu, the first woman to be elected APS president in 1975, and Henry (Heinz) H. Barschall, a former editor of *Physical Review C*, will be memorialized by friends and colleagues for their contributions to physics and their service to the Society.

  The APS Forum on Physics and Society and the APS Division of Nuclear Physics will co-sponsor a session on Sunday, April 20, at 11 AM in honor of Barschall, who was a professor of physics at the University of Wisconsin at the time of his death. Featured speakers will include APS President D. Allan Bromley and Robert Sachs, who will speak on Barschall's contributions to the National Academy of Sciences; former APS Treasurer Harry Lustig on his contributions within the APS; Ruth Howes, who worked closely with Barschall on the APS Forum on Physics and Society; Jay C. Davis, a student of Barschall's; and two former students, Robert Adair and Sam Austin. Lustig also spoke at a memorial session for Barschall in Madison, Wisconsin, on March 15.

  The APS Committee on the Status of Women in Physics will include a special memorial lecture on Wu's contributions at the beginning of its session entitled "Women in Physics: An International Perspective," which will be held Saturday, April 19, 1997, at 5:30 pm. Noemie Benczer-Koller of Rutgers University will deliver the address. In addition, T.D. Lee will speak about Wu and her work during the Plenary Session on Sunday afternoon at 4:30 pm. Wu is best known for leading the 1957 experiment that demolished what was thought to be a fundamental law of physics, the conservation of parity. One of the leaders of physics who emerged from the Manhattan Project, she resolved a major problem that occured in the first plutonium production reactor at Hanford, which had shut down just hours after it was started. She fingered Xe-137, a fission product and neutron absorber, as the culprit. The remainder of her career was spent at Columbia University.
- The American Institute of Physics (AIP) Corporate Associates program announces the 1997-1998 competition for its Prize for Industrial Applications of Physics. The $10,000 prize is intended to recognize outstanding contributions to industrial applications of physics. The deadline for receipt of nominations is May 31, 1997 at the American Institute of Physics, One Physics Ellipse, College Park, MD 20740. Attn: Committee for the IAP Prize. For more information, contact: assoc@aip.org.

OPINION

APS VIEWS

APS Goals

by Judy Franz, APS Executive Officer

According to the APS Constitution, "the objective of the Society shall be the advancement and diffusion of the knowledge of physics." I think that almost all of our members know that while this remains our primary goal, the current activities of the Society can only be contained in this one sentence if it is given the broadest possible interpretation. When we organize sessions on "careers in physics" at our meetings, we are trying to help physicists find jobs, knowing that without jobs it will be difficult for them to "advance the knowledge of physics" in any productive way. When we organize training sessions to prepare scientists to work with elementary school teachers in promoting "hands-on" science, we may "diffuse" a small amount of physics but we are really hoping to interest and inform all students so that they will become better citizens and perhaps in the future help "advance" physics in some indirect way. When we select and sponsor a congressional fellow each year to work as a staff member on Capitol Hill, we believe that we are helping in a broad program to provide Congress with scientifically trained personnel to better inform their decisions for our country. If our fellows "diffuse" some physics to Members of Congress and other staffers, this is a terrific bonus.

What then are the goals of APS? My counterpart in one of our sister scientific societies informed me recently that his society had, after a major strategic planning effort, agreed upon seven major goals, and he challenged me to provide a list of goals for APS. Since APS has not gone through a similar planning process, I can't put forth the Society's seven goals. Nonetheless, I have taken up his challenge on a more personal basis and am prepared to state my eight goals for APS. Many of these will be shared with most APS members, but others may be controversial. If this controversy stimulates you to write to APS News or to me with your own goals for APS, then I welcome it. Hearing from many of you on this issue will help the leadership and staff of APS do a better job of guiding the Society.

Goal #1: *To maintain a large, committed membership that is broadly representative of the national physics community as a whole and includes interested foreign physicists.* I think that APS is first and foremost a membership society and without a large, active membership we would quickly become impotent. Yes, we could publish journals and hold meetings, but so can commercial providers. What gives the Society substance is that our 40,000 members are, to a large extent, the physics community. That allows us to act and speak for the physics community, and make sure that its voice is heard. We realize that we have to do this cautiously and that our members may often disagree with one another. We do this through the APS Council, the governing body of the Society, which is elected democratically and advised by a large number of committees that involve several hundred members in this process. The leadership of the 31 APS units: divisions, topical groups, forums, and sections, actively involves at least another 300 members in APS governance.

Goal #2: *To publish the preeminent physics journals and have them serve the world physics community.* Having said that we are primarily a membership society, I have to follow this closely with stressing how much pride we take in our journals. I believe that continuing to make these journals outstanding has to be a top APS priority; 2/3 of the APS staff are employed in this endeavor. This is the primary way that we "diffuse" the knowledge of physics, and we are extremely pleased that we can serve the world physics community in this way. Authors, referees, editorial boards, subscribers, and readers come from all countries where physics is active. We must continue to serve this very diverse community.

Goal #3: *To bring physicists together from around the world to exchange key ideas and information by holding a variety of meetings that are viewed as central to this purpose.* APS holds or jointly sponsors 15-20 meetings a year that bring together more than 10,000 physicists to discuss exciting new research results, physics education and other topics of importance to the physics community. Together they cover most fields of physics and clearly fall within the central objective of the Society. These meetings, whether large or small, should continue to be a high priority of the Society.

Goal #4: *To work to enhance the resources that are available for physics research and education.* More so than ever before, "advancing and diffusing the knowledge of physics" take expensive resources. We in the physics community know that this is the case. Whether it is a huge particle accelerator, the Hubble telescope, a synchrotron light source, a high power laser, or new equipment for a teaching laboratory, resources are critical and seem to be harder and harder to obtain. For this reason, the APS has expanded its Washington Office staff and put more effort into trying to encourage the physics community to communicate the need for increased support of science to federal and state government officials as well as the general public. With the enactment of new legislation, our enhanced activities required us to register officially as a lobbying organization and report every six months our expenditures on such activities. I believe that the positive response of the physics community to this cause has made it well worth these efforts.

Goal #5: *To work with the APS units to enhance their ability to accomplish APS goals and the more specific goals of each unit.* Each of the 31 units of APS has its own mission and bylaws. At the annual Unit Convocation, representatives of these units share with each other some of the highlights of their activities. The range of these activities is truly impressive, and I think that everyone who attends the Convocation is proud to be part of a Society that is doing so many good things. APS staff works with the units in many different ways to help them with their programs, and we believe that it is one of our very important functions.

