APS NEWS

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APS Members Elect Helen Quinn as Society's Next Vice President

Members of the APS have chosen Helen Quinn of the Stanford Linear Accelerator Center to be the Society's next vice president. Quinn is the fourth woman to be elected to the presidential line in the Society's 102-year history, following C.S. Wu of Columbia University in 1975, Mildred Dresselhaus of MIT in 1984, and current APS Vice President Myriam Sarachik (City College of New York), who will assume the role of president-elect next year when William Brinkman of Bell Labs/Lucent Technologies becomes president. Quinn will assume the APS presidency in 2004, following Brinkman and Sarachik, who will be president in 2003.

In other election results, Susan Seestrom of Los Alamos National Laboratory will become chair-elect of the APS Nominating Committee, which will be chaired by Susan Coppersmith (University of Chicago) in 2002. The Nominating Committee selects the slate of candidates in the annual general elections, and its choices are then voted on by the APS membership. Elected as new general councillors were Frances Houle of IBM's Almaden Research Center and Gerald Mahan of the University of Tennessee. T. Maurice Rice of the Swiss Federal Institute of Technology was elected to the new position of international councillor.

"I appreciate and accept the trust my colleagues have placed in me," Quinn said of her election. "I look forward to the challenge of helping provide good leadership to the APS over the next four years." A native of Melbourne, Australia, Quinn completed her PhD in physics in 1967 at Stanford and has been a permanent staff member of the Stanford Linear Accelerator Center since 1979. She has made significant contributions to particle physics theory, for which she has received numerous honors.

Quinn devotes significant professional time to education work. She was the founding President of

See ELECTION *on page 5*

Newly Elected APS Officials

VICE PRESIDENT
Helen Quinn

CHAIR-ELECT OF THE NOMINATING COMMITTEE
Susan Seestrom

INTERNATIONAL COUNCILLOR
T. Maurice Rice

GENERAL COUNCILLOR
Frances Houle

GENERAL COUNCILLOR
Gerald Mahan

APS Teacher Prep Program Gets Full Funding From NSF

The National Science Foundation has awarded a five-year, $5.76 million grant to the APS, in partnership with the American Association of Physics Teachers (AAPT) and the American Institute of Physics (AIP), to create a nationwide initiative known as the Physics Teacher Education Coalition (PhysTEC). In addition, the Fund for the Improvement of Postsecondary Education (FIPSE) in the US Department of Education awarded a three-year, $498,456, grant to enhance the evaluation, induction, and dissemination components of the PhysTEC program. The fledgling program is aimed at improving the science preparation and teaching skills of future secondary and elementary teachers and establishing a mentor program for new teachers.

Alicia Chang/APS

APS Education Director Fred Stein

Over the last 20 years, national reports on the state of education in the US have decried the inadequate preparation and lack of competency of new science teachers at all levels K-12, according to Fredrick Stein, Director of Education at APS and PhysTEC's principal investigator. The reports cited inadequate understanding of science content, and the lack of student-centered, inquiry-based approaches in science classrooms. While there has been some improvement over the last decade, "many of our high school physics courses are still modeled after college courses that are not inquiry-based and do not develop good conceptual understanding," says Stein. "And as indicated by low enrollment figures, [such courses] do not interest many of our students. The overwhelming need for inservice teacher enhancement

See PHYSTEC *on page 3*

Apker Finalists Meet in Washington

Lalena Lancaster/APS

The seven finalists in the competition for the 2002 Apker Award for undergraduate research met in Washington on September 10 for interviews with the selection committee. The finalists are divided into two groups, those from PhD-granting institutions, and those from institutions that do not grant PhD's in physics. The committee will recommend two recipients for approval by the APS Executive Board, and the results will be announced in next month's APS News.

All the finalists received plaques recognizing their achievement and checks for $2,000. They are, left to right, Till Rosenband (MIT), Laurie Sibbach (Moravian College), Michael Seifert (Swarthmore College), Charis Quay Huei Li (Mount Holyoke College), Kathryn Todd (Caltech), Albert Torr-Jong Wang (University of Rochester), and Robert E. Wagner (Illinois State University).

APS News Survey Tracks Chinese Student Visa Problems

By Richard M. Todaro

Has the US State Department been giving Chinese citizens an especially difficult time obtaining student and exchange visitor visas to come to the United States in the past year or two?

This question has elicited strong debate, with some members of the academic and research community, especially in physics, feeling under siege at what they perceive to be an unfair and arbitrary crackdown on students and scientists from China, and in some instances, from other countries. They say this crackdown has harmed scientific inquiry and damaged graduate programs, particularly those in physics, around the country.

But the State Department unequivocally denies charges of any crackdown or change in policy as "simply not true," citing figures that show steady increases over the past several years in the number of people from China coming to the US under student and exchange visitor visa categories. These figures show steady increases in the number of "F1" student visas issued to people from China each year since fiscal 1998, including a nearly 10 percent jump from fiscal 2000 to fiscal 2001 (ending September 30). The State Department also says that the refusal rate for Chinese student visa applicants was markedly lower in fiscal 2000 than in the prior two fiscal years. (Refusal rates for fiscal 2001 were not provided.)

Helping to set the dimensions of the problem are the results of a survey, conducted this September by the APS, of the heads of the 254 PhD- and Masters-granting physics graduate programs in the United States. Among the respondents, 54 percent said they have encountered sudden and unusual problems getting visas for Chinese citizens or other foreign nationals entering their programs, while 46 percent said they did not.

While the survey found that Chinese students seeking visas for the 2001-2002 academic year experienced difficulties at a rate almost four times that of other foreign nationals, this rate was the same as the State Department's student visa applicant refusal rate for all Chinese citizens in both fiscal 1998 and 1999. This indicate little had changed in the past three years except the perception of a problem.

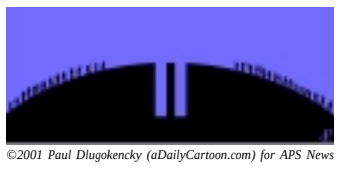
Clouding the picture are the horrific events of September 11, 2001, which have abruptly and dramatically changed the political agenda and put any proposed changes in student visa categories on ice for some time to come.

The issue has generated increasing controversy and confusion in the past year. News

See SURVEY *on page 6*

Highlights

Photo from http://www.softcode.com/X_ray.html



©2001 Paul Dlugokencky (aDailyCartoon.com) for APS News

Members in the Media

"This primitive organism forms a material with unique optical properties. Here, nature teaches us a lesson in how to solve a very complex technological problem."

—Joanna Aizenberg, Bell Laboratories, on a strange starfish with a many-lensed eye, Boston Globe, 8/23/01

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"It's achieved an intellectual critical mass and it's in a drop-dead gorgeous place. The smartest people in the world come here."

—David Bishop, Bell Laboratories, on the advantages of the Aspen Center for Physics, NY Times, 8/28/01

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"We're doing this wrong."

—Paul Ginsparg, Cornell University, on what inspired him to invent the e-print archive, NY Times, 8/28/01

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"It has lived up to all our hopes, giving us front-row seats to phenomena light years away—exotic celestial objects, matter falling into black holes, and stellar explosions."

—Martin Weisskopf, NASA, Huntsville, Alabama, on the Chandra X-ray Observatory, ABC News.com., 9/6/01

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"There's always been that nagging doubt."

—Fulvio Melia, University of Arizona, about whether there is a black hole at the center of our galaxy, New Scientist.com, 9/6/01

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"About 60 percent of these devices are used for brain research. Physicians inject glucose labeled with a radioactive chemical in the patient's body. The brain burns glucose, so the glucose goes to where the brain is working, and since the glucose produces radiation, the PET scan can image it. So it is a powerful way to look inside the brain."

—John A. McIntyre, Texas A&M, on the PET scan, UPI, 9/25/01

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"Some of the dust raised by the 'reading wars' has been settled. But the real solution lies in winning the hearts and minds of teachers."

—Donald N. Langenberg , University of Maryland, on the controversy over how to teach students to read, LA Times, 9/17/01

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"I eat oatmeal at least twice a week, not always for breakfast, you know what I mean? I did go through my neon-orange macaroni and cheese phase. Put cheese in quotes because I don't know what the hell it was. No one should eat lab chemicals for a year. I even went for the off-brand that was 25 cents a box. But that was in graduate school. I haven't done it since."

—Brian Moeckly, San Francisco, on the diet of single people, Detroit Free Press, 9/18/01

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"You can't think of security as just a screening device. It's a system—in fact, a system of systems. You have to optimize the way the whole thing works."

—Thomas Hartwick, Snohomish, Washington, on airport screening procedures, LA Times, 9/23/01

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"If you have all the bad students in one group they don't learn."

—Ezequiel Albano, Institute of Applied and Theoretical Physical Chemistry, La Plata, Argentina, on the predictions of a model of atoms used to describe classroom behavior, New Scientist, 9/22/01

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"It's always possible that these new structures will improve our understanding and lead to other advances."

—Ken Kihlstrom, Westmont College, on a proposed new type of high temperature superconductor, Information Week, 9/24/01

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"We're trying to run the most complex problems in the world."

—David Nowak, Livermore National Laboratory, on his lab's Accelerated Strategic Computing Initiative, Cox News Service, 9/24/01

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"There was some serendipity in making this discovery, [because] we were actually trying to understand the wetting and spreading properties of lead on copper for soldering and brazing applications. Our original goal was to get a more microscopic view of what is going on during wetting and spreading of solder, but this just jumped out at us."

