APS NEWS

A PUBLICATION OF THE AMERICAN PHYSICAL SOCIETY • WWW.APS.ORG/PUBLICATIONS/APSNEWS

January 2011
Volume 20, No. 1
www.aps.org/publications/apsnews

Meet the New President
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Southern California Hosts APS April Meeting

The APS April Meeting will take place April 30 through May 3 at the Hyatt Hotel Orange County, in Garden Grove, California, next to Anaheim and a mile from Disneyland. This year's theme is "100 Years of Sub-Atomic Physics," commemorating Rutherford's 1911 paper on the atomic nucleus. The yearly meeting is expected to host about 1,500 attendees and will feature about 75 invited sessions, more than 100 contributed sessions, nine plenary talks, poster sessions and a public lecture.

The meeting highlights the latest research from the APS divisions of Particles and Fields, Astrophysics, Nuclear, Computational, Plasma and Beam physics. In addition, the forums on Education, Graduate Student Affairs, History of Physics,

International Physics, and Physics and Society will be participating, along with the topical groups on Energy Research and Applications, Few-Body Systems, Gravitation, Hadronic Physics, Plasma Astrophysics, and Precision Measurements & Fundamental Constants.

The three plenary sessions will cover a wide variety of exciting topics. Saturday morning's session is sponsored by the Kavli Foundation, and features keynote speaker Steven Weinberg of the University of Texas at Austin, whose talk is titled "From Rutherford to the LHC." Also at the same session, Maria Spiropulu from CERN and Caltech will describe recent scientific results from the LHC, and Dan Hooper of Fermilab will have an update on the latest efforts to pin down dark matter. Monday morn-

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Council Approves Five New APS Awards

At its November meeting, APS Council approved five new awards of varying types. All of them will be calling for nominations in early 2011, in the expectation of presenting the first round of awards later in the year or in early 2012.

Among the new awards is the Stanley Corssin Award in Fluid Dynamics, named for a distinguished professor at Johns Hopkins who was closely associated with the establishment of the Division of Fluid Dynamics and himself won the Fluid Dynamics Prize in 1983. The Corrsin Award will have a stipend of $5000, and is intended as a mid-career award to complement the Fluid Dynamics Prize, which usually goes to a senior physicist.

Another new award is the Landau-Spitzer Award in Plasma Physics, which will be unique in the APS portfolio in that it will be administered jointly with the European Physical Society. The award will be given for outstanding contributions to plasma physics, together with advancement of the collaboration and unity between the European Union and the US. It will be presented in alternate years, and at least every second time (i.e. every 4 years) will be given to an early-career researcher. It carries a stipend of $4000.

Council also approved the Henry Primakoff Award for Early-Career Particle Physics, proposed by the Division of Particles and Fields. It will recognize outstanding research in elementary-particle physics performed by a physicist who has held the PhD for no more than 7 years, plus any career breaks. Supported by a fund that was established by members of the University of Pennsylvania physics department in memory of Henry Primakoff, who was a professor there for many years until his death in 1983, the award will have a stipend of $1500.

Also proposed by DPF and approved by Council is a new dissertation award in theoretical particle physics, which will complement the Tanaka Award, given annually for the best dissertation in experimental particle physics.

Finally, Council approved an award to be administered by the Committee on Education, that will recognize programmatic excellence in undergraduate physics education. Each such department or program will be recognized for a three-year term, and approximately three departments or programs per year will be selected. The award will consist of a plaque, and will be noted on the APS website. It will provide additional recognition for education beyond the existing Award for Excellence in Physics Education.

National Science Board Rejects Funding for Underground Lab

By Michael Lucibella

In an unexpected move, the National Science Foundation in early December opted not to fund further design work on a massive laboratory planned for an abandoned mine in South Dakota. The Deep Underground Science and Engineering Laboratory (DUSEL) would lose millions of dollars to cover budget overages in the lab design process, possibly leaving their partner, the Department of Energy, as the project's sole financier.

Lab planners, as well as the governor of South Dakota, said that despite this early setback they intend to continue work to develop the $875 million facility, and are currently weighing their options.