Goal #6: *To assist the physics community in working to enhance physics and to achieve the national (and international) goals of peace, prosperity, and improved education.* Physicists are prominently engaged in such activities, and I think APS is in a unique position to help them do more. The important national study that APS did some years ago on directed energy weapons, our more recent investigation of the biological effects of electromagnetic fields, and our grassroots lobbying activities to maintain the country's helium reserves are just three examples of important contributions of the physics community to society. The APS allows physicists to be heard on such issues as opposing "equal time" for creation science and the theory of evolution, promoting science literacy for all, and deploring politically based restrictions on the travel of physicists to international scientific conferences, to quote from just a few APS Council statements.

Goal #7: *To work to ensure that all students in the United States and throughout the world have the opportunity to be exposed to physics, and that those who excel have the chance to participate in advanced study and research.* The work of the APS Committee on the Status of Women in Physics and the Committee on Minorities in Physics has had a major impact on bringing women and minorities into the mainstream of the physics community. I believe strongly that these efforts must continue. In addition, the Committee on the International Freedom of Scientists continues to work to insure that the physicists around the world are allowed to participate fully in the physics community. APS statements include the sentence: "The APS condemns harassment of scientists based on their religious beliefs or ethnic origin." I am proud of these endeavors.

Goal #8: *To broaden the meaning of "physicist" to include all those who are trained in physics, regardless of their current field of employment.* This last goal might not be on everyone's list, but I feel very strongly about it. For too long, we physicists have been defining people out of the community instead of welcoming people in. How often have you heard the words "I used to be a physicist" or "I was trained as a physicist but haven't been one for a long time."? The problem-solving skills and approach to life that one gains with a physics education do not disappear if one takes an industrial job, or becomes a consultant or a university administrator. At a time when many of our young physicists are entering a diversity of careers, they would like to hear from their senior colleagues that they will remain part of the physics community. I know that the leadership of APS is committed to this idea.

In next month's *APS News*, we will print the 1996 APS Annual Report. Let us know if you think that we are doing the right things. Keeping APS members involved in the Society is my #1 goal. We need to hear your views on how best to do this.

LETTERS

Another View of Two-Year Colleges...

In the February 1997 issue of *APS News*, John Connell gives his "take" on teaching at a two-year college (TYC). In particular, he mentions that he finds many of the points about TYCs raised by M. Sawicki in a previous letter (November 1996) unfounded, based on his 26 years of teaching at a TYC. I have been teaching at such an institution for 10 years now, and I find a tremendous amount wrong with Connell's rebuttal. His statement, "TYC teachers can keep up research if they really want to," incensed me beyond words.

I am the only member of the physics department at Sussex County Community College. I teach all the physics classes alone, without help. These include algebra-based physics and calculus-based physics courses, courses in astronomy and differential equations every spring, and at least one section of an introductory computer course each semester. I must also create the budgetary requirements for the entire lab, as well as order, store, clean and repair all the equipment for the physics lab courses. My teaching load is generally more than 20 credit hours per semester. In addition, we are required to sit on at least two committees, advise students and find some way to actively participate in our community. So when exactly are we to find time to do any research?

The nearest university with a physics program is two hours away. With my schedule I cannot even take classes, let alone interact with others in the profession and conduct research. I have heard the suggestion of running a lab for instructional purposes. This would be fine if I had a laboratory devoted solely to physics — I share a lab with environmental sciences, geology, ecology and sometimes biology — and a lab assistant. Often we do not have enough equipment for every lab group to be doing the same experiment simultaneously.

In summation, let me congratulate Professor Connell. He is apparently at a TYC that is well-located, well-funded, and where he has the luxury and benefit of all best possible worlds: he can do research and teach. Somehow I do not believe that his circumstances are typical of those of us teaching at the majority of TYCs. Despite programs designed to help us, many of us are isolated, overworked, and underfunded, without the possibility of further coursework or research, and will remain so unless our circumstances are recognized and addressed by organizations like the APS and the American Association of Physics Teachers.

Peter Schoch
Newton, New Jersey

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.

OPINION

Science Centers: Partners in Science Education

by Robert J. Semper

The 1960s saw the development of a new type of public education institution which has become known as a science center. Based in part on established science and industry museums, these institutions were explicitly defined to be educational and were made up almost entirely of a collection of demonstrated ideas rather than of objects. This movement was stimulated and shaped by the confluence of three trends at the time.

The first was a revival of public fascination in science and technology following World War II. This interest powered a renewed development in the U.S. of both existing and new museums. Recognizing this trend as an opening for the development of public educational institutions, existing museums of historical artifacts, such as the Franklin Institute in Philadelphia and the Museum of Science in Boston, began to add more interactive exhibits.

The second trend was the science education reform movement of the late 1950s to mid 1960s that happened in the U.S. as a result of the launch of the Sputnik satellite by the Soviet Union. The reform movement emphasized hands-on education in science and the importance of working with objects while learning. It drew scientists into the science education enterprise in a big way, and it was the start not only of many new curriculum efforts for the schools, but also a series of science centers in the U.S. and abroad.

The third trend was the general education reform movement of the late 1960s. The hallmark was a reaction against the authoritative structures of formal education. There was a developing sense that individuals should be much more in control of their own learning. This thinking resulted in the development of new forms of educational and social systems which focused on informal, community-based multigenerational learning.

Since the late 1960s, the science center community has experienced tremendous growth. From the handful of institutions in existence in 1969 — e.g., the Oregon Museum of Science and Industry (1957), the Pacific Science Center (1963), the New York Hall of Science (1966), and the Exploratorium (1969) — the number has grown to include over 364 members of the Association of Science and Technology Centers (ASTC). By some estimates there are over 100 million visits per year to these institutions in the U.S. alone.

These centers have also grown in terms of their mission. While most often associated with the casual family visit on a weekend afternoon, or class field trips, science centers are increasingly playing a significant role in supporting education in a larger arena. A recent ASTC study, *First Hand Learning*, found that over 20 percent of the elementary school in-service teacher development occurs in science museums. Some of the major curriculums in use by schools today were developed by science centers. And science centers have been at the forefront of supporting the institutionalization of inquiry-based instruction in the schools, a key aspect of the recently promulgated National Academy of Sciences science education standards. This role has capitalized on the science center's unique position as an independent institution that is nevertheless still connected with the school, the home and the community.

The Exploratorium, like many other science centers today, sees its mission as being much broader than just providing an experience for a visiting public. From its inception, its founder, Dr. Frank Oppenheimer, envisioned creating a place which provided adjunctive educational experiences to formal schooling. Therefore, the museum has continually explored ways to reach additional audiences beyond the casual public visitors, through books, magazines, television and teacher workshops.