—Norm Bartelt, Sandia National Laboratory, on how metal films make the transition from droplets to organized structures, Electronic Engineering Times, 9/24/01

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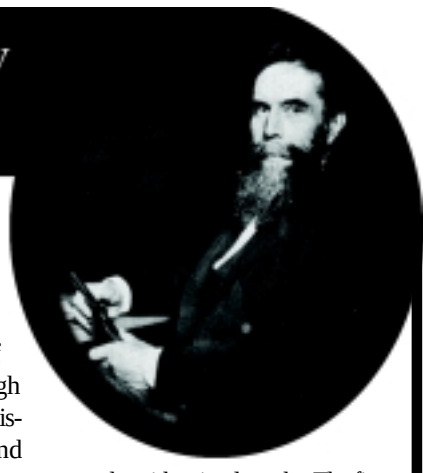
"This is one of the many nonlinear methods known to produce quantum states of light. You take one blue photon, annihilate it in the crystal, and it generates two near-infrared photons."

—Daniel Gauthier, Duke University, on how to use quantum entanglement to focus light more narrowly, NY Times, 9/20/01

This Month in Physics History

November 8, 1895: Roentgen's Discovery of X-Rays



Few scientific breakthroughs have had as immediate an impact as Wilhelm Conrad Roentgen's discovery of X-rays, a momentous event that instantly revolutionized the fields of physics and medicine. The X-ray emerged from the laboratory and into widespread use in a startlingly brief leap: within a year of Roentgen's announcement of his discovery, the application of X-rays to diagnosis and therapy was an established part of the medical profession.

Roentgen's scientific career was one beset with difficulties. As a student in Holland, he was expelled from the Utrecht Technical School for a prank committed by another student. His lack of a diploma initially prevented him from obtaining a position at the University of Würzburg even after he received his doctorate, although he eventually was accepted. His experiments at Würzburg focused on light phenomena and other emissions generated by discharging electrical current in so-called "Crookes tubes," glass bulbs with positive and negative electrodes, evacuated of air, which display a fluorescent glow when a high voltage current is passed through it. He was particularly interested in cathode rays and in assessing their range outside of charged tubes.

On November 8, 1895, Roentgen noticed that when he shielded the tube with heavy black cardboard, the green fluorescent light caused a platinobarium screen nine feet at away to glow — too far away to be reacting to the cathode rays as he understood them. He determined the fluorescence was caused by invisible rays originating from the Crookes tube he was using to study cathode rays (later recognized as electrons), which penetrated the opaque black paper wrapped around the tube. Further experiments revealed that this new type of ray was capable of passing through most substances, including the soft tissues of the body, but left bones and metals visible. One of his earliest photographic plates from his experiments was a film of his wife Bertha's hand, with her wedding ring clearly visible.

To test his observations and enhance his scientific data, Roentgen plunged into seven weeks of meticulous planned and executed experiments. On December 28, he submitted his first "provisional" communication, "On a New Kind of Rays," in the Proceedings of the Würzburg Physico-Medical Society. In January 1896 he made his first public presentation before the same society, following his lecture with a demonstration: he made a plate of the hand of an attending anatomist, who proposed the new discovery be named "Roentgen's Rays."

The news spread rapidly throughout the world. Thomas Edison was among those eager to perfect Roentgen's discovery, developing a handheld fluoroscope, although he failed to make a commercial "X-ray lamp" for domestic use. The apparatus for producing X-rays was soon widely available, and studios opened to take "bone portraits," further fueling public interest and imagination. Poems about X-rays appeared in popular journals, and the metaphorical use of the rays popped up in political cartoons, short stories, and advertising. Detectives touted the use of Roentgen devices in following unfaithful spouses, and lead underwear was manufactured to foil attempts at peeking with "X-ray glasses."

As frivolous as such reactions may seem, the medical community quickly recognized the importance of Roentgen's discovery. By February 1896, X-rays were finding their first clinical use in the US in Dartmouth, MA, when Edwin Brant Frost produced a plate of a patient's Colles fracture for his brother, a local doctor. Soon attempts were made to insert metal rods or inject radio-opaque substances to give clear pictures of organs and vessels, with mixed results. The first angiography, moving-picture X-rays, and military radiology, were performed in early 1896.

In addition to the diagnostic powers of X-rays, some experimentalists began applying the rays to treating disease. Since the early 19th century, electrotherapy had proved popular for the temporary relief of real and imagined pains. The same apparatus could generate X-rays. In January 1896, only a few days after the announcement of Roentgen's work, a Chicago electrotherapist named Emil Grubbe irradiated a woman with a recurrent cancer of the breast, and by the end of the year, several researchers had noted the palliative effects of the rays on cancers. Others found remarkable results in the treatment of surface lesions and skin problems while others investigated the possible bacterial action of the rays. X-rays even found cosmetic uses in depilatory clinics set up in the US and France.

Roentgen was awarded the first Nobel Prize in physics in 1901 for his discovery. When asked what his thoughts were at the moment of discovery, he replied, true to form, "I didn't think, I investigated." Today, Roentgen is widely recognized as a brilliant experimentalist who never sought honors or financial profits for his research. He rejected a title that would have given him entry into the German nobility, and donated his Nobel Prize money to his university. While he accepted the honorary degree of doctor of medicine offered to him by his own university, he never took out any patents on X-rays, to ensure that the world could freely benefit from his work. His altruism came at considerable personal cost: at the time of his death in 1923, Roentgen was nearly bankrupt from the inflation following World War I.

Photos from http://www.softcode.com/X_ray.html

One of the earliest photographic plates from Roentgen's experiments was a film of his wife, Bertha's hand with a ring, produced on Friday, November 8, 1895.

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SPOTLIGHT on the Profession of Physics

Physicists in the "Engines of Tomorrow"

By Craig Davis and Jim Tsang

Craig Davis

Jim Tsang

Editor's Note: This is the second in a new series exploring the health of the physics profession. The first article appeared as The Back Page in last month's issue. Other articles, by other authors, will appear in coming months.

When one of the authors was looking for a permanent job at the end of his post-doctoral appointment, he mainly interviewed industries. A prominent professor observed, "You're good enough to get an academic job," implying that somehow he would be settling for less. No doubt this view is still held by some people today: the ultimate career for physics PhDs worth their salt is at a university, or perhaps a national lab.

In the past a position in an industrial research laboratory frequently did not differ that much from one in academic environment. Today, however, even the most prestigious industrial laboratories have changed. While physicists may still perform research fundamental to technology, increasingly industry expects them to be engaged in the business. Physicists are called upon to be involved in customer satisfaction, finance, and marketing. They work in teams comprised of scientists from other disciplines, engineers, and non-technical people. They may find themselves on a long journey that takes one of their scientific papers into a commercial product, which can be simultaneously educational, amusing, appalling, tedious, and exciting. The special qualities of physicists that allow them to get to the bottom of a problem or to understand technology broadly often mean that they lead teams or manage R&D departments.

In his provocative essay "Find the Hidden Physicist" (September, 1997 issue of *The Industrial Physicist*), John Rigden noted that 1/3 of physics PhDs eventually go into industry, and that an astounding 63% of baccalaureates entering the job market take industrial jobs. Their employers call many of these people engineers, rather than physicists. They are "hidden" behind a misnomer, which diminishes the recognition of the physics contributions. He called upon industry to identify physicists properly and for the academic community to think of industrial physicists as their colleagues. Much to its credit, the APS recognized the significance of this major portion of its membership as the job market weakened in the 1990s. The creation of the APS Forum on Industrial and Applied Physics and its subsequent growth is a sign of this change.

Some say the 21st century will belong to the biologists. Thus, the physics profession potentially faces a new crisis: no longer being the premiere science and the attendant reduction of its slice of the research funding pie. Although it is foolish to assume that physics will lose its luster indefinitely, it is equally risky to think that the profession will remain healthy without change. There is an opportunity for the APS and the physics community to embrace fully the value of industrial and applied physics, not only for the health of the profession, but also for the benefit of society.

What should the academic world know about industrial physicists? Many physicists in industry have jobs with titles that fail to mention physics. How do they obtain such jobs? Many are hired directly into such positions, especially at the bachelors level. Others, especially PhDs, begin in research, often doing work related to their thesis or post-doc. The activities of these rather fundamental researchers evolve over time into applied work, development, and even into business-oriented projects. In today's world, few will remain in fundamental research throughout their careers. At the very minimum, they must understand the impact of their work on their companies and appreciate the problems their employers face. Besides talking to their former classmates, professors, and other colleagues at APS meetings, they learn to talk to new communities. These include engineers designing, manufacturing and testing products, and sales people who see how existing products are being used in the field and the problems that customers are looking for solutions to. Often they find pressing needs for what they know or can learn.

Should physics education and training be changed to reflect the needs of industry? Perhaps. There are a number of innovative programs, such as the entrepreneurial physics program at Case Western Reserve University. Our guess is that many of these programs will flourish and contribute valuable technical talent for industry. However, even with no changes in the traditional education of physicists, without altering the curriculum, there are some simple actions that university departments can take. Summer internships for students are extremely valuable. Internships give students a chance to see what industry is like, provide contacts and opportunities to network, and give students the opportunity to prove themselves to potential employers. MIT, for example, is making internships in industry or national laboratories part of their graduate program.

Likewise, professors should consider spending part of their sabbatical leaves in industry. There is a new APS Industrial Faculty Fellowship Program, which promises to be useful as well. Such experiences provide interesting new research projects and open up possibilities for future collaborations and for placing students and graduates. Obviously, industry benefits considerably from having students and faculty as visitors in research labs, R&D activities, and business groups. Industrial speaker programs (AIP, FIAP) provide physicists who can speak to students, as well as faculty, about life in industry. Our experiences suggest that students greatly appreciate the information and insight. The most important point, however, is simply to keep an open mind about the many alternatives a physics graduate can pursue.