In September of 2009, the Committee on Programs and Plans of the NSF's oversight body, the National Science Board, authorized $29 million to draw up a preliminary design of the lab. However the costs soon overran the allotted budget and the lab's designers submitted a follow-up request for an additional $19 million for spring 2011, with a further $10 million request likely sometime next year. These "bridge" requests were turned down by the National Science Board.

"It was a bit of a surprise," said Bob Sanders, spokesperson for the project at the University of California, Berkeley. "It was just supposed to be a continuation of funding."

In addition to the funding, the National Science Board balked at its proposed role in the project. Under the plan, the NSF would have been part of a stewardship program to run the lab, along with the Department of Energy, the University of California, and the South Dakota School of Mines and Technology, ultimately turning the current Sanford Underground Science and Engineering Laboratory into the full-fledged DUSEL.

"That model was not appropriate for the role and mission of the NSF," said Ray Bowen, Chairman of the National Science Board, adding that the NSF does not typically run large science laboratories, a role he said was more in line with the work of the Department of

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Council Establishes Forum on Outreach and Engaging the Public

On November 20, APS Council voted to accept a petition to create a new Forum on Outreach and Engaging the Public (FOEP), and adopted the proposed draft of its by-laws.

The APS Committee on Informing the Public (CIP) had spearheaded the drive to create the new forum. In order to bring a petition to Council, at least 200 APS member signatures are required; the petition drive quickly obtained more than 600. The organizers say that the forum is aimed at building a stronger community of people involved with raising the visibility of physics and science to the general public.

"We wanted to create an opportunity for physicists who are interested in outreach and engagement and the public to come together," said Philip Hammer of the American Institute of Physics. He is a member of the CIP as well as of the forum's organizing committee.

In the coming months, the organizers will concentrate on getting the word out to the APS membership as part of a campaign to recruit members of the forum. In addition the organizing committee will start formalizing the leadership of the new forum.

The forum will enable physicists interested in interacting with the general public to network and share the best approaches and techniques. The forum will publish a newsletter and maintain an email listserv to foster an active community, and will begin to organize sessions at APS meetings. Ultimately the organizers hope that this forum will help raise the quality of outreach efforts.

"The forum provides a venue for people to congregate, provide best practice manuals…and disseminate things that work so people don't have to repeat the mistakes that other people have made," said CIP committee chair Dan Dahlberg of the University of Minnesota in Minneapolis, "The need for physics to be more visible is important. The visibility has impact on funding and just the general need to educate the public on science."

Other members of the forum's organizing committee have also said that they hope the forum will focus on disseminating materials on traditional outreach efforts such as physics demonstrations, lectures, and working with schools. However they say it will also incorporate newer techniques such as working with new media such as blogs, twitter and social network sites as well as interacting with lawmakers, authors, museums, television and movie producers and even getting the public involved with citizen science.

The name "Outreach and Engaging the Public" was chosen

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Topical Group Organizers Meet

Photo by Mary Catherine Adams

In December at APS headquarters in College Park, the organizing committee for the proposed new Topical Group on the Physics of Climate held a productive face-to-face meeting. It is expected that their proposal will be ready for consideration at the next APS Council meeting in April. Seated in the photo are (l to r): Judith Lean, Roger Cohen, Brad Marston, and Warren Warren. Standing are (l to r): Pierre Meystre, Bob Austin, and the Chair of the committee, Jerry Friedman, who expressed satisfaction with the meeting, commenting that "we have made excellent progress in establishing a new topical group." Committee member James Brasseur was not present but participated by teleconference.

Members in the Media

"For reasons no one yet understands, nature ruled out antimatter."

Jeffery Hangst, *CERN,* The Christian Science Monitor, *November 18, 2010.*

"The atoms that were trapped were not yet trapped very long and in a very usable number, but one has to crawl before you sprint."

Gerald Gabrielse, *Harvard University, on CERN being the first to successfully trap antimatter,* The Associated Press, *November 18, 2010.*

"Actually fairly shocking…My own preliminary appraisal would be 'guilty as charged'."

Paul Ginsparg*, Cornell, after looking into allegations that claim an influential anti-global warming report contained plagiarized sections,* USA Today*, November 21, 2010.*

"I think it will turn out to be a consideration in the future redesign of helmets."