Our goal is to create and sustain a culture of learning which fosters the process of personal inquiry, experimentation, communication, understanding, and the sharing of values about our world. To meet this goal, the Exploratorium has reorganized itself into three interlocking centers of activity: the Center for Public Exhibition, the Center for Teaching and Learning, and the Center for Media and Communication.

The Center for Public Exhibition oversees the development and operation of more than 600 interactive exhibits on the museum floor, and provides programming to complement them. Exhibited subjects include light, color, vision, sound and hearing, waves and resonance, neurobiology, animal behavior, electricity and magnetism, language, mathematics and weather and the environment. The museum uses its exhibit services division's developmental capacity to provide exhibits and consulting support to science museums worldwide.

The Center for Teaching and Learning serves more than 550 Bay Area teachers in grades K-12 each year with intensive workshops and follow-up seminars based on the exhibit collection, designed to foster increased effectiveness in today's classrooms. It has developed a network of 2,500 teachers, many of whom return periodically to receive additional support. Its national professional development programs are designed to support teachers nationwide as they implement new national science education standards. The center is also responsible for outreach programs that reach more than 3,400 underserved children annually, as well as the high school field trip programs which reach 69,000 students and their teachers annually.

The Center for Media and Communication, the newest of the three centers, is dedicated to support the development of scientific literacy through communication and the use of media. This center uses publishing and venues such as the Internet to carry the Exploratorium's pedagogy beyond the walls of the museum, while developing interactive media tools for learning within the museum itself. Recent projects include the creation of the Explorabook, a science museum in a book; the Science Snackbook, a teacher development guide to the creation of classroom versions of Exploratorium exhibits; and the Family Science Snackbook, a book of science activities for parents and their children. The Center's World Wide Web site originates programming based on the museum's exhibits and teaching resources, and currently attracts over 600,000 remote users per year.

Science centers are situated at a special nexus between the community, the school, and the home. This position gives them a unique role in the educational infrastructure, one which can propel science education reform into the 21st century. During the last push to reform science education, the task was the job of schools and universities. This time around, there is a powerful new ally to help.

Robert Semper is Executive Associate Director of the Exploratorium in San Francisco, CA. He formerly served on the faculty at St. Olaf College and as a research associate at Johns Hopkins University. This article originally appeared in the Fall 1996 issue of the newsletter of the APS Forum on Education.

Science Education Reform *(continued from page 3)*

Q What are some of the criteria you consider when selecting educational materials?

A We look for materials that reflect the national science standards and recommend those to school districts. We favor those that have been developed by education research groups like the National Science Resources Center. They involve science educators, psychologists, teachers, scientists, and evaluators in the process — a wide spectrum of professions, all of whom are contributing their particular expertise to the development of those materials. Such materials have undergone extensive field testing in a variety of settings around the country. And they are based on cognitive research that exists around a particular subject, so that the materials can address any set of misconceptions kids might have about how something works.

For example, most kids, and many adults, hold the naive conception that heavy things sink and light things float. That's a pretty good description for most of the things they're going to encounter in the world, but that's not the scientifically accurate idea. So one set of materials tries to modify that understanding so the kids emerge with a much better understanding of things like displacement and other scientific factors that affect whether an object sinks or floats. That particular unit took almost three years to develop.

Q Why is a hands-on approach considered so important to reforming science education?

A You learn science by doing science; anybody who's been to graduate school knows that. That should be the way all people have the chance to learn science. The national science standards contain a wonderful line: "Science is something that children should do, not something that should be done to them." Science is often something that is done to kids, so it's no surprise that by the third grade most kids are rapidly tuning out to science. Another essential aspect contained in the science standards is the notion of science as inquiry: the questioning, the reasoning, the problem solving — all of that is seen as part of the content of science.

Q What are some important future directions for the APS education activities?

A The big issue on the horizon is undergraduate reform in science, math and technology. This May there's going to be an APS/AAPT department chairs conference on undergraduate education. That could evolve into national undergraduate reform. This is an area in which the APS can help because we are a major voice for the physics community. The time is right.

Physical Review A Goes Online *(continued from page 1)*

Current APS Research Journals Online

Physical Review A online Launched March 3, 1997, *PRA-online* is available free of charge to APS members who have a fiscal year 1997 subscription to *PRA*, and to all APS members until May 1, 1997. For further information please see http://publish.aps.org/genintro.html#prao.

Physical Review B Rapid Communications-online Launched July 1, 1996, *PRB Rapids-online* is available free of charge to APS members who have a fiscal year 1997 subscription to any part of *PRB*. For further information please see http://publish.aps.org/genintro.html#prbo.

Physical Review C online Launched July 1, 1996, *PRC-online* is available free of charge to APS members who have a fiscal year 1997 subscription to *PRC*. For further information please see http://publish.aps.org/genintro.html#prco.

Physical Review D online Launched in its beta version August 1, 1996, *PRD-online* is available free of charge to APS members who have a fiscal year 1997 subscription to either part of *PRD*. For further information please see http://publish.aps.org/genintro.html#prdo.

Physical Review Letters online Launched July 1, 1995, *PRL-online* is available on a subscription basis. For further information please see http://publish.aps.org/genintro.html#prlo or contact assocpub@aps.org.

APS Research Journals to Go Online in 1997

Physical Review B, Physical Review E, **and** ***Reviews of Modern Physics*** are scheduled to go online throughout the spring of 1997. For future updates please watch for announcements in upcoming issues of *APS News* or visit http://publish.aps.org/genintro.html.

NOMINATIONS FOR 1998 APS PRIZES AND AWARDS

The following prizes and awards will be bestowed at meetings of the Society in the coming year. Members are invited to nominate candidates to the respective committees charged with the privilege of recommending the winners. A brief description of each prize and award is given below, along with the addresses of the selection committee chairs to whom nominations should be sent. Please refer to the APS Membership Directory, pages xxiii- xxxix, or the APS Home Page [http://aps.org] under the Prize and Award button, for complete information regarding rules and eligibility requirements for individual prizes and awards.

PRIZES

JULIUS EDGAR LILIENFELD PRIZE

Sponsored by the Lilienfeld Trust.

Purpose: To recognize a most outstanding contribution to physics.

Nature: The prize consists of $10,000, a certificate citing the contributions made by the recipient, and expenses for three lectures by the recipient given at an APS general meeting, a research university, and a predominantly undergraduate institution.