One can debate whether physics is a field of scholarship or a profession. For us, it is both. We believe the latter aspect is essential for the continued health of the physics community. Public support for physics research is usually based on the promise of future applications and contributions to economic growth or on an appeal to national pride, not necessarily on scholarship. The great successes of biology in gaining federal support derive directly from the benefits to human health and the eradication of disease. Regarding physics as a profession in addition to a scholarly pursuit recognizes the usefulness of physicists and the impact of the science on society.

Craig Davis is Manager of the Physics Department, Ford Research Laboratory.

James C. Tsang is a member of the research staff at the IBM T. J. Watson Research Center.

Focus on Committees

Committee on Committees Finds the Talent That Keeps APS Running

Editor's Note: With this article, APS News begins an occasional series on the various standing committees of the American Physical Society.

Of the 17 standing committees – including nine operating committees and eight public affairs and outreach committees – that exist through the bylaws of the American Physical Society, one in particular stands out for its unusual name: the Committee on Committees, also known by its abbreviation, the COC.

The unusual name of this 10-person committee reflects the unique role it has, which is to find and recommend qualified people to serve on many of the other 16 committees of the Society.

The COC is not to be confused with the Nominating Committee, whose responsibility is to prepare a slate of candidates for senior leadership positions, including some member-elected ones.

"While the duties of the COC overlap somewhat with the Nominating Committee, it basically provides the APS President with names of people to serve on various committees of the society," Ken Cole, the administrator of governing committees, says. "Because of its nominating-like function, it is a very important committee, as it determines the make-up of the important committees of the Society."

Alicia Chang/APS

Zachary Fisk

Zachary Fisk of Florida State, the current COC chair, echoed those sentiments.

"In some sense, it sounds crazy to have a Committee on Committees, but when you look at it, the job is rather important," said Fisk. "The committees of the APS serve a very important function (and) the Committee on Committees is where the selections are made… who gets chosen is very important. It makes a lot of difference."

Fisk said the COC consists of elected members of Council who represent the diversity of fields within the Society and who "have some basis for trying to make appropriate suggestions" for suitable candidates to occupy the slots of the other standing committees.

Judy Franz, the Executive Officer of the APS and a senior advisor to the COC, said the entire organization benefits from the role it plays.

"When COC selects new committee members with expertise, drive, and commitment, all other APS committees profit as does the APS as a whole," Franz said.

—Richard M. Todaro

PhysTEC, *from page 1*

programs in physics at the most basic level points to the failure of programs in our colleges and universities to prepare students adequately for teaching."

Based on the concept that teachers "teach as they were taught," PhysTEC was proposed in 1999 as an effective mechanism to greatly increase the role of physics departments, in collaboration with education departments nationwide, to radically improve the science preparation of teachers (see *APS News*, October 2000). "PhysTEC inverts the strategy of university-based projects involving all science departments, to that of a nationally recognized coalition within a single discipline, aimed at a large number of colleges and universities that are linked through the professional societies," says Stein. "This project also builds upon the many years of research and work within the physics community involving teacher preparation."

The program incorporates exemplary components of past NSF-supported projects that have proven successful in making long-term changes in teacher preparation. These include a teacher-in-residence program, providing for local K-12 science teachers to assist faculty with both team-teaching and course revisions, as well as a long-term, active collaboration among the physics and education departments and the local school community. It also calls for the redesign of content for elementary and secondary science courses with an emphasis on inquiry-based, hands-on approaches to teaching and learning.

Alicia Chang/APS

Participating PhysTEC Institutions members (from l to r): Al Rosenthal, Western Michigan University; Elia Eschenazi & Stephen Rodrigue, Xavier; David Grosnick, Ball State; James Lilly, Xavier; Ruth Howes, Ball State; Henri Jansen, Oregon State; Marcia Fetters, Western Michigan University; Gay Stewart & Caroline Beller, U of Arkansas; Ken Krane, Oregon State. Not shown: Charles Payne, Ball State; Ingrid Novodvorsky & James McCullen, U of Arizona.

PhysTEC's efforts will kick off immediately with an initial set of six primary institutions that share a strong commitment to revising their teacher preparation program, including that of elementary and secondary science teachers, according to Stein. The six initial institutions, selected after a series of nationwide site visits by Stein and his collaborators at AAPT and AIP, are Ball State University, Oregon State University, University of Arizona, University of Arkansas, Western Michigan University, and Xavier University of Louisiana. "The NSF grant allows us to provide these institutions with the support and technical assistance necessary to undertake this pioneering task," says Stein. "Now we hope to translate that into better-prepared science teachers who are committed to student-centered, inquiry-based, hands-on approaches to teaching from the moment they hit the classroom."

Stein admits that several obstacles still exist to the success of PhysTEC, most notably enticing faculty members at research universities to turn their creativity toward improving teaching, as well as persuading physics departments and schools of education to communicate and work together. Yet in both cases, says Stein, "The direct involvement of the key physics professional societies can play a major role in producing positive, lasting changes in the way universities interact with undergraduate students and thus, their prospective teachers."

LETTERS

More on Alternate Theories

I have some additional information regarding "An alternate theory of perpetual motion" (Zero Gravity, *APS News*, October 2000), some of which was explained by Julian Griffiths in the August/September 2001 issue. The buttered cat theory did indeed originate with a magazine contest. He had no way of knowing this. No versions of the emails I have seen have properly acknowledged the source of this ingenious theory. But I recalled reading the article in *OMNI* magazine in the July 1993 issue (Vol. 15, No. 9, p. 96). The true originator of the theory is also the winner of the contest: John Frazee of Kingston, New York.

Further curiosity led me to the November 1992 issue of *OMNI*, which first announced the competition. It should not come as a surprise to most readers that the inspiration for the contest was *The Journal of Irreproducible Results*. Some of the theories of the runners-up and honorable mentions are quite amusing.

Jason C. Verley
Albuquerque, NM

Editors' Note: The other theories were amusing indeed. Our favorites:

Clothes dryers produce a tunnel effect that throws socks into an alternate universe. Scientists should use this effect to dispose of nuclear waste: just put chunks of it into socks and set the timer for 40 minutes. (Thaddeus P. Rosen, Bakersfield, CA)

If an infinite number of rednecks, riding in an infinite number of pickup trucks, fire an infinite number of shotgun rounds at an infinite number of highway signs, they will eventually produce all the world's great literary works in Braille. (John A. Banker, Show Low, AZ)

When subjected to extreme feminine heat and pressure, male hydrocarbons will often produce a diamond. (R.E. Swap, Fairview, UT)

In the spirit of the original OMNI competition, we invite our readers to submit their own alternate scientific theories: Editor, APS News, One Physics Ellipse, College Park, MD, 20740, letters@aps.org.

No Plurals

In the August/September issue, which only reached these distant shores towards the end of September, one of your readers points out that there is no such thing as a "degree Kelvin". The unit named after Lord Kelvin is simply 1 kelvin = 1 K. He then goes on to claim that the correct way to specify the temperature of the uniform background is 2.73 kelvins. But an international system of units obviously cannot be based on the grammar rules of one particular language. Therefore, one does not add s'es to make plurals of SI units. The background temperature is thus 2.73 kelvin = 2.73 K.

Arne Reitan
Arendal, Norway

MEETING BRIEFS

Texas Section, October 4-6, 2001

The APS Texas section held its annual fall meeting in October at Texas Christian University in Forth Worth, TX, jointly with the corresponding sections of the American Association of Physics Teachers and the Society of Physics Students. The program featured several plenary speakers focusing on topics of general interest, including the Society's own Robert Park, "speaking about whatever he likes"; Ronald Walsworth of the Harvard-Smithsonian Astrophysics Observatory on the real story behind "stopping light"; Neal Lane, former science advisor to President Clinton and now at Rice University; and 2000 Nobel Laureate Jack Kilby of Texas Instruments. Friday evening's banquet speaker was Nowell Donovan, a professor of geology at TCU, who described the unique meteorite collection housed at TCU and the plans for a Smithsonian Institution facility to study them. There were also invited sessions on applied physics and materials science and quantum thermodynamics, as well as special interest sections on chemical physics, physics jobs in industry, and the use of WEB-CT in classes. In addition, the AAPT offered several workshops for teachers.

Ohio Section, October 19-20, 2001

The APS Ohio Section held its annual fall meeting in October at Columbus State Community College in Columbus, OH. The meeting program featured a plenary session on novel techniques in physics pedagogy, summarized by an impressive list of speakers who have made significant contributions to the field of physics education. Wolfgang Christian of Davidson College described a new approach to authoring interactive curricular material, while Mano Singham of Case Western Reserve University described the challenges of transforming education research into classroom practice. Robert Lopez of the Rose-Hulman Institute of Technology spoke on applying symbolic computing to methods of mathematical physics. And David Vernier of Vernier Software and Technology presented his favorite physics demonstrations over the past 20 years.

Viewpoint...

Why Is a Home Run Like a Higgs Boson?

Or, What's a Meta For?

By Judy Jackson

Everyone agrees that scientists need to do a better job of communicating what they do and why it matters. It is a rare science policy speech that fails to exhort scientists to communicate more often and effectively. "The scientists have done badly in terms of communicating with Congress and keeping Congress and the public informed—in an explainable way—about what they're doing and why it is important," said Congressman Vern Ehlers (R-MI) recently. Ehlers is a member of the House Science Committee and one of two physicists in Congress.