Eric Blackman *of the University of Rochester, on his study recommending a face shield for military helmets,* The Los Angeles Times*, November 22, 2010.*

"Instead of seeing a few small cascades of centrifuges, which I believed to exist in North Korea, we saw a modern, clean centrifuge plant of more than a thousand centrifuges all neatly aligned and plumbed."

Siegfried Hecker*, Stanford, on seeing North Korea's surprisingly advanced nuclear program,* The Wall Street Journal, *November 22, 2010.*

"To capture the characteristics of each crystal, I have developed a special microscope that allows me to add back lighting…The snow crystal functions as a complex lens that reflects light, resulting in beautiful coloring effects."

Ken Libbrecht*, Caltech, on his photography of snowflakes,* The Los Angeles Times, *November 24, 2010.*

"We have a different life inside the house and outside…When you are married to someone who does the same thing as you, it can feel a little claustrophobic. I need more stuff. I need other questions. For me, it's perfect to move from one world to the other."

Angela Olinto*, University of Chicago, on being married to world renowned classical guitarist Sérgio Assad,* The New York Times*, November 25, 2010.*

"People have been searching for evidence of this for decades… What's exciting is if this is really true … [it's] the first unambiguous measurement of this condition of the early universe."

Richard Teuscher*, CERN ATLAS, on the first isolation of quark-gluon plasma at CERN,* CBCNews.com*, November 26, 2010.*

"Intellectually, I'm opposed to these awards…I think I've gotten more than enough reward from working in physics."

Ezra (Ted) Newman*, University of Pittsburgh, on being selected to receive APS's Einstein Prize,* The Pittsburgh Post-Gazette*, November 29, 2010.*

"It's very speculative…and this is one of the things that particle physicists do all the time."

Helen Quinn*, SLAC, after reading a recently published theory potentially solving the mystery of dark matter and missing antimatter through a proposed "X particle,"* MSNBC.com*, December 3, 2010.*

"It has our fingerprints all over it."

Steven Chu*, Department of Energy, on why ratios of different types of carbon dioxide gas indicate that global warming is caused by humans,* The New York Times*, December 6, 2010.*

"If these new documents were relevant to the N.A.S.'s review why were they previously undisclosed and withheld?"

Rush Holt*, House of Representatives, in a letter to the FBI director criticizing the handling of the anthrax investigations,* The New York Times*, December 9, 2010.*

This Month in Physics History

January 10, 1919: Death of Wallace Sabine, pioneer of architectural acoustics

Composers have always recognized the importance of the acoustics of a given performance space, and many tailored the music they composed to fit those spaces. For instance, Gregorian chants fare well in medieval cathedrals, known for long-reverberation times; ditto for organ music, such as Bach's "Toccata in D Minor." In contrast, Mozart and Haydn composed music to be played in highly furnished chambers, for smaller, intimate audiences. Such pieces lose their clarity when played in highly reverberant spaces.

But no one really thought about how to design a concert hall or opera house to achieve optimal acoustics until the end of the 19th century. It was done through trial and error, with little acoustical theory to provide much of a framework to centuries of experiment.

The father of modern architectural acoustics is an American physicist named Wallace Clement Sabine. Born in 1868, Sabine graduated from Ohio State University in 1886 and pursued graduate study at Harvard University. By 1895, he was a young assistant physics professor in Harvard's physics department. His lack of seniority is one reason he was handed the knotty problem of improving the infamously bad acoustics of the university's Fogg Lecture Hall, part of the recently constructed Fogg Art Museum.

Sabine didn't have any particular expertise with sound–he didn't even hold a PhD, although he was an excellent instructor and researcher–but he doggedly tackled the challenge as he would any other physics experiment. He chose to characterize sound in a room as a diffuse body of energy, rather than adopting the more typical 19th century geometric approach that focused on manipulating the propagation of sound waves. He focused his investigations on the sound-absorbing properties of various materials and their effect on reverberation times.

To that end, he spent several years studying the acoustical qualities of both the museum's lecture hall, and the Sanders Theater, widely considered to have excellent acoustics, in order to determine what might be causing the difference in sound quality. Specifically, he was attempting to find some objective formula or standard by which to measure and assess the acoustics of performance space designs.