Send the name of candidates, biographical information and supporting letters to: David L Goodstein, 114-36,Caltech, Pasadena, CA 91125, Phone: (818) 356-4319, Fax: (818) 683 9060, Email: david_goodstein@Starbase1.Caltech.edu. Nominations must be received no later than 1 July 1997.

LARS ONSAGER PRIZE

Endowed by Russell and Marion Donnelly.

Purpose: To recognize outstanding research in theoretical statistical physics, including the quantum fluids.

Nature: The prize consists of $10,000 and a certificate citing the contributions made by the recipient.

Send the name of candidates, biographical information and supporting letters to: Katepalli Raju Sreenivasan, Dept of Mech Engr, Yale Univ, PO Box 208286,New Haven, CT 06520, Phone: (203) 432-4345, Fax: (203) 432-7654, Email: k.sreenivasan@yale.edu. Nominations must be received no later than 1 July 1997.

ARTHUR L. SCHAWLOW PRIZE IN LASER SCIENCE

Endowed by the NEC Corporation.

Purpose: To recognize outstanding contributions to basic research that uses lasers to advance our knowledge of the fundamental physical properties of materials and their interaction with light.

Nature: The prize consists of $10,000 and a certificate citing the contributions made by the recipient.

Send the name of candidates, biographical information and supporting letters to: Thomas J McIlrath, APS, One Physics Ellipse, College Park, MD 20740, Phone: (301) 209-3220, Fax: (301) 209-0844, Email: mcilrath@aps.org. Nominations must be received no later than 1 July 1997.

HANS A. BETHE PRIZE

This prize is endowed by contributions from the Division of Astrophysics, the Division of Nuclear Physics and friends of Hans A. Bethe.

Purpose: To recognize outstanding work in theory, experiment or observation in the areas of astrophysics, nuclear physics, nuclear astrophysics, or closely related fields.

Nature: The prize consists of $7,500 and a certificate citing the contributions made by the recipient.

Send names of candidates, biographical information and supporting letters to: Ernest Henley, Dept of Phys, Univ of Washington, PO Box 351560, Seattle WA 98195, Phone: (206) 543-2896, Fax: (206) 685-0635, Email: henley@phys.washington.edu. Nominations must be received by 1 July 1997.

WILL ALLIS PRIZE FOR THE STUDY OF IONIZED GASES

Purpose: To recognize and encourage outstanding research into the microscopic or macroscopic behavior of ionized gases.

Nature: The Prize consists of $5,000 and a certificate citing the contributions made by the recipient. An allowance will be provided for travel expenses of the recipient to the meeting of the Society at which the Prize is bestowed.

Send nomination letters, biographical information and supporting letters to: Kurt H Becker, Department of Physics and Engineering Physics, Stevens Institute of Technology, Hoboken, NJ 07030, Phone/Fax: (201) 216-5671, Email: kbecker@stevens-tech.edu. Nominations must be received by 1 July 1997.

DANNIE HEINEMAN PRIZE FOR MATHEMATICAL PHYSICS

Endowed by the Heineman Foundation for Research, Educational, Charitable, and Scientific Purposes, Incorporated through the American Institute of Physics.

Purpose: To recognize outstanding publications in the field of mathematical physics.

Nature: The prize consists of $7,500 and a certificate citing contributions made by the recipient.

Send the name of candidates, biographical information and supporting letters to: Stanley Deser, Dept of Phys, Brandeis Univ, 415 South St, Waltham, MA 02254, Phone: (617) 736-2845, Fax: (617)736-2915, Email: deser@binah.cc.brandeis.edu. Nominations must be received no later than 1 July 1997.

TOM W. BONNER PRIZE IN NUCLEAR PHYSICS

Endowed by Friends of Tom W. Bonner.

Purpose: To recognize and encourage outstanding experimental research in nuclear physics, including the development of a method, technique, or device that significantly contributes in a general way to nuclear physics research.

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

Send the name of candidates, biographical information and supporting letters to: Noemie Benczer, Dept of Physics, Rutgers University, New Brunswick, NJ 08903, Phone: (908) 932-2525, Fax: (908) 932-4343. Nominations must be received no later than 1 July 1997.

BIOLOGICAL PHYSICS PRIZE

The Prize was established in 1981 by friends of the Division of Biological Physics.

Purpose: To recognize and encourage outstanding achievement in biological physics research.

Nature: The Prize consists of $5,000, an allowance for travel to attend the meeting at which the Prize is awarded, and a certificate citing the contributions made by the recipient or recipients.

Send nomination letter, biographical summary and supporting letters to: John J. Hopfield, Beckman Institute, Caltech 139-74, Pasadena, CA 91125, Phone: (818) 397-2808, Fax:(818)792-7402, Email: john@hope.caltech.edu. Nominations must be received by 1 July 1997.

OLIVER W. BUCKLEY CONDENSED MATTER PHYSICS PRIZE

Endowed by AT&T Bell Laboratories.

Purpose: To recognize and encourage outstanding theoretical or experimental contributions to condensed matter physics.

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

Send the name of candidates, biographical information and supporting letters to: John Clarke, Dept of Phys, UCB, 366 LeConte Hall, Berkeley, CA 94720, Phone: (510)642-3069, Fax: (510)642-1304, Email: jclarke@physics. berkeley.edu. Nominations must be received no later than 1 July 1997.

DAVISSON-GERMER PRIZE

Sponsored by AT&T Lucent Technologies.

Purpose: To recognize and encourage outstanding work in atomic physics or surface physics.

Nature: The prize consists of $5,000 and a certificate citing the contributions made by the recipient. This annual prize will normally be awarded alternatively for outstanding work in atomic physics one year and for outstanding work in surface physics the following year. The 1998 prize will be awarded for outstanding work in surface physics.

Send the name of candidates, biographical information and supporting letters to: Andrew C Tam, 21463 Continental Cir, Saratoga CA 95070, Phone: (408) 927-1943, Email: ACTAM@almaden.ibm.com. Nominations must be received no later than 1 July 1997.

HIGH POLYMER PHYSICS PRIZE

Sponsored by the Ford Motor Company.

Purpose: To recognize outstanding accomplishments and excellence of contributions in high polymer physics research.

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

Send the name of candidates, biographical information and supporting letters to: Timothy P Lodge, Dept of Chem, Univ of Minnesota, 207 Pleasant St SE, Minneapolis, MN 55455-0431, Phone: (612) 625-0877, Fax: (612) 624-1589, Email: lodge@chemsun.chem.umn.edu. Nominations must be received no later than 1 July 1997.

FRANK ISAKSON PRIZE

The prize is supported by *Solid State Communications* (Elsevier Science Ltd.).