Physicists above all others, say those both outside and within the field, are failing to get their message across. The clear implication is that the physical sciences would not be experiencing their current funding troubles if they would simply improve at explaining what they're up to. Many cite the Superconducting Super Collider as a case in point. Never mind the gazillion-dollar cost overruns, this line of thinking goes, if physicists had only done a better job of talking up the SSC, we would be smashing protons under Waxahachie today.

Biology is easy to sell. Putting aside the benefits of medical research, it seems obvious that it's a good idea to study living things: *we're* alive, aren't we? Cosmology and astrophysics have a similar advantage: perhaps it's in human genes, a relic of our nomadic hunter-gatherer days of gazing heavenward for guidance while we wandered in the wild, but for some reason, everybody loves to look at the stars. The geologists have dinosaurs, one of the branding success stories of all time. Chemistry's image has a certain down side, but the chemists surely have one of the great tag lines of the ages. "Better living through quantum mechanics" just doesn't have the same ring to it.

Physics, by contrast, is a hard sell, because from the point of view of general comprehension, when physics left the realm of the visible at the end of the 19th century, it entered the world of the abstract. For all practical purposes, to those outside its own rarefied precincts, physics left reality behind and became an abstraction.

Of course, quantum mechanics and relativity have as much to do with solid reality around us as does the structure of DNA or the fossil of a dinosaur. And quarks are every bit as real as viruses or stars. Nevertheless, to the average bystander they don't *seem* as real. They seem less like things you can touch and see, and more like... math. And as anyone who has tried will tell you, if science is a tough sell, math is impossible.

So physicists did what they had to do when faced with the problem of communicating the abstract to a math-challenged world: they turned to metaphor. From the "football field with the nuclear pea at the 50-yard line and the electrons in the stands" to the bowling ball top quark and Campbell's Cream of Primordial Soup, the search was on for the metaphors that would bring physics back from incomprehensible equations to understandable—and fundable—life.

It's a never-ending search. A recent spate of news stories prompted by the CERN-Fermilab rivalry for discovery of the Higgs Boson turned up many old favorites, as well as some interesting new examples. Predictably, a particle accelerator, or "atom smasher," is compared to "a giant racetrack," or "the world's largest microscope" or a "time machine" reproducing the Big Bang. The Higgs is "molasses-like goo," "cold molasses," or "subatomic molasses." Particle detectors look like "spaceships" or "rockets on their sides," or in one memorable case, "a shopping mall." Particle collisions produce a "spray like shrapnel" yielding "a zoo of particles," or a "smashed watch" that physicists must reassemble from the scrambled springs and gears.

A recent *Chicago Tribune* story yielded this delectable homegrown image of how physicists detect what comes out of a high-energy particle collision: "It's like standing on the corner of Waveland Avenue and watching a Sammy Sosa home run ball come sailing out of Wrigley Field." The particles then "fall back into their low-energy state and become invisible again, just as Sosa's ball is quickly whisked away by a souvenir hunter."

One story compared physicists to wild geese, migrating to the high-energy physics lab with the highest energy. Another evoked CERN scientists as hungry souls with their noses pressed to the restaurant window while Fermilab experimenters sit down to dinner inside, presumably to a feast of roast boson under glass. And "a basic prejudice of the universe for matter over anti-matter" does as good a job as any of explaining that peskily difficult concept, CP violation.

Feelings run high on the subject of just which metaphors work best for conveying the essence of frontier physics. For example, among particle physicists, partisans of the accelerator-as-giant-microscope school froth at the mere mention of accelerator-as-recreator-of-Big Bang, while Big Bang adherents smile patronizingly at the microscopists. At times, it can feel like metaphor warfare. Maybe it's a physicist's need to reduce the complex world to a set of mathematical laws that makes it hard to accept that both of these metaphors work sometimes, neither works every time, and that occasionally they even work together.

My 9th grade English teacher used an example of metaphor that has stuck with me for 40 years: "The truth is a hard deer to hunt." Physics is all about the hard hunt for truth, and the search for words and images to convey the excitement of the chase, and why it matters to us and to society, is almost as hard. We're never going to find the single perfect formula for explaining it. But with a glorious mix of metaphors—stars, home runs, microscopes, or shopping malls—we'll all die trying. Metaphorically, of course.

Judy Jackson is director of Fermilab's Office of Public Affairs. This article is reprinted from the Forum on Education newsletter.

zero gravity

Secrets of Clichés Uncovered

Science writers are nearing a breakthrough, perhaps a major breakthrough, in their age-old quest to unlock the secrets, even the ultimate secrets, of cliché-free prose, researchers reported yesterday.

Using cutting-edge, state-of-the-art, high-tech, and other dash-laden methodologies, the science journalists sifted obscure clues to reach their tentative conclusions. "This is statistically significant," one senior research said. "It is an important step forward," said another. "This is science in action," they agreed.

The research was reported in *Science* magazine, a prestigious journal, and also in *Nature*, a leading British journal. Other researchers welcomed the report, but were cautious. They called for more research. Science writers covered all the (usual) bases, quoting John Pike of the Federation of American Scientists, climatologist Stephen Schneider of Stanford University, bioethicist Arthur Caplan, live astronomer Steve Maran, dead astronomer Carl Sagan, outspoken physicist Robert Park, and neo-Luddite anti-technology gadfly Jeremy Rifkin. Stephen Jay Gould would have added class, but was unavailable for comment.

Clichés are a window into the past, even if they are red-shifted like the whistle on a passing train that changes pitch when it goes by, an analogy that itself is a window into the past. They offer a glimpse of the future, too. They add to the growing evidence of the cataclysm that may have killed the dinosaurs. Debate is sure to continue. And while the latest results do not offer a cure, they point the way to better understanding of the underlying basic cellular causes to the ancient affliction. "We may never know all the answers, but this is an important piece of the puzzle," said everybody.

—Charles Petit, U.S. News and World Report
Reprinted with permission.

TSAI Program Winds Up Successful Seven-Year Run

Early next year, the APS will close a seven-year chapter in the Society's ongoing efforts in education reform when the Teacher-Scientist Alliance Institutes (TSAI) program concludes. TSAI is a comprehensive initiative designed to promote the systemic reform of K-8 science education from the traditional, lecture-oriented methodology to a hands-on, inquiry-centered approach. The program has provided institutes, workshops, and other support for educators and scientists throughout the country, all of which have been free of charge to participants.

"In the last ten years, a broad consensus has developed in the U.S. as to what science education should be. In meeting the goals of the new consensus, the APS believes that the involvement of scientists is of great value, even essential," says Ted Schultz, assistant director for education and director of the TSAI program. "For example, the differences between reading about science and doing science, and the increase in demands the latter makes on teachers, instructional materials, and school systems, are profound."

The TSAI program was formed to get scientists and other technical professionals involved in support of hands-on, inquiry-centered science education programs in their local school districts. It was established in 1995 by Ramon Lopez, then director of the APS Education and Outreach Department, initially with funds from the APS/AAPT Campaign for Physics and later with an NSF grant to support its continued efforts. Initially aimed at the reform of elementary school science education, the program was eventually expanded to include middle schools.

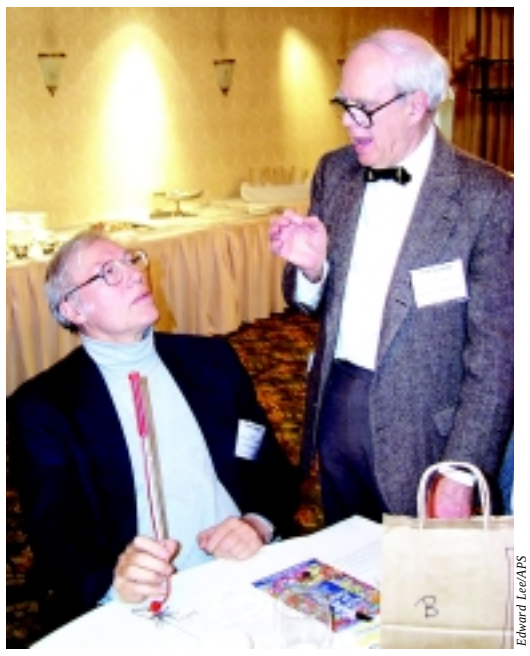
Since its inception, a principal aspect of the program has been the annual Lead Scientist Institutes (LSIs), five-day events held in Washington, DC, to prepare participants to support the science education programs in their areas. These institutes have provided an intensive introduction to the basic issues of science education reform. Applicants are usually accepted in teams of two or three from school districts already involved in systemic reform, teams comprising scientists, engineers or other technical professionals with a demonstrated commitment to improving science education, as well as one or sometimes two educators to help integrate scientists into reform efforts.

In addition, TSAI has conducted Regional Leadership Institutes in New England, the Southeast, San Diego, and Texas, as well as a three-day version in Atlanta in 1999, as part of the APS Centennial celebration. At the request of individual school districts, TSAI-trained scientists have also helped conduct one-day workshops to recruit other scientists to the education reform efforts underway, or half-day workshops for leaders in the local education and business communities and parents. "The aim is to try to convey the value and excitement of a hands-on, inquiry-centered science program," says Schultz. "By all indications, these workshops have been very effective in building both community and administrative understanding, enthusiasm, and support."