It wasn't an easy task because so many variables had to be taken into consideration. He and his assistants tested each space repeatedly under varying conditions, moving materials back and forth between the two halls and making careful measurements armed only with an organ pipe and a stop watch. He timed how long it took for different frequencies of sounds to decay to inaudibility under those varying conditions: with and without Oriental rugs, seat cushions, various numbers of people occupying the seats, and so forth. He found that the body of the average person decreased reverberation time by as much as six seat cushions.

Based on these experiments, Sabine was able to determine that there was a definitive relationship between the quality of a room's acoustics, the size of the chamber, and the amount of absorption surfaces that were present. He devised a formula for calculating reverberation time, defined as the number of seconds required for the intensity of the sound to drop from the starting level by 60 decibels. It is still the critical factor for gauging a space's acoustical quality: $RT60 = 0.49\ V/SA$, where V is the room volume (expressed in cubic feet) and SA is the total absorption (expressed in square feet), where A is the average absorption coefficient of the room, and S is the surface area. The modern unit of sound absorption, the sabin, is named after him, and is considered the most important quantitative tool in architectural acoustics today.

Sabine concluded that the Fogg Lecture Hall's reverberation time was too long–a spoken word would remain audible for 5.5 seconds, as opposed to the optimal reverberation time of 2.25 seconds–so there was too much resonance and echo. He solved the problem by outfitting the space with sound-absorbent materials to reduce the "echo effect."

His success cemented his reputation and he went on to serve as acoustical consultant for the design of Boston's Symphony Hall. For that design, Sabine suggested the shoebox configuration favored in European concert halls, instead of the wider fan shape more typical of the halls built in America at that time, along with narrowed balconies to keep the sound from being trapped, and banking the stage walls inward to focus the sound. The materials used were brick, steel and plaster–all hard reverberant surfaces–with wood flooring to add a touch of "softness." At Sabine's suggestion, the architects topped the hall with a coffered ceiling to provide the best possible acoustical experience to every seat in the house.

Symphony Hall made its debut in 1900, with a gala preceded by a benefit concert conducted by Maestro Wilhelm Gericke. It is still considered one of the best halls in the world in terms of sound quality. One decorative detail was not among Sabine's recommendations. The arch above the proscenium is ringed with plaques, but only one is inscribed, with the name of the great composer Ludwig von Beethoven. The original intention was to inscribe each plaque with the name of a composer but in the end, the directors deemed Beethoven the only one deserving of such an honor.

Eventually Sabine became dean of Harvard's Graduate School of Applied Science from 1906 through 1915, when the school was dissolved. He served on the Rockefeller War Relief Commission during World War I, and was a member of the National Advisory Committee for Aeronautics as well. The strain of all his wartime activities took a toll on his already fragile health, however, and he died on January 10, 1919, from complications following surgery for a kidney infection–just before he was slated to move into a new laboratory outside of Chicago, built for him by philanthropist Colonel George Fabyan. Architectural acoustics has developed into a prestigious field of expertise since his death, and Sabine is widely recognized as the founder of the profession.

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Wallace C. Sabine, *Collected Papers on Acoustics*. Los Altos, US: Peninsula Publishing, 1993.

APS NEWS

Series II, Vol. 20, No. 01
January 2011

Coden: ANWSEN ISSN: 1058-8132

Editor . . . . . **Alan Chodos**
Staff Science Writer . . . . . **Michael Lucibella**
Art Director and Special Publications Manager. . . . . . **Kerry G. Johnson**
Design and Production. . . . . . **Nancy Bennett-Karasik**
Proofreader. . . . . . **Edward Lee**

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

Letters to the editor are welcomed from the membership. Letters must be signed and should include an address and daytime telephone number. The APS reserves the right to select and to edit for length or clarity. All correspondence regarding *APS News* should be directed to: Editor, APS News, One Physics Ellipse, College Park, MD 20740-3844, E-mail: letters@aps.org.

Subscriptions: APS News is an on-membership publication delivered by Periodical Mail. Members residing abroad may receive airfreight delivery for a fee of $15. Nonmembers: Subscription rates are available at http://librarians.aps.org/institutional.html.