Purpose: To recognize and encourage outstanding contributions to the field of optical effects in solids.

Nature: The Prize consists of $5,000, an allowance for travel to the meeting of the Society at which the prize is being presented and a certificate citing the contributions made by the recipient.

Send nomination letters, biographical information and letters of support to: Thomas Timusk, Dept of Phys, McMaster Univ, Hamilton ON L8S 4M1 Canada, Fax: (905) 546-1252, Email: timusk@mcmaster.ca. Nominations must be received by 1 July 1997.

GEORGE E. PAKE PRIZE

Endowed by the Xerox Corporation.

Purpose: To recognize and encourage outstanding work by physicists combining original research accomplishments with leadership in the management of research or development in industry.

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

Send the name of candidates, biographical information and supporting letters to: Venkatesh Narayanamurti, Off of the Dean, Coll of Engr, UCSB, Santa Barbara, CA 93106, Phone: (805) 893-3141, Fax: (805) 893-8124, Email: venky@engrhub.ucsb.edu. Nominations must be received no later than 1 July 1997.

W.K.H. PANOFSKY PRIZE

Sponsored by the friends of W.K.H. Panofsky & the Division of Particles & Fields.

Purpose: To recognize and encourage outstanding achievements in experimental particle physics.

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

Send the name of candidates, biographical information and supporting letters to: James E Pilcher, Enrico Fermi Inst, Univ of Chicago, 5640 S Ellis Ave, Chicago, IL 60637, Phone: (312) 702-7443, Fax: (312) 702 1914, Email: pilcher@uchep.uchicago.edu. Nominations must be received no later than 1 July 1997.

EARLE K. PLYLER PRIZE

Sponsored by the George E. Crouch Foundation.

Purpose: To recognize and encourage notable contributions to molecular spectroscopy.

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

Send the name of candidates, biographical information and supporting letters to: Terry A Miller, Dept of Chem, Ohio State Univ, 140 W 18th St, Columbus, OH 43210, Phone: (614) 292-2569, Fax: (614) 292-1948, Email: tamiller+@osu.edu. Nominations must be received no later than 1 July 1997.

PRIZE TO A FACULTY MEMBER FOR RESEARCH IN AN UNDERGRADUATE INSTITUTION

Sponsored by the Research Corporation.

Purpose: To honor a physicist whose research in an undergraduate setting has achieved wide recognition and contributed significantly to physics and who has contributed substantially to the professional development of undergraduate physics students.

Nature: The prize consists of a $5,000 stipend to the recipient, a certificate citing the contribution of the recipient, and a separate $4,000 unrestricted grant for the research of the recipient to the awardee's institution.

Send the name of candidates, biographical information and supporting letters to: Thomas D Rossing, Dept of Phys, Northern Illinois Univ, De Kalb, IL 60115, Phone: (815) 753-6493. Nominations must be received no later than 1 July 1997.

ANEESUR RAHMAN PRIZE

Sponsored by the IBM Corporation.

Purpose: To recognize and encourage outstanding achievement in computational physics research.

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

Send the name of candidates, biographical information and supporting letters to: Malvin H Kalos, 521 ETC Bldg, Cornell Univ, Hoy Rd, Ithaca, NY 14853-3801, Phone: (607) 254-8691, Fax: (607)254-8888, Email: kalos@tc.cornell.edu. Nominations must be received no later than 1 July 1997.

J.J. SAKURAI PRIZE FOR THEORETICAL PHYSICS

Endowed by the family and friends of J.J. Sakurai.

Purpose: To recognize and encourage outstanding achievement in particle theory by a young physicist.

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

Send the name of candidates, biographical information and supporting letters to: William J Marciano, Dept of Phys, Brookhaven Natl Lab., Upton, NY 11973, Phone: (516) 282-3151, Email: marciano@bnlcli.bnl.gov. Nominations must be received no later than 1 July 1997.

ROBERT R. WILSON PRIZE

Endowed by friends of Robert R. Wilson.

Purpose: To recognize and encourage outstanding achievement in the physics of particle accelerators.

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

Send the name of candidates, biographical information and supporting letters to: Claudio Pellegrini, Dept of Phys, UCLA, 405 Hilgard Ave, Los Angeles, CA 90024-1547, Phone: (310) 206-1677, Fax: (310) 206-1091, Email: claudio@vesta.physics.ucla.edu. Nominations must be received no later than 1 July 1997.

AWARDS

JOSEPH F. KEITHLEY AWARD FOR ADVANCES IN MEASUREMENT SCIENCE

This Award is being endowed by Keithley Instruments, Inc. and the Instrument & Measurement Science Topical Group (IMSTG).

Purpose: To recognize physicists who have been instrumental in the development of measurement techniques or equipment that have impact on the physics community by providing better measurements.

Nature: The award consists of $5,000 and a certificate citing the contributions made by the recipient, plus travel to the meeting at which the prize is bestowed.

Send nomination letter, biographical in-

formation and supporting letters to: Robert J Erdman, Keithley Instruments Inc, 28775 Aurora Rd, Solon OH 44139, Phone: (216) 248-0400, Fax: (216) 248-6168, Email erdman_bob@ keithley.com. Nominations must be received by 1 July 1997

LEROY APKER AWARDS

Endowed by Jean Dickey Apker, in memory of LeRoy Apker.

Purpose: To recognize outstanding achievement in physics by undergraduate students, thereby providing encouragement to young physicists who have demonstrated great potential for future scientific accomplishment.

Nature: Two awards may be made, one to a nominee from an institution that offers a Ph.D. program in physics, the other to a nominee from an institution that does not. The award to each recipient consists of $3,000, an allowance for travel to the meeting of the Society at which the award is being presented, and a certificate citing the work and school of the recipient. Each of the finalists in the annual competition will receive an honorarium of $1,000 and a certificate as an Apker Award Finalist. Certificates and grants equal to 50 percent of the recipient and finalist awards will be presented to the home institutions.

Send the name of candidates, biographical information and supporting letters to: Barrett Ripin, Administrator, Apker Award Selection Committee, The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, Phone: (301) 209-3233, Fax: (301) 209-0865, email: ripin@aps.org. Nominations must be received no later than 13 June 1997.

MARIA GOEPPERT-MAYER AWARD

Sponsored by the General Electric Foundation.

Purpose: To recognize and enhance outstanding achievement by a woman physicist in the early years of her career, and to provide opportunities for her to present these achievements to others through public lectures.