A 2000 report by the Institute for Learning Innovation, based in Annapolis, MD, evaluated the impact of the TSAI program to date, and found that the participants surveyed were overwhelmingly complimentary and appreciative of the program's impact in their districts, believing they had made substantial progress in their reform efforts. While recognizing that much work remained to be done, the report noted, "The scope of change advocated by TSAI is broad and systemic. Real sustainable change takes time and over the last four years, TSAI has planted important and thriving science education reform seeds," despite having to operate in a turbulent and ever-changing education environment.

However, the report noted that some teams have struggled with ways to make the most effective use of scientists, and expressed concern that without on-going support, fledgling initiatives may die out in many districts. Nevertheless, TSAI's additional goal, of spawning second-generation institutes, has been met in North Carolina. There, state science-education leaders who received their first training at TSAI's Southeast Leadership Institute in Clemson, SC, or at a subsequent Lead Scientist Institute in Washington, have now conducted the first three of a series of annual institutes intended to reach all school districts in the state.

Schultz, who has written an article on this subject, admits that "there are serious challenges in getting scientists and educators to bridge the culture gap between them and work closely together," and the results have been varied (see http://www.aps.org/units/fed/summer2001/schultz.html). Often scientists are interested in becoming involved, but lack support from the school districts, which do not always know how to integrate the participation of scientists. Ideally, the goal is to achieve a large number of scientists who are moderately involved. "Even if their contribution is only two or three days per year, scientists and engineers can add some unique elements, such as their by-now instinctive understanding of inquiry and their knowledge of scientific content in their field, to any reform effort, particularly to the professional development of teachers," says Schultz. Nevertheless, he believes, the greatest value of the TSAI program ultimately lies in the relatively small number of scientists who have become extremely involved and committed to systemic reform of science education, scientists who become real leaders of their local programs.



Edward Lee/APS

Ted Schultz, right, makes a point to Wolf Berger at one of the TSA Institutes.

Carrying the Torch of Education Reform

Ted Schultz, who heads the APS TSAI program, first developed an interest in science education in the 1960s, early in his 32-year tenure as a theoretical physicist at IBM's Watson Research Center in Yorktown Heights, NY. For two years, along with seven other IBM colleagues, he taught truly abstract mathematics to third, fourth and fifth graders through a program originating in Berkeley, California. In the 1990s, now working in a largely administrative position at IBM, Schultz decided he wanted to do something more "socially relevant," and immediately thought of science education. "At first, I thought it would have to be mathematics again, because mathematical worlds or systems can be constructed in which kids can meaningfully learn to discover their properties. In science, the world is already there and its complicated properties seemed too difficult for kids to discover. Then I found out there was an entire movement in science education to get kids to learn about the real world by actually investigating it, by doing experiments, asking questions and so on," he said, "and I was sold."

Schultz retired from IBM and found a position at the National Science Resources Center (NSRC), a joint enterprise of the Smithsonian Institute and the National Academy of Sciences based in Washington, DC, where he met Ramon Lopez. When Schultz's NSRC project ended, he moved half time to the National Research Council, researching the ways scientists have become involved in science education, and half time to the APS to assist Lopez in the TSAI program. Later, Schultz joined the APS full-time and three years later, when Lopez left the APS, he took over the TSAI directorship.

Schultz had hoped to raise new funds to continue the TSAI program once the NSF grant funds ran out, but health problems have intervened. One last leadership institute is planned for January 2002. "I may be quixotic, but I'm hoping to introduce this institute to a number of other scientific societies, and to demonstrate its successes, so that the baton will be picked up and a program to involve scientists in science education will continue and improve."

Schultz and Lopez co-authored an article entitled "Two Revolutions in K-8 Science Education" in the September, 2001 issue of *Physics Today*.

Election, *from page 1*

the non-profit Contemporary Physics Education Project which produces wall-charts and other materials for high school and college physics teachers. She also manages SLAC's education and outreach programs. This experience is reflected in her candidate's statement. "We all know the necessity of building on one another's research, but too often go it alone when it comes to changes within our departments or outreach to K-12 education," she wrote. "The society's [education] activities help promulgate successful innovations and prevent replication of failures." Quinn also cited the continuing evolution towards electronic publishing and outreach to Congress and the general public as major challenges facing the APS in her statement. "We must plan wisely for the future, developing the Society's activities in response to the needs of physics and of physicists, and at the same time maintaining our fiscal health," she said.

Seestrom was named Director of the Physics Division at Los Alamos National Laboratory in 2000, having joined the scientific staff in 1986. Her research has been in nuclear physics, studying nuclear structure with medium energy probes and symmetry violation using low energy neutrons. She has most recently been involved in development of novel sources of ultra-cold neutrons. In her candidate's statement, Seestrom set forth her belief that a primary role for the APS is to be an advocate for the importance of basic science to our society, with a corresponding need for diversity in the society's leadership. "The events of September 11th have created a great sense of fear and uncertainty around the world, and it will be important for the APS to demonstrate the relevance of physics to challenging national problems," said Seestrom. "It will be important that the leadership of the society reflect the breadth of contributions that physicists are making, and the nominating committee will be key in maintaining the great breadth and depth the APS is known for."

Newly elected International Councillor Maurice Rice is a native of Ireland and obtained a PhD from the University of Cambridge in 1964. During his fifteen years at Bell Labs he served terms as head of the Theoretical Physics and Surface Physics Departments, assuming his present position as professor of physics at the ETH Zurich in 1981. Rice's research interests extend over many fields in theoretical condensed matter physics. In recent years he has concentrated mainly on the theory of strongly correlated electrons and its application to the microscopic theory of the high temperature superconductors. In his candidate's statement, Rice spoke of the continuing globalization of the APS, most notably in the number of foreign manuscripts (70% of the total) submitted to its journals each year, and praised the Society's decision to have international representation on its Council. "I will try to foster international collaborations to face common challenges, in particular the consequences of increasing globalization and the e-print revolution," he said.

Houle received her PhD from the California Institute of Technology (1979) in Chemistry. In 1980, after an appointment as an IBM postdoctoral fellow at the University of California at Berkeley, she joined the IBM Research Laboratory, now the IBM Almaden Research Center. Her research is in the area of physics and chemistry of thermal and radiation-induction chemical modification of surfaces and thin films. "The new world of multidisciplinary, team-oriented research at the boundaries of traditional disciplines is tremendously exciting," Houle wrote in her candidate's statement, adding, "It is vital that the APS promote and facilitate multi-investigator, physics-related collaborations throughout all its programs." She said she is "most pleased" to be elected to Council. "I have been an APS member for many years and am very excited to have the opportunity to serve the Society."

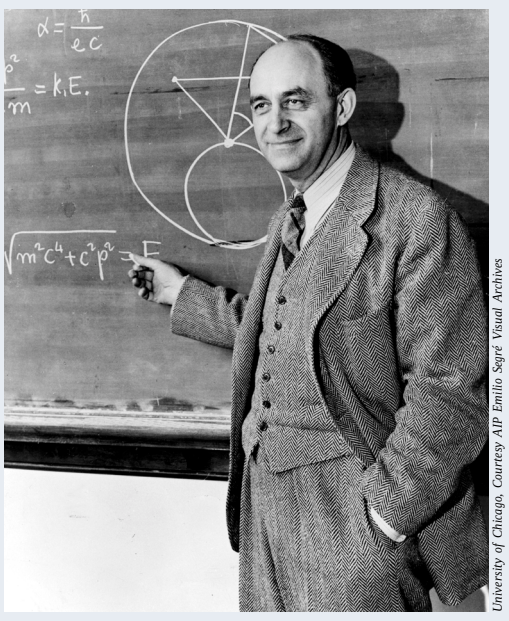
Mahan admits to some surprise at the news of his election, considering the high qualifications of the field of candidates. "I look forward to working with the other board members, many (of whom) are friends," he said. "I also encourage any member of the APS to contact me about their concerns, complaints, and suggestions for improvements in the APS." Mahan received his PhD in physics from University of California, Berkeley, in 1964, and 1984 held a joint appointment as a professor in the Department of Physics and Astronomy at the University of Tennessee, and as a Distinguished Scientist at Oak Ridge National Laboratory. He has recently become Distingished Professor of Physics at Penn State. "Physics research is changing rapidly and diversifying, [with] many new fields of research starting, while old fields are becoming more interdisciplinary," Mahan wrote in his candidate's statement, emphasizing his own broad experience in academia, industry and government laboratories. "It is the job of the APS Council to adapt the organization to these new directions."

Happy Birthday Enrico!

The hundredth anniversary of Enrico Fermi's birth took place on September 29. The event was commemorated at Fermilab on the 28th, and at the University of Chicago (where Fermi taught and where he developed the first nuclear reactor) on the 29th. Fermi was President of the APS in 1953, the year before his death.

Shown here cutting the birthday cake after Fermilab's centennial symposium are Mildred Dresselhaus of MIT (APS President in 1984) and Michael Witherell, Director of Fermilab. As a student, Dresselhaus took a course on quantum mechanics from Enrico Fermi at the University of Chicago. At right is a picture of Fermi that appears on a recently issued stamp. It contains an amusingly heterodox formula for the fine-structure constant in the upper left.

Courtesy of Fermilab



University of Chicago, Courtesy AIP Emilio Segrè Visual Archives

Survey, *from page 1*

articles have appeared in the *Chronicle of Higher Education* and in the *New York Times*, and an op-ed piece appeared recently in the *Wall Street Journal*.

According to the *Times* report, there is no question in China but that the US Government has cracked down arbitrarily and unfairly on Chinese students. It cited numerous multi-part series and angry editorials that have appeared in Chinese newspapers, while internet chat rooms have vented against the handful of overworked American visa officers in one of five consular offices around China who issue thousands of visas each year.