Subscription orders, renewals and address changes should be addressed as follows: For APS Members–Membership Department, American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, membership@aps.org.
For Nonmembers–Circulation and Fulfillment Division, American Institute of Physics, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502. Allow at least 6 weeks advance notice. For address changes, please send both the old and new addresses, and, if possible, include a mailing label from a recent issue. Requests from subscribers for missing issues will be honored without charge only if received within 6 months of the issue's actual date of publication. Periodical Postage Paid at College Park, MD and at additional mailing offices. Postmaster: Send address changes to APS News, Membership Department, American Physical Society, One Physics Ellipse, College Park, MD 20740-3844.

New President Stresses Research Funding, International Engagement as Key Concerns

Barry Barish, Linde Professor of Physics Emeritus at Caltech, assumed the APS presidency on January 1st 2011. In the following interview with *APS News*, he discusses his priorities for the Society during his presidential year.

Q: What do you see as the most pressing issues facing the physics community right now?

Research funding! This is always near the top of the list, but the economic downturn and the election of a new Congress with a major shift in makeup make this issue even more critical than usual. Probably the most urgent issue is for constituent scientists to make contact with the new members of Congress to talk to them about how valuable basic science is to the future of the country. Leadership in science, especially through innovation, helps the economy, makes jobs and creates long term benefits to our way of life.

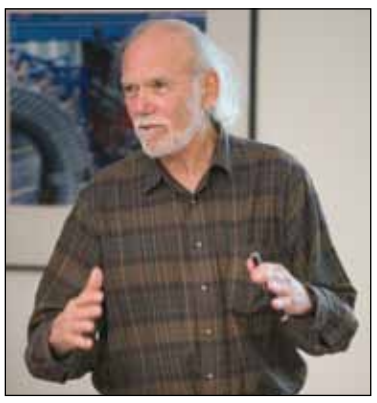
Q: What will be your main focus during your presidential year? What approach will you take towards achieving these goals?

There are many duties for the president, who is the "face" of the APS and many issues that arise will require my time and energy. I have observed how much of the time and energy of my two very capable predecessors have gone to fulfilling such unscheduled duties. Nevertheless, I plan to give special emphasis to several areas during the coming year:

1. The construction of the addition to the APS Ridge facility. This addition is badly needed and is a result of our own success, resulting in continued and steady growth of our journals. We have a very attractive building design to augment the present facility and we are hopeful that we will receive final building approvals soon. Working with our architects, our consultants and our contractor, we should begin the actual building in the coming months.
2. Evolving the APS to better fill the needs of our diverse membership. The first and most obvious need is to recognize the fact that our membership has a growing and large international component. We recently expanded the number of APS International Councilors in recognition of this fact, but we also need to develop international representation on our committees, make our scientific meetings more accessible through modern communication techniques, and make sure our journals, which have such a large number of submissions from outside the US, are fully responsive to the make-up of those publishing and reading our articles around the world.
3. The other big issue involving publishing is the movement toward "open access." We must become pro-active in developing an open access concept for APS journals, and one that has a viable and sustainable business model.

Q: How well do you think the society is serving its members? Are there any areas where you think APS programs could be enhanced?

I haven't heard complaints that there are large areas of our membership that are underserved, but in addition to adapting to our growing foreign membership, we underserve our younger members, both students and young researchers. The membership of



the APS has a large component of students and young researchers, yet they are not well represented in our policy committees, at our meetings, etc. I would like to see how we can both facilitate better representation in these society activities and we should try to understand and respond to whatever issues there are for this important component of our membership.

Q: What do you see as the Society's role in public policy?

The APS can and does play important roles in studies of policy issues that involve physics and related technologies. We play an important role in influencing policy decisions on such issues. It is important to realize that our government has few elected scientists or technically knowledgeable members. Therefore, it is incumbent on the science community to help inform the government on policy issues that involve science and technology. Our PPC and POPA committees, and more generally our Washington DC office, play important roles in this area. I am interested in understanding how we might or should evolve the mission of the Washington Office, both because of the expertise we have to offer, coupled with the needs for having an informed government.

Q: What do you see as the

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If You Can Make It Here...

Photo by Kip Patrick

The LaserFest celebration of the 50th anniversary of the first working laser had one last trick up its sleeve as 2010 came to a close. Recognition of the four founding partners of LaserFest, including APS, scrolled across one of the jumbotrons strategically located in Times Square. Throughout late November and December, this teaser piqued the curiosity of the hundreds of thousands of visitors to that storied New York destination, perhaps intriguing some of them enough to visit the LaserFest website whose URL appeared at the bottom of the screen.