Nature: The award consists of $2,500, plus a $4,000 travel allowance to provide opportunities for the recipient to give lectures in her field of physics at four institutions of her choice and at the meeting of the Society at which the award is bestowed. Nominee must be a female physicist having U.S. citizenship or a permanent U.S. resident and received her Ph.D. after Sept. 1, 1987.

Send the name of candidates, biographical information and supporting letters to: Anne Kernan, 33605 Moonsail Drive, Dana Point, CA 92629-4483, (H)Phone: (714) 488-7750, (H) Fax: (714) 488-7729, email: a.kernan @worldnet.att.net. Nominations must be received no later than 30 May 1997.

JOSEPH A. BURTON FORUM AWARD (Formerly the Forum Award)

Endowed in 1997 by Jean Dickey Apker

Purpose: To recognize outstanding contributions to the public understanding or resolution of issues involving the interface of physics and society.

Nature: The award consists of $3,000, a certificate citing the contributions of the recipient, and an allowance for travel to the meeting of the Society at which the award is presented. It will be awarded annually.

Send nomination letter, biographical information and supporting letters to: Tina Marie Kaarsberg, Vista Tech, 7101 Woodland Ave, Takoma Park, MD 20912, Phone: (301) 270-0646, Fax: (301)270-5359, Email: tina.kaarsberg@hq.doe.gov. Nominations must be received by 1 July 1997.

LEO SZILARD AWARD FOR PHYSICS IN THE PUBLIC INTEREST

Purpose: To recognize outstanding accomplishments by a physicist in promoting the use of physics for the benefit of society in such areas as the environment, arms control, and science policy.

Nature: The award consists of a certificate citing the contributions of the recipient and a sculpture to be held one year and passed on to the next recipient.

Send the name of candidates, biographical information and supporting letters to: Send nomination letter, biographical information and supporting letters to: Tina Marie Kaarsberg, Vista Tech, 7101 Woodland Ave, Takoma Park, MD 20912, Phone: (301) 270-0646, Fax: (301) 270-5359, Email: tina.kaarsberg@hq.doe.gov. Nominations must be received by 1 July 1997.

MEDALS AND LECTURESHIPS

DAVID ADLER LECTURESHIP AWARD

Sponsored by the friends of David Adler.

Purpose: To recognize an outstanding contributor to the field of materials physics who is noted for the quality of his/her research, review articles, and lecturing.

Nature: The award consists of an award an honorarium for the lecturer, and a certificate citing the contribution made by the recipient.

Send the name of candidates, biographical information and supporting letters to: Jim Roberto, Oak Ridge National Laboratory, MS6033 Solid State Div., P.O. Box 2008, Oak Ridge, TN 37831, Phone: (615) 576-0227, Fax: (615) 574-4143, Email: robertojb@ornl.gov. Nominations must be received no later than 1 July 1997.

EDWARD A. BOUCHET AWARD

Sponsored by the Research Corporation.

Purpose: The Bouchet Award is intended to promote the participation of under-represented minorities in physics by publicizing the recipients work and career development to the physics community, especially to young minority physics students.

Nature: The lectureship consists of a stipend of $3,000 plus support for travel to an APS general meeting where the recipient will receive the award and give his/her first address. In addition, the recipient will be invited to lecture at least three academic institutions where the impact of the visit on minority students would be significant.

Send the name of candidates, biographical information and supporting letters to: Kennedy J Reed, L-41, Lawrence Livermore National Lab., Livermore, CA 94550, Phone: (510) 423-1112, Fax: (510) 423-7228, Email: reed5@LLNL.GOV. Nominations must be received no later than 1 July 1997.

JOHN H. DILLON MEDAL

The medal is sponsored by *Polymer*, (Elsevier Science Ltd.)

Purpose: To recognize outstanding accomplishments by young polymer physicists.

Nature: The award consists of $2,000, the John H. Dillon Medal, an allowance to travel to the meeting at which the medal is to be presented, and a certificate citing the contributions made by the recipient.

Send the name of candidates, biographical information and supporting letters to: Timothy P Lodge, Dept of Chem, Univ of Minnesota, 207 Pleasant St SE, Minneapolis, MN 55455-0431, Phone: (612) 625-0877, Fax: (612)624-1589, Email: lodge@chemsun.chem.umn.edu. Nominations must be received no later than 1 July 1997.

DISSERTATION AWARDS

AWARD FOR OUTSTANDING DOCTORAL THESIS RESEARCH IN BEAM PHYSICS

Supported by the Universities Research Association.

Purpose: To recognize doctoral thesis research of outstanding quality and achievement in beam physics and engineering.

Nature: The award consists of $1,500 and a certificate to be presented at an awards ceremony at the Division of Physics of Beams Annual Meeting.

Send the name of candidates, biographical information and supporting letters to: Alexander Wu, SLAC, Stanford Univ, PO Box 4349, Stanford, CA 94309, Phone: (415) 926-2985, Fax: (415) 926-4999, Email: achao@slac.stanford.edu. Nominations must be received no later than 1 July 1997.

DISSERTATION IN NUCLEAR PHYSICS AWARD

Endowed by members and friends of the Division of Nuclear Physics.

Purpose: To recognize a recent PhD in Nuclear Physics.

Nature: The Award consists of $1,000 and an allowance for travel to the annual Spring Meeting of the Division of Nuclear Physics, when the award will be presented.

Send nomination letters, biographical information, and supporting letters to: Bunny C Clark, Phys Dept, The Ohio State Univ, 174 W 18th Ave, Columbus OH 43210-1106, Phone: (614) 292-1843, Fax (614) 292-7557, Email: bcc@mps.ohio-state.edu. Nominations must be received by 1 July 1997.

Physicists to be Honored at 1997 Spring Meeting *(continued from page 2)*

Citation: "For achieving Bose-Einstein condensation of an atomic gas, for creating techniques for studying the Bose condensation, and for measuring the physical properties of the weakly interacting atomic Bose gas."

Cornell received his PhD from MIT in 1990, researching precision mass spectroscopy of single trapped molecular ions. He went to JILA at the University of Colorado in Boulder in 1990 and since 1992 has been a staff scientist with the National Institute of Standards and Technology. His research interests center around various aspects of laser cooling, including Bose-Einstein condensation and an experiment on atoms guided by optical forces inside hollow glass fibers. He is also attempting to realize laser cooling in the solid state.

A native of Germany, Ketterle received his PhD from the University of Munich in 1986. He did postdoctoral research in molecular spectroscopy at the Max Planck Institute for Quantum Optics in Garching, and in combustion diagnostics in Heidelberg, before joining the faculty of MIT in 1990. His research is in atomic physics and laser spectroscopy, working on novel methods to slow, cool and trap atoms in order to explore novel aspects of ultra cold atomic matter. Since the realization of Bose-Einstein condensation, he has focused on the study of quantum-degenerate gases and the development of an "atom laser."