In the US, colleges and universities have complained to the State Department, while a number of physics departments have contacted the APS detailing their problems in getting student and visitor exchange visas.

"Until about 1998, we never had a case where an F1 visa was denied. In fact, it never occurred to me that a student with an I-20 (a document required of international students before a student visa can be issued) would not get an F1 visa," said Kurt Haller, the head of the physics graduate program at the University of Connecticut, Storrs. "One person was denied in 1999 and couldn't come and one was denied in 2000, but subsequently accepted. This year, we accepted seven Chinese students, but only two received an F1 (and) five were denied. That's a big jump."

At the University of Utah in Salt Lake City, Heidi Frank deals with international student issues for the physics department. She expressed a great deal of frustration because all ten of the Chinese students accepted into the department were rejected on their first attempt.

Frank recounted how she ultimately was able to get seven of the ten into the program through the intervention of Utah Sen. Orrin Hatch, who sent letters on behalf of the students to the US embassy in Beijing. The other three have had to defer their admissions to at least Spring 2002, with no guarantee that they will get their visas then.

"I faxed petition letters to the embassy and consulates on behalf of the students. The embassy faxed back a very rude letter informing me that I had no right to send anything to the embassy," Frank said. "Apparently, the embassy workers forget that the taxes I pay to the government pay their salaries."

At Pittsburg State University, a small school in rural southeastern Kansas, physics department chair Chuck Blatchley said difficulties getting Chinese and other international students, combined with a drop-off in enrollment by American students, are jeopardizing the very existence of his department's small master's program.

"We were down to one MS student two years ago. This year, we are back up to five, but none of several applicants from China made it into the country," Blatchley said. "In our program review last year, we were asked to justify keeping the MS program running if we did not have enough applicants to fill our three existing graduate assistantship positions."

Blatchley's program was put on a probationary status for three years even as stipends were increased somewhat to see if the larger amount of money attracts more students. If not, he said, the program will likely be disbanded.

But do cases like these genuinely reflect a larger problem, or are they relatively isolated? The APS survey of physics graduate programs around the country had decidedly mixed results.

Of the 90 replies received – representing just over one-third of all the physics graduate programs in the United States – 49 said they had encountered sudden and unusual problems getting student visas for Chinese or other foreign nationals entering their program in the 2001-2002 academic year, while 41 said they had not.

The 49 programs that encountered problems accepted 243 Chinese citizens and 350 other foreign nationals. Of these 243 Chinese, 63, or 26, percent experienced at least one student visa refusal but ultimately secured their visas and arrived on time in the US into their programs, while another 49, or 20, percent were unable to get their student visas on time and hence were unable to start their programs. So overall, 112 Chinese citizens, or 46 percent, had some type of student visa difficulty.

By contrast, of the 350 other foreign nationals, 24, or 7 percent, experienced at least one student visa refusal, but were ultimately successful in time for the start of their programs, while 27 or 8 percent were unsuccessful and could not start their programs. So overall, 51 other foreign nationals, or 15 percent, had some type of student visa difficulty. Compared to other foreign nationals,

- A Chinese citizen was almost four times as likely to have experienced a student visa problem he or she ultimately overcame in time for the start of the 2001-2002 academic year.
- A Chinese citizen was two and a half times as likely to have experienced a student visa problem he or she could not overcome in time for the start of the 2001-2002 academic year.
- Overall, a Chinese citizen was about three times as likely to have experienced some student visa problem for the current academic year.

This 46 percent rate of refusal for Chinese student visa applicants seeking to enter US physics graduate programs matches very closely with the State Department's own reported refusal rate for all Chinese student visa applicants for fiscal 1998 and fiscal 1999. That rate "hovered between 45 and 47 percent" before dropping to 33 percent in fiscal 2000, a fact that "hardly seems to indicate tougher standards than in the past," according to Chris Lamora, spokesman for the State Department's Bureau of Consular Affairs.

Lamora also cites the large and steady gains in the numbers of F and J visas issued to Chinese citizens during this time. The number of student "F1" visas issued in China at one of five American consular posts rose from 12,370 in fiscal 1998 to 19,018 in fiscal 2001 (less the last 18 days of September), while the number of "J1" exchange visitor visas issued in China rose from 5,737 to 6,079 in the same period.

Lamora said that all of these figures outweigh the anecdotal evidence. "The State Department does recognize and understand visa applicants' frustration when they fail to obtain student visas. However, the anecdotal 'evidence' that somehow the process has become more difficult of late is simply not supported by the facts. There have been absolutely no changes in the procedures or policies our consular officers abroad use to access Chinese citizens' applications for student visas," Lamora said.

He also pointed out that the 1952 law governing such visa issues requires consular officers to assume that the applicant intends to migrate to the US. The famous Section 214-b of the Immigration and Nationality Act requires visa applicants to demonstrate an "intent to return" to their native country, and if the consular officer is not satisfied, the officer is required to reject the applicant.

Carl Shakin, who oversees the physics graduate program at Brooklyn College, one of the five main campuses comprising the City University of New York system, criticized this aspect of the law as essentially arbitrary and subjective.

"They can use this argument that the (applicant) really seems to have intentions of emigrating to the States. They can always use that argument. No one can really prove otherwise," Shakin said.

Historically, the overwhelming majority of Chinese citizens who have come to the US on student and other visas have ended up staying in the country permanently. The State Department cites this fact as evidence that it really does not make it tough for visa applicants. Others like Shakin see this fact as a good thing for the country.

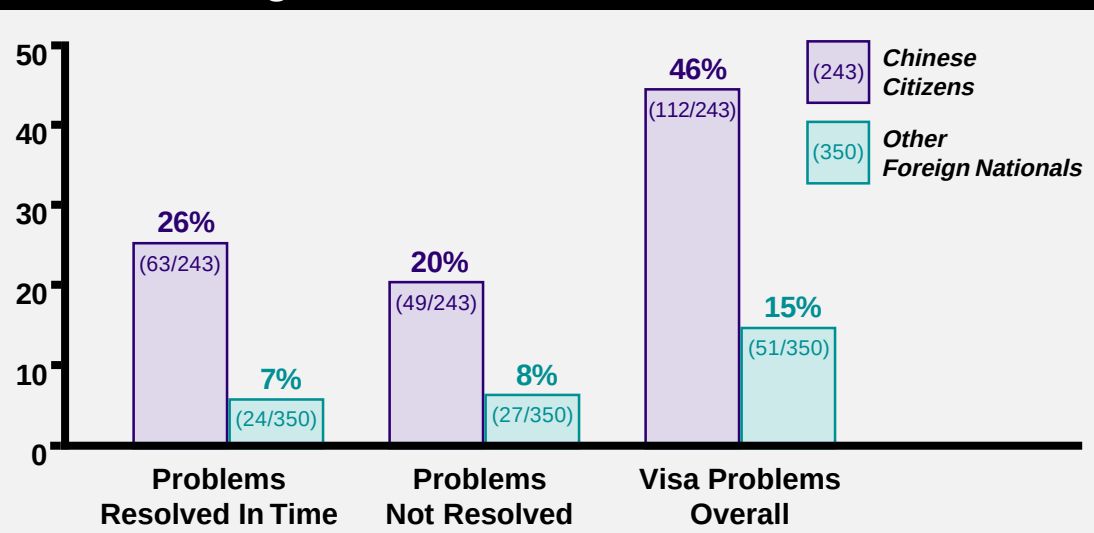
"Chinese citizens work in the industries like finance and information technology and are a major asset to the country," he said.

During an August meeting at the State Department between a group of university admissions personnel, physics researchers, and APS staff members on one side and State Department and Immigration and Naturalization Service officials on the other, there was discussion of ways the student visa process could be smoothed out. One possible solution was the creation of yet another visa category.

However, the events of September 11, 2001 have ended the effort to create a new visa category, according to Irving Lerch, the APS Director of International Affairs. "The 'new visa' issue is dead – for the moment," he said. "There are people in the [consular affairs] bureau who are sympathetic, but now is not the time to press the case."

Lerch said any initiative for a visa category would have to come from Congress and have the okay of the immigration service. "If I were to raise this issue again, it would be directly with the Immigration and Naturalization Service staff," he said.

Percentages of Students with Visa Problems



(The survey did not take into account individuals who were accepted into more than one program and in opting for one program, necessarily did not "arrive on time" for the other program, even though they may not have experienced any visa difficulties.)

ANNOUNCEMENTS

FELLOWSHIP PROGRAMS

APS/AIP CONGRESSIONAL SCIENCE FELLOWSHIP

The American Physical Society and the American Institute of Physics are accepting applications for their 2002-2003 Congressional Science Fellowship programs. Fellows serve one year on the staff of a Member of Congress or congressional committee, learning the legislative process while lending scientific expertise to public policy issues. Application deadline is January 15, 2002. For more information, visit: http://www.aip.org/pubinfo or http://www.aps.org/public_affairs/fellow/index.shtml

AIP STATE DEPARTMENT SCIENCE FELLOWSHIP

The American Institute of Physics (AIP) is now accepting applications for the AIP State Department Science Fellowship. This fellowship program represents an opportunity for scientists to make a unique and substantial contribution to the nation's foreign policy. Each year, AIP sponsors one fellow to work in a bureau or office of the US State Department, becoming actively and directly involved in the foreign policy process by providing much-needed scientific and technical expertise. Application deadline is November 1, 2001. For more information, visit: http://www.aip.org/mgr/sdf.html

Science Meets the Arts in Exploratorium's Holiday Events

APS members in the Bay Area this holiday season are invited to participate in a special series of events at the Exploratorium Science Center in San Francisco. Now in its third season, the Second Wednesdays Arts series combines the spirit of inquiry, interactivity, and experimentation that characterizes the Exploratorium, with the innovative intensity of the Bay Area arts community. Curated around themes and investigations from self-propulsion to biotechnology, the series includes artists and curators from the Bay Area and beyond, in disciplines ranging from poetry and film, to installation art and music. All events are free with admission to the Exploratorium.