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Energy. "There's never any question of the quality of the science being conducted."

Bowen noted that the job of helping to run the lab would be outside the NSF's traditional role in science, but he added that the NSF was not opposed to working with the project should another more acceptable model for its involvement be proposed. "We think the science is great. It's important, it's exciting, but there needs to be a way to fix that model to be more consistent with the NSF role."

The proposed DUSEL facility would dramatically increase the underground laboratory space in the United States. The almost two-mile deep mine is the perfect location to shield sensitive detectors from cosmic rays and other radiation.

The massive underground laboratory will use the defunct Homestake gold mine in Lead, South Dakota. Before it closed, Homestake was the deepest and most expansive mine in the Western Hemisphere. As deep as 8,000 feet in some places, the mine shafts would be ideal for proposed dark matter detectors, and for experiments looking for neutrino oscillations and neutrino-less double-beta decay, as well as for biological, engineering and geological experiments.

The mine has already been used for a variety of notable physics experiments. In 2002 Ray Davis was awarded a Nobel Prize for his work done at a neutrino detector nearly a mile underground that studied neutrinos emitted from the sun and thereby detected the phenomenon of neutrino oscillation.

However when the Barrick Gold Corporation, which maintained the defunct mine, donated it to the state of South Dakota, the mine was in rough shape. Pumps that had kept the lower levels dry had been turned off for years, and the bottom 3,000 feet of the mine was filled with water. The state of South Dakota has committed about $120 million to refurbishing the mine to prepare it for the science experiments to be installed in its depths. Altogether, including funding for facility design, experimental designs and other work, the NSF has committed about $70 million. The Department of Energy has similarly committed about $100 million to the project.

"There are a number of hurdles over the next couple of years that will have to be overcome," said Governor Mike Rounds, calling the NSB decision unfortunate but not insurmountable. "We will work through them one at a time."

For the time being, the cut in funding won't affect the day to day work being done at the lab.

"For right now it's business as usual for us," said Bill Harlan, spokesperson for the South Dakota School of Mines and Technology, which helps oversee the facility. "This decision does not affect us immediately."

He added that the current work refurbishing the mine and pumping out water is fully funded by the state of South Dakota through the end of 2011. In addition to the refurbishment, work has begun in a facility on the surface on two of the first detectors, the Large Underground Xenon dark-matter detector and the Majorana experiment to hunt for neutrino-less double beta decay. Several other smaller experiments are currently being conducted to establish baseline readings deep in the mine.

INSIDE THE BELTWAY

Will Barack Obama Back Down on Science?

by Michael S. Lubell, APS Director of Public Affairs

Elements of pop culture often find their way into the realm of American politics. And the closing days of 2010 were no exception.

Several months before the curtain was about to fall on the first decade of the 21st century, the President had resolved to leave the extension of the Bush tax cuts unresolved until after the November 2010 election. He might not have recognized it at the time, but he was about to walk onto Howie Mandel's TV sound stage.

Confession: I am neither a gambler nor a couch potato, but occasionally, when no one has been watching, I've snuck in a few minutes of vicarious viewing of NBC's TV game show, "Deal or No Deal," which Mandel hosts Friday evenings.

For any of you who are even less into pop culture than I am, rest assured the show is the epitome of intellectual vacuousness. The network touts it as an "exhilarating hit…where contestants play and deal for a top prize of $1 million in a high-energy contest of nerves, instincts and raw intuition." Watch it some time and be the judge.

Round after round, with the show's "Banker" offering the contestant a buyout for a sealed suitcase that holds an unknown amount of cash–it might be as little as a penny or as much as a megabuck–a puckish, sleek-suited Howie Mandel, with a gleaming pate, chin puff, and solitary earring, issues the inevitable challenge, "Deal or no deal?"

The contestant's family and friends, who share the stage, goad the competitor on. "No deal!" they scream. And more often than not, with a high-octane studio audience imploring him to hold firm, the contestant plays on. Win or lose, the audience wants the participant to fight. That's the American way.