1997 PRIZE FOR RESEARCH IN AN UNDERGRADUATE INSTITUTION

Established in 1984 by a grant from the Research Corporation, this prize is intended to honor a physicist whose research in an undergraduate setting has achieved wide recognition and contributed significantly to physics, and who has contributed substantially to the professional development of undergraduate physics students.

Robert C. Hilborn
Amherst College

Citation: "For his research contributions in lasers and atomic physics, fundamental symmetries, and nonlinear dynamics, and for his leadership and energy in guiding Amherst College students in his research programs."

Hilborn received his PhD from Harvard University in 1971. Following a two-year postdoctoral position at the State University of New York at Stony Brook, he taught physics for 13 years at Oberlin College. In 1986 he moved to Amherst College, where he is currently the Amanda and Lisa Cross Professor of Physics. He is a former president of the American Association for Physics Teachers and has served on the APS Council and the AIP Governing Board. In addition, he authored *Chaos and Nonlinear Dynamics: An Introduction for Scientists and Engineers*, which was recognized by *Choice* magazine as one of the outstanding academic books of 1995.

1997 J.J. SAKURAI PRIZE

Established in 1984 by contributions from family and friends of J.J. Sakurai, this prize is awarded annually in recognition of outstanding achievements in particle theory.

Thomas Appelquist
Yale University

Citation: "For his pioneering work on charmonium and on the decoupling of heavy particles."

Applequist received his PhD from Cornell University in 1968 and held a two-year postdoctoral fellowship at the Stanford Linear Accelerator Center before joining the faculty of Harvard University in 1970. In 1975 he moved to Yale University, where he is currently the Eugene Higgins Professor of Physics and Dean of the Graduate School. His research has focused on the theory of elementary particles, including the strong interactions and electroweak unification. His most recent interests have dealt with dynamical electroweak symmetry breaking and the origin of the quark and lepton masses.

1997 LEO SZILARD AWARD

This award was established in 1974 by the Forum on Physics and Society in recognition of Leo Szilard's concern for the social consequences of science. Its purpose is to recognize outstanding accomplishments by a physicist in promoting the use of physics for the benefit of society in such areas as the environment, arms control, and science policy.

Thomas L. Neff
Massachusetts Institute of Technology

Citation: "For proposing and working to keep on track the historic agreement for the U.S. to purchase uranium from the former Soviet Union weapons stockpile and to transform it from highly enriched uranium to low-enriched uranium for civilian purposes, thereby significantly reducing the number of nuclear weapons."

Neff received his PhD in theoretical physics from Stanford University in 1973 and held several postdoctoral positions. He then served as a senior staff member of the Ford Foundation's study of nuclear power and nonproliferation issues. He served as manager and director of MIT's International Energy Studies Program. For more than five years he helped implement the "swords into plowshares" deal between the two countries. He is also currently involved in defense conversion activities with major weapons production facilities in the former Soviet Union. In the U.S. he has served as advisor to the Department of State, the Department of Energy, and the Executive Office of the President.

1997 JOHN WHEATLEY AWARD

Established in 1991 by the International Physics Group, now the Forum on International Physics, the award is intended to honor and recognize the dedication of physicists who have made contributions to the development of physics in countries of the third world.

Manuel Cardona
Max Planck Institute for Solid State Research, Stuttgart, Germany

Citation: "For being a dedicated mentor and guide to a whole generation of Latin American physicists and playing a decisive role in the development of physics in Latin America. By example, enthusiasm, and very exacting standards he has inspired a respect for excellence and collegiality which now motivates many groups throughout Latin America."

A native of Spain, Cardona received his PhD in applied physics from Harvard University in 1959, and subsequently worked for RCA Laboratories in both Zurich, Switzerland and Princeton, New Jersey. He joined the faculty of Brown University in 1964, and has been affiliated with the Max Planck Institute for Solid State Research at Stuttgart, Germany, since 1991. A past recipient of the APS Frank Isakson Prize, Cardona's present research interests include high temperature superconductors, as well as isotopically modified crystals and the optical properties of semiconductor nanostructures. He has been active in many scientific societies internationally, and has served on the board of editors of seven scientific journals.

1997 Apker Award

Editor's Note: The recipients of the 1996 Apker Award will also be honored during the ceremonial session at the April Meeting. Names, citations and biographical information were published in the January 1996 issue of *APS News*.

THE BACK PAGE

The 'Crunch'

by Peter Abbamonte

As an undergraduate physics student at the University of Texas in 1992, the future shined bright. Though my high school career had by all measures been a disaster, college had illuminated in me a basic talent for visualizing and solving physical problems (where had this been when I was 15?). What had for most of my friends been 4+ years of depression and confusion for me came to be a period of orientation and self discovery. And what I discovered, with the direction of my physics professors, of course pointed toward a career in physics research. I read pop science novels about the lives of physicists in the 50's, found I liked the nerd lifestyle and the people I met in it, and found that physics could be a creative release and not just a series of homework problems. I saw the rest of my life in a vision: a groovy, eccentric wardrobe, conferences in obscure European cities, living on a 26 hour cycle so my meals would precess against the solar calendar, impressing trendy women in cafes with my keen wit and insight. The world was to be my oyster.

Skipping both commencement and post-collegiate reflection, I headed off to the University of Illinois with nothing but a box of books, an obsolete Macintosh, $500 in cash, and inexhaustible enthusiasm. As my first two years passed my elation with life's new direction grew, along with a holistic grasp of basic physics and what felt like my own philosophy toward research. The latter I even named: Informed Experimentation. I found the thesis advisor with whom this philosophy fit and embarked on the phase of physics life I had been craving: full time research.

Life proceeded as planned for those two years, but then things began to change. It's hard to pinpoint when, because it was a gradual drift of attitude and not a defined event. In the earliest stages I remember faculty discussing the recent ubiquity of repeat postdocs. I also remember a few blurbs by Roman Czujko appearing in *APS News* about a growing disparity between the number of available academic jobs and the supply of young Ph.D.'s. In the later stages, a feature article appeared in *Physics Today* using the words "physics" and "bleak" in the same title, an association I never imagined I would see. Similar articles followed in the *New York Times*, *Newsweek*, and even the local rag, the *Champaign-Urbana News Gazette*, a periodical which usually emphasizes coverage of local bake sales. I watched in amazement as a spiraling "Physics Job Crunch" became the talk of the town.