A sampling of upcoming events:

- *The Mathematics of Pool*. Demonstrating probability with the help of a billiards table.
- *The Physics of Toys*. Find out how your favorite toys work and make your own in this fascinating workshop.
- *Holiday Iron Science Teacher Competition*. A live event in which science teachers have ten minutes to concoct a science activity from a "secret" ingredient that can be used in the classroom.
- *Mathematica: A World of Numbers and Beyond*. First created in 1961 by the late Charles and Ray Eames, this classic exhibition is the first major posthumous retrospective of their lifework.
- Numerous film programs showcasing some of the best science-related animated shorts and features of today.

For more information on these and other upcoming events, go to http://www.exploratorium.edu.

"Copenhagen" Hits the Road

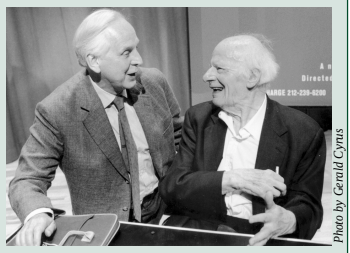


Photo by Gerald Cyrus

Hans Bethe (right) picks up some acting tips from Copenhagen director Michael Blakemore.

"Copenhagen," the Tony-Award-winning play by Michael Frayn that reenacts the 1941 visit of Werner Heisenberg to Niels Bohr, is going on a nationwide tour with two separate companies: one traveling to large cities, and the other focusing on performances in smaller cities and college towns. The first performances kick off in Salt Lake City in mid-November before moving to Los Angeles through the end of the year. For more information about performance dates and location, see http://web.gc.cuny.edu/ashp/nml/artsci, and click on the "Copenhagen Symposium" link.

Physicists Honored at Fall Unit Meetings

Nine APS members were honored with prizes and awards at the fall meetings of three separate units. The 2001 Arthur Schawlow Prize was presented at the Interdisciplinary Laser Science Conference in Long Beach, CA, October 14-18. The ILS is the annual meeting of the APS Division of Laser Science. At the APS Division of Plasma Physics meeting, also held in Long Beach, October 29-November 2, physicists were honored with the Maxwell Prize, the Excellence in Plasma Physics Award, and the award for Outstanding Doctoral Thesis in Plasma Physics. Finally, the Fluid Dynamics Prize and Otto Laporte Award will be presented later this month at the meeting of the APS Division of Fluid Dynamics, November 18-20, in San Diego, CA.

ARTHUR SCHAWLOW PRIZE

David J. Wineland
National Institute of Standards & Technology

Citation: "For an extraordinary range of pioneering studies combining trapped ions and lasers."

Wineland received his PhD in 1970 from Harvard University and spent five years as a postdoctoral fellow at the University of Washington before joining what was then known as the National Bureau of Standards as a staff scientist. His research interests are focused on the laser cooling and spectroscopy of trapped ions with applications to atomic clocks, cold plasmas, and fundamental tests; quantum state engineering with applications to quantum information processing and quantum-limited measurement. He has won numerous prizes and awards for his research over the years, including the 1990 APS Davisson-Germer Prize.

JAMES CLERK MAXWELL PRIZE

Roald Sagdeev
University of Maryland

Citation: "For an unmatched set of contributions to modern plasma theory including, collisionless shocks, stochastic magnetic fields, ion temperature gradient instabilities, quasi-linear theory, neoclassical transport, and weak turbulence theory."

Sagdeev is a Distinguished University Professor of the University of Maryland, College Park, and director of the East West Space Science Center in the Department of Physics. After graduating from Moscow State University in the 1950s, he became a member of the controlled fusion team at Kurchtov Institute of Atomic Energy in Moscow, where he was a driving force behind the development in our understanding of nonlinear phenomena in rarefied plasmas. In 1961 he founded the Plasma Theory Lab at the Budker Institute of Nuclear Physics in Novosibirsk, expanding the original scope of his work on nonlinear plasmas. And from 1973-1988 he was director of Moscow's Institute for Space Research. He was also politically involved as an advisor to Mikhail Gorbachev on arms control and space, and in 1989 was elected to the USSR Congress of Peoples Deputies, together with fellow physicist Andrei Sakharov.

EXCELLENCE IN PLASMA PHYSICS AWARD

Keith H. Burrell
General Atomics
Richard Joseph Groebner
General Atomics
Edward Doyle
University of California, Los Angeles
Edmund J. Synakowski
Princeton Plasma Physics Laboratory

Citation: "For experiments that show that sheared ExB flows can suppress turbulence and transport in tokamak plasmas, and that such flows can spontaneously arise at the edge and in the core of tokamak plasmas."

Burrell received his PhD from CalTech in 1974 and has spent the last 27 years at General Atomics working on a variety of experimental and theoretical topics in controlled fusion research. He is currently program manager in the company's Experimental Science Division, overseeing fusion research work on the D-III-D tokamak. His primary research focus is on energy and angular momentum transport in tokamak plasma, and he has helped develop numerous diagnostics, including the highly successful charge exchange recombination spectroscopy technique.

Since obtaining his PhD from the University of Wisconsin, Madison in 1979, Groebner has been employed by General Atomics in San Diego, CA. A major focus of his research has been the development of diagnostic techniques, using charge exchange recombination spectroscopy, for the measurement of ion temperature and velocity profiles. He implemented such a system to study the boundary plasma on the DIII-D tokamak and discovered that the edge radial electric field became more negative when the plasma made a transition to an improved confinement mode, called the H mode. He has helped foster H-mode research as leader of H-mode studies on DIII-D.

Doyle received his BE and MEngSc degrees in Electrical Engineering from the National University of Ireland, University College Cork in 1980 and 1982. From 1980 to 1985 he was a research associate at the UKAEA Culham Laboratory, where he developed a far-forward scattering system for the TOSCA tokamak. In 1985 he joined the research staff at UCLA, where he is currently a senior researcher in the Electrical Engineering Dept. and Institute for Plasma Science and Technology. At UCLA he has pursued applications of advanced Far Infra-Red and mm-wave diagnostic systems to improve fundamental understanding of plasma turbulence and transport. In 1989 he joined the collaborative research team at the DIII-D National Fusion Facility, San Diego to study turbulence changes associated with the formation of edge and internal transport barriersssion effects.

Synakowski received his PhD in physics from the University of Texas at Austin in 1988, having performed spectroscopic studies of plasma impurity transport on the TEXT tokamak. Since then he has been a member of the research staff at Princeton Plasma Physics Laboratory, where he is currently deputy program director of the National Spherical Torus Experiment. His most recent research efforts include a focus on bifurcating plasma systems and studies of the effects of sheared plasma flows on transport and transport barried dynamics. He has recently extended this work to include joint research on the DIII-D tokamak at General Atomics.

OUTSTANDING DOCTORAL THESIS IN PLASMA PHYSICS AWARD

Kevin James Bowers
University of California, Berkeley

Citation: "For comprehensive and insightful theories and simulations of electron series resonant (ESR) diodes and ESR surface-wave plasmas, which showed how distributed slow-wave excitation might produce large area plasma discharges for processing and other applications."

Bowers graduated with highest distinction from Purdue University in 1997 with a BS in electrical engineering. He received his PhD in electrical engineering from the University of California, Berkeley, earlier this year, with thesis work on high frequency plasma surface waves. Since then he has joined Agere Systems (formerly the Lucent Bell Labs Microelectronics Corporation), where he has been investigating mesoscopic and nanoscopic photonic devices and manufacturing. His research interests include electromagnetics, plasmas, quantum electronics, and scientific computing.

FLUID DYNAMICS PRIZE

Howard Brenner
Massachusetts Institute of Technology

Citation: "For his outstanding and sustained research in physico-chemical hydrodynamics, the quality of his monographs and textbooks, and his long-standing service to the fluid mechanics community."

Born and raised in New York City, Brenner received his PhD in chemical engineering from New York University in 1957. His 46-year career as a chemical engineering faculty member has included stints at NYU, Carnegie-Mellon University, the University of Rochester, and MIT, where he is currently W.H. Dow Professor. The co-author of three books on fluid dynamics, his lifelong research interests focus on modeling particulate physico-chemical transport processes. Current research efforts involve modeling chromatographic bio-particle separation processes in microfluidic devices and, more fundamentally, quantifying the molecular and convective transport of volume.

OTTO LAPORTE AWARD

John Kim
University of California, Los Angeles

Citation: "For his pioneering work in the development of direct numerical simulation as a tool in turbulence research, and for his important contributions to the understanding of the physics and control of turbulent boundary layers."