But in the view of liberal Democrats, President Obama, has lost his way. He has been too quick to accept the "Banker's" offer, they say. He accepted the "deal" on health care, abandoning the public option in the face of conservative opposition. And after having campaigned relentlessly on forcing wealthy Americans to shoulder a larger share of the federal tax burden, he quickly caved into pressure from the right in December and accepted the "deal" to extend all of the Bush tax cuts for the next two years.

How the American public will judge the President's deal with the Republicans–which included extension of unemployment benefits for thirteen months and a host of tax credits for business, as well as reductions in the estate taxes for the super rich–we probably won't know until voters have a chance to express their views at the ballot box two years from now. They may give Obama points for pragmatism and prioritizing achievement over ideology. Or they may view him as a weak leader who doesn't stand up for his principles.

However the President fares in the arena of public opinion, the deal he cut in December is expected to increase the federal debt by almost a trillion dollars over the next two years, making it necessary to slash federal spending by an even greater amount once the economy begins to grow substantially and unemployment begins to drop recognizably. Although Social Security, Medicare, and Medicaid will represent a large part of the adjustment, discretionary spending will be part of the squeeze on federal outlays.

President Obama has spoken repeatedly about the need for strong investments in science re-

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Letters

Early Use of Scotch Tape Cited

The adhesive tape technique used by the recent Physics Nobel Laureates Andre Geim and Konstantin Novoselov has at least one precedent, although I suspect there could be more than one.

In 1966-67 I was a physics student at the University of North Dakota, Grand Forks, working in the lab of Professor Henn Soonpaa (formerly a research scientist at Honeywell). We were measuring how the resistivity of thin films of $Bi_8Te_7S_5$ crystals might be affected by its thickness. Professor Soonpaa taught me the technique of peeling off layers of the film with scotch tape to obtain extremely thin samples. Eventually, the measured thickness of the film was down to 5 atoms thick. My recollection of that time is that very few people, if any, believe the film was that thin.

The published reference is E. Ugaz and H. H. Soonpaa, "Electrical conductivity in an extremely thin single crystal," *Solid State Comm*. 6, 417 (1968).

Eduardo Ugaz
Minneapolis, MN

Enforcement Necessary to Prevent Nuclear Spread

The Back Page on tactical nuclear weapons by Irving A. Lerch entitled "Invisible Nukes" [*APS News*, October 2010] expresses the misguided conviction that nuclear deterrence is *a priori* bad and should be done away with, the sooner the better. It is particularly outrageous that he writes that "the risk... had been relocated from the war zones to [our] homeland." He seems to argue that it is preferable that the US suffer an attack on its soil with nuclear weaponry to deterring it (unless we are sure to start with that no nuclear state will consider it). He states that "the threatened use of such [nuclear] weapons against states like Iran...[is a situation where] we should be considering reductions–or better yet a total ban...."

If he wants to reduce the motivation for nuclear proliferation, I would argue it makes more sense to work on enforcement. We should increase security in nuclear power plants and marshal support for sanctions. I would also recommend task forces on international intelligence, case studies to minimize risk and bringing nuclear sites under international scrutiny.

He writes that 'the use of any nuclear weapon, however small, is of strategic import.' How do you disseminate that knowledge to rogue states whose government hides in schools and sends women out to blow themselves up?

Igor Kleyn
New York, NY

Tactical Nukes? What Tactical Nukes?

Irving Lerch's Back Page in the October *APS News* is completely wrong. There is no cover-up regarding tactical nuclear weapons because the US has none.

In 1991 President Bush (41) and Chairman Gorbachev agreed to mutually eliminate tactical, or battlefield, nuclear forces. The US promptly removed its tactical nukes. Since I retired from Los Alamos National Laboratory, I no longer have access to intelligence information on whether the Russians have too. The US enduring stockpile consists of two land-based missile systems (ICBMs), two submarine launched ballistic missiles (SLBMs), two aerial bombs, and a warhead deployed on several cruise missiles. All are under control of STRATCOM, Strategic Command headquartered at Omaha. The army and surface navy including marines do not have any nuclear weapons. During the 1991 Gulf War, there were six nuclear-weapon-armed aircraft carriers prowling the waters off Iraq; during the 2003 Gulf War, there were aircraft carriers in the theater but they were not armed with nuclear weapons.