What struck me most about the Crunch, besides its very existence, was how differently it affected people in different stages of their academic careers. Faculty, for example, seemed to think of the crunch as a purely academic phenomenon. A few activists added the issue to their postmodern plates, along with responsible science, environmentalism, and multiculturalism. But most just filed it in their mental glossary of current events, aside the war in Rwanda and the AIDS epidemic, and went along their merry ways.

But for graduate students it struck much more deeply. A fog of low morale seemed to fall over the back offices, cubicles, labs, and classrooms of the department. Ironic hallway postings appeared, including a completed employment application to a local Mexican food restaurant and a very Dilberty sign which read "The beatings will continue until morale improves." And productivity became a greater casualty than bliss, as many fell into the drink/sleep/email/play-Doom-to-forget cycle.

Late one night, when work time had turned into reflective commiseration time as it had acquired a propensity to do, I sat talking with a fellow student, who I hear is now self employed. We pinned down one thing that night I will never forget. This employment crisis was doing more than force us to rethink our careers; it was forcing us to rethink our identities. Because we had not come to graduate school to get jobs as physicists. We had come to become physicists. So the reason for the morale problem was not that we were spoiled kids who were being denied our fun. It was that the very foundation on which we had chosen to build our character was crumbling. And adding to the anxiety, looming over our heads, was the $250,000 question: Why?

Why was this happening? Most of us were told it never would. When applying to graduate school, I read in the application to one which eventually rejected me, and which I will not name but is a swanky private school in New Jersey, "The employment market for well-trained, young scientists is excellent and is expected to be for years to come." Was this a lie? What was happening? Absolutely no one knew. A few bold pundits who would publicly speculate blamed the problem on the post-Reaganomics recession and the end of the Cold War, and claimed things would turn around in a few years. But I hesitated to believe them, simply because I felt we had reached the limit of things we can blame on Ronald Reagan. But no one had a better explanation, so everyone continued sleep, play Doom, and work as best they could.

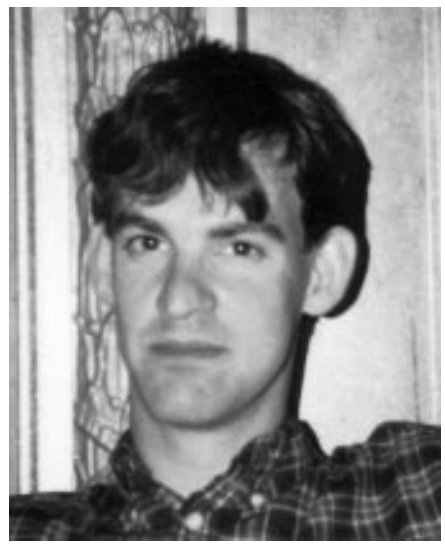
This cycle would have continued adgraduatum, at least for me, had it not been for a single event which I can honestly say changed my life. I found, in the garbage in my communal office, a tattered yet just legible photocopy of David Goodstein's *American Scholar* article. It had apparently been published several years earlier but was not widely read. It was also not focused on employment. But it had one particular merit: it had the answer to "why?"

I read the article in its entirety while standing next to the garbage. The answer was so ridiculously simple I almost hit myself: if every faculty member trains 15 new faculty members in his or her career, by the year 2085 every man, woman and child in the United States will be a physicist. Conclusion: an employment crisis was *a priori* inevitable, but had gone unanticipated for decades.

I was stunned. I continued to stand next to the garbage. I looked up from the page and out the window. As I looked a translucent curtain, which I had never noticed until it began to rise, revealed a gray world of dispassion and uncertainty. The hallowed world of physics transformed before my eyes into a regular profession, like Law or Medicine, occupied not by visionaries but by normal people acting in self-interest. One question pulsated in my mind: how had physicists gone so long without ever turning their talent for analysis on themselves? How had I failed to do this myself? I didn't know. But there was one thing I knew for sure: What was happening now could have been anticipated at any time during the previous 80 years by literally anyone who knew the solution to N(t)=+r dN(t)/dt. But it wasn't. Conclusion: I could not count on anyone to step in and help me. So I had better damned well do something to help myself.

But what? I figured what I had to do was prepare for the end of my academic career. And this, I imagined, meant I would have to get a regular job. But how? What is a regular job? What do I do? I started asking my peers, hoping to stumble on some insight. There was none. I found, to my shock and dismay, that not a single person in my class had ever thought about not being an academic physicist. Given that Roman Czujko was forecasting less than one academic position per four graduates, this was disheartening indeed.

It was then that I realized our Physics Job Crunch was much more than just a Job Crunch. It was a Truth Crunch, a Communication Crunch, an Ego Crunch, and most of all a Knowledge Crunch, all wrapped up into one. What a friggin' mess. But as daunting as it was to state the problem that way, it made me optimistic. Because now at least I knew what the problem was. And articulated as such, it pointed to an obvious solution. As physicists, while maybe we are a bunch of babies, there is one thing we know well: how to behave when we do not know. So the answer was simple. Someone had to perform thorough, well-documented research on what employment



alternatives exist for young physics PhD's. With any luck, there would be some.

What grew out of this idea was the *Open Forum on Alternative Careers for Physicists*. This was formed to be a research organization dedicated, by whatever unorthodox means necessary, to establishing what young physicists can do with their PhD's besides academic research. It turns out that options for the savvy and prepared PhD are plentiful. Some of them are briefly described at http://www.physics.uiuc.edu/jobs/non-physics/forum.

Ironically, since then my academic career has taken a turn for the better, as I lucked into some high-profile research at the politically beleaguered yet technologically supreme Advanced Photon Source at Argonne. So the Forum is latent. Yet a spirit of self reliance, of which the Forum was just an outcome, appears to have endured. Very recently, several other Urbana students worked out a technique for a physics PhD student to infiltrate their local engineering placement office, and all found industrial jobs as a result. So what is important really is not the Forum itself, but the spirit of which it is a manifestation.

Even if my research career works out, it will not be the same as it would have been. Because the approach I try to take to science now is not that of a child staring at the stars, but of a professional performing a craft. Some would oversimplify by saying that my interests are now "more applied." But it would be more correct to say that they are more informed, namely of the history, culture, and humanity in which they reside. Plus, if my research career ever ends, whether that is now or when I am 50, I now know how to survive. It makes me wonder if the employment Crunch is not a curse placed on physicists, but rather a blessing in disguise.

Peter Abbamonte is a graduate student at the University of Illinois, Urbana in the Loomis Laboratory of Physics. He is a member of the APS Task Force on Career and Professional Development.

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.*