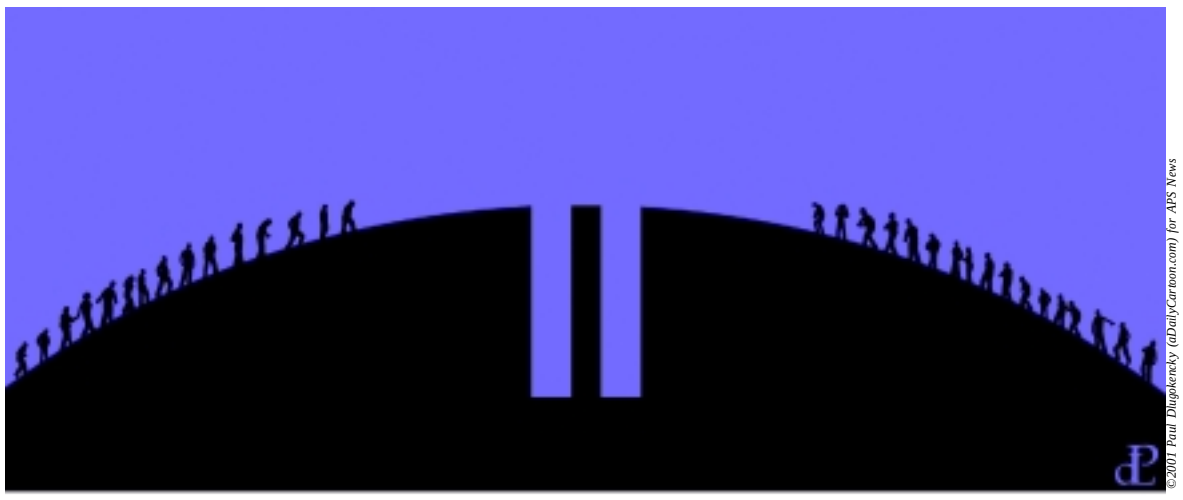
Kim received his BS degree from Seoul National University in Korea and earned an MS from Brown University before completing his PhD in mechanical engineering at Stanford University in 1978. Before joining UCLA, he conducted research in the areas of transition and turbulence physics at NASA's Ames Research Center, serving as chief of the Turbulence and Transition Physics Branch. He is currently active in investigating control strategies for turbulent boundary layers, using systems theoretic approaches. Since 1998 he has been the editor of the journal *Physics of Fluids*.

THE BACK PAGE

Unity of Physics in Action: Voices from Around the World

Editor's Note: The entire country was deeply affected by the tragic events of September 11, 2001, which claimed the lives of more than 6,000+ people. In the midst of such horror and loss, we were particularly gratified by the outpouring of support and consolation received from our friends and colleagues in other countries. The sampling below represents but a small fraction of the encouraging notes received by various APS officers and staff in the aftermath of the attacks. We reprint them here as a testament to the universality of physics, whose community knows no national borders.

The Executive Board of The American Physical Society expresses its profound sorrow at the loss of so many innocent victims of terrorism on September 11, and offers deep sympathy and condolences to their family and friends. We mourn as well the deaths of members of our own physics community. We grieve with our members and staff who have lost loved ones, friends and colleagues.
APS Executive Board
Motion Passed September 22, 2001



The Deutsche Physikalische Gesellschaft unreservedly condemns the recent appalling terrorist attacks in the United States. They are attacks upon our whole civilization.

The Deutsche Physikalische Gesellschaft assures The American Physical Society and the whole American people of its complete solidarity with them at this difficult time.

In memory of the victims and with my deepest sympathy for their families, I remain in great sadness,
Dirk Basting
President, DPG

We are sorry [about] what has happened to your country. Please have our heartfelt sympathies.
Santanu Datta
Secretary, Indian Physics Association, Calcutta Chapter

All of us in the Indian Physics Association are most distressed with the human tragedies [that] have struck New York and Washington. Our hearts go out in sympathy with the innocent victims of these acts of madness. We stand by you in this hour of grief.
C.L. Bhat
Secretary, Indian Physics Association

We are deeply in consternation for the tragic and violent events in the United States. We hope that everybody and everything by the American Physical Society is okay.
Gerardo Contreras Puente
President, Sociedad Mexicana de Fisica

On behalf of the Cuban Physical Society, we would like to transmit to you our sad feelings and human solidarity because of the tragic facts that occurred in New York City and Washington.
Victor Fajer
President, Sociedad Cubana de Fisica

With deepest shock we have seen the totally senseless attack on humans and institutions in the United States. Helpless as anyone in this situation, we would like at least to share with all of you our deep sympathy. Scientific collaborations have played for many years an important role in fostering the understanding of humans across borders. I hope this spirit will finally win over fanaticism.
Albrecht Wagner
Director, DESY German High Energy Physics Laboratory

I and my colleagues sympathize with you in your sorrow on the terrorism in New York and Washington. We were sorry to hear of the death of the people in the United States.
V.M. Matveev and V.V. Matveev
State Research Institute of Physical Problems Zelenograd, Moscow, Russia

We hope very much that you are safe and mourn with all the unimaginably large losses. Today we Germans are all Americans.
Eberhard Hilf
University of Oldenburg, Germany

Please accept my condolences for the tragedy that has hit your great country.
Taieb Gasmi
Universidad Complutense de Madrid, Spain

I was shocked to learn of the recent terrorist attacks in the United States. I share the concern with the people of the United States and express my heartfelt condolences to the dependents of the victims. I am very sure such attacks by cowards will not stop the United States from its targeted missions against global terrorism.
K. Shadananan Nair
Cochin University of Science & Technology Kerala, India

It is with deepest sorrow that we learned of the tragedy which happened in the United States. I wish to extend to you my sincere sympathy, knowing the sorrow you must feel.
Andrzej Slebarski
University of Silesia, Poland

We are shocked and saddened by the tragedy because of the terrorist attacks in the United States. All of us from the Central American and Caribbean Physical Society (SOCEAF) want to express our condolences to the families and friends of the victims in these tragic events. Please let us know if we can be of any help in this terrible situation.
Leopoldo Esquivel
President, SOCEAF

I send my sincere condolences to everybody in America on the terrorist attack.
Mikhail Kisselev
University of Wuerzburg, Germany

I would like to express my condolences to the American people at this dark and tragic moment for the attack on the free and democratic world. This is not only an attack on the United States, but an attack on the civilized world. We stand close by you. Let me hope that you never forgive these monstrous criminal suicide attackers.
Vitaly Gasparov
Institute of Solid State Physics Russian Academy of Sciences

After the dramatic events of last week, I would like to express to all US people our deepest thoughts in these terrible moments. We French people have a very special debt to you that began in 1945 when you came as liberators.

Be sure that we are with all of you.
Thierry Jolicoeur
Ecole Normale Supérieure, France

MEMO

TO: Publications Staff of the American Physical Society, Ridge, NY
FROM: Martin Blume, *APS Editor in Chief*
DATE: September 12, 2001

Yesterday's terrible events will be in the forefront of our minds for a long time to come. I believe that as we learn more about the toll of the tragedy, none of us in our office will be spared some brush with death. Some of us will have lost close loved ones, and most, if not all, will know of friends, neighbors, or relatives who have perished or who are badly injured. Our thoughts, hopes, wishes and prayers are with the survivors and with the families and friends of those who have died. Inevitably, we will be thinking as well of punishment for those responsible. It is important that we not hold entire groups of people accountable. The world of physics, of which we are an important part, is very international in scope, and we have many friends and colleagues in all corners of the world. Here in our own office we have many coworkers who have come from faraway places, who are as horrified by what has happened as the rest of us. Let us keep that in mind when the pursuit of the guilty becomes our paramount thought. One strong contribution that we can make here to defeat the purposes of the terrorists is for us to carry out our tasks as best we can. In that way, we will overcome their aim of complete disruption of our society. This will not be easy, but it should be our goal.

The scientists of the Joint Institute for Nuclear Research at Dubna feel deeply indignant at the unprecedented terrorist acts committed on September 11 in New York, Washington, and Pittsburgh. In these tragic days we join you in your grief over the immense loss of human life and express our sincere condolences to the families of the victims. We wish you, dear colleagues, and the entire US people all the courage to overcome the aftermaths of this tragedy. Please accept our profound sympathy. On behalf of the staff members of JINR and from all your true friends at Dubna...
Vladimir Kadyshevsky, Alexey Sissakian, Tsvetan Vylov
Russia

May I, on behalf of the Institute of Physics, express deep sympathy to all American physicists for the tragic events of last week. These cataclysmic occurrences still seem incredible and the trivializing of human life is so alien to us in the Western world. Here in London, we have suffered for the past 30 years from terrorist activities, but none has been on the scale of those on New York and Washington. We hear today of 250 Britons who were victims in the World Trade Center, making this one of the worst ever peacetime tragedies for our country. It is also probable that amongst the dead there will be physicists, who in increasing numbers in recent years, with their mathematical and model building skills, have added an extra dimension to the financial world. I am confident, however, that the American people with their resolve and determination will continue to progress in spite of the mental and physical scars which last week's acts of terrorism have inflicted upon your country.
Alun Jones
Institute of Physics, England

In shock and horror I followed the news of last Tuesday's terror attack, together with many of our faculty and staff, as unspeakable events unfolded in lower Manhattan, Washington, DC, and Pennsylvania. We share in the suffering, the sadness, anger, and confusion of all Americans. Our thoughts and prayers are especially with those of you who may now be confronted with the loss of a loved one. I pray that the burden of grief will not break your spirit, and I trust that in a nation standing together hearts will be healed, made strong enough to withstand, free to pursue dreams again. But any words seem lost like chaff in the wind in the face of a tragedy this vast. There is little else I can say except that my heart goes out to you.
Juergen T. Stockburger
Universitaet Stuttgart, Germany

APS News welcomes and encourages letters and submissions from its members responding to these and other issues. Responses may be sent to: letters@aps.org.