John L. Richter
Albuquerque, NM

APS Should Stick to Scientific Matters

We read with some interest the story headlined "APS Responds to Member Resignation over Climate Change" (*APS News*, November 2010.)

It seems to us that the real question is not whether global warming ideology is a scam or not. The real question is what type of an organization does APS want to be? Since joining APS in the 1960's we have noted a constant drift from a scientific agenda toward a *socially relevant* agenda. We believe that APS should limit its activities and publications to scientific matters and avoid political and societal issues altogether. We are not saying that scientists should not be concerned with politics and social issues. They should. It is their duty to do so.

But they speak for themselves, according to their own beliefs. APS is on a slippery slope.

Once politics and societal issues creep into its agenda scientific integrity will suffer at the hands of *political correctness* and *demagoguery*. As a trivial example, in APS's response the following occurs: "...APS notes that virtually all reputable scientists agree with the following observations:..." In science truth is not determined by a majority vote. Words such as *consensus* and *incontrovertible* do not play a role. The annals of physics are rife with instances in which the majority of scientists agreed on something that turned out to be wrong. (Light propagates through the aether, and the atom is the smallest unit of matter.)

We feel that APS should limit its activities to establishing facts and finding the truth by scientific means. Individuals or groups of individuals within the APS membership have every right to express political or policy views as it may affect various funding scenarios, but identification of those individuals who espouse a particular point of view should be explicitly provided. The APS Council, and POPA in particular, should not attempt to speak for the membership as a whole on political policy matters. As a start to move toward openness and transparency, the APS should publish in this newspaper a list of individuals who formulated and wrote the current climate policy statement(s). It is their statement and not necessarily the statement of the APS membership. The APS should also publish on the web the 1600 (or so) members' commentary statements on the climate issue solicited this past year. Then, we and the public as a whole can begin to see the diversity and divergence of views, knowledge, and expertise amongst physicists in the US.

Thomas Wolfram,
San Clemente, CA

Sam Werner,
Gaithersburg, MD

Laura Ingraham's Role Questioned

With regard to the front-page article in the November *APS News* headlined, "*Fox News* Fails at Fact-Checking 101": I do not speak for either Laura Ingraham or *Fox News*, and I did not see the program referred to. But I do frequently watch *Fox News* and observe Ingraham there. She is not a "correspondent" of *Fox News*. She is a commentator who sometimes appears on Fox and in many other venues. On Fox she always appears on "commentary" rather than "hard-news" programs and is frequently balanced by someone of opposite opinion. She is not a Fox employee and does not have access to Fox's news-gathering (and-checking) ability. Since she is independent, *Fox News* cannot "retract" what she says, contrary to the implication of your article. Laura Ingraham is intentionally confrontational and sensational in her commentary, and because of your error the article gave the issue more exposure. I am surprised that Fox did not clarify her position.

J. Roland Gonano
Clarksburg MD

Ed. Note: *Not only did* Fox News *not clarify her position, they have been unwilling to discuss any attempt to correct the facts, despite much effort by APS to do so. And not only did they air Ingraham's report (or "commentary"), they also simultaneously displayed a picture of Curtis Callan, thereby compounding the error and assuming at least some complicity in promulgating erroneous information.*

Resignation Story not Balanced

I was disappointed to read your coverage of the Hal Lewis resignation and the accompanying piece on *Fox News*–both of which read more like partisan drivel than news meant for the membership of a premiere scientific society. Had *APS News* been interested in presenting its readers (most of whom are very educated scientists) with a balanced view of the controversy, it would have printed Lewis's resignation letter along with President Callan's response and let the reader make up his or her own mind. I could not miss the irony that the *APS News* response to a letter detailing how APS has stifled debate was to present only half of the story.

Peter Friedman
Dartmouth, MA

Ed. Note: *Hal Lewis's letter is quite long and, as our story noted, available on the internet. We quoted from the letter in our story, and endeavored to present Lewis's main points as well as the APS rebuttal.*

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by the organizing committee to reflect this two-way interaction with the public.

"Outreach is educating, entertaining, and increasing the interest of the public in physics and science that is not in the normal setting, that's not in the classroom, that's not what we normally do," Dahlberg said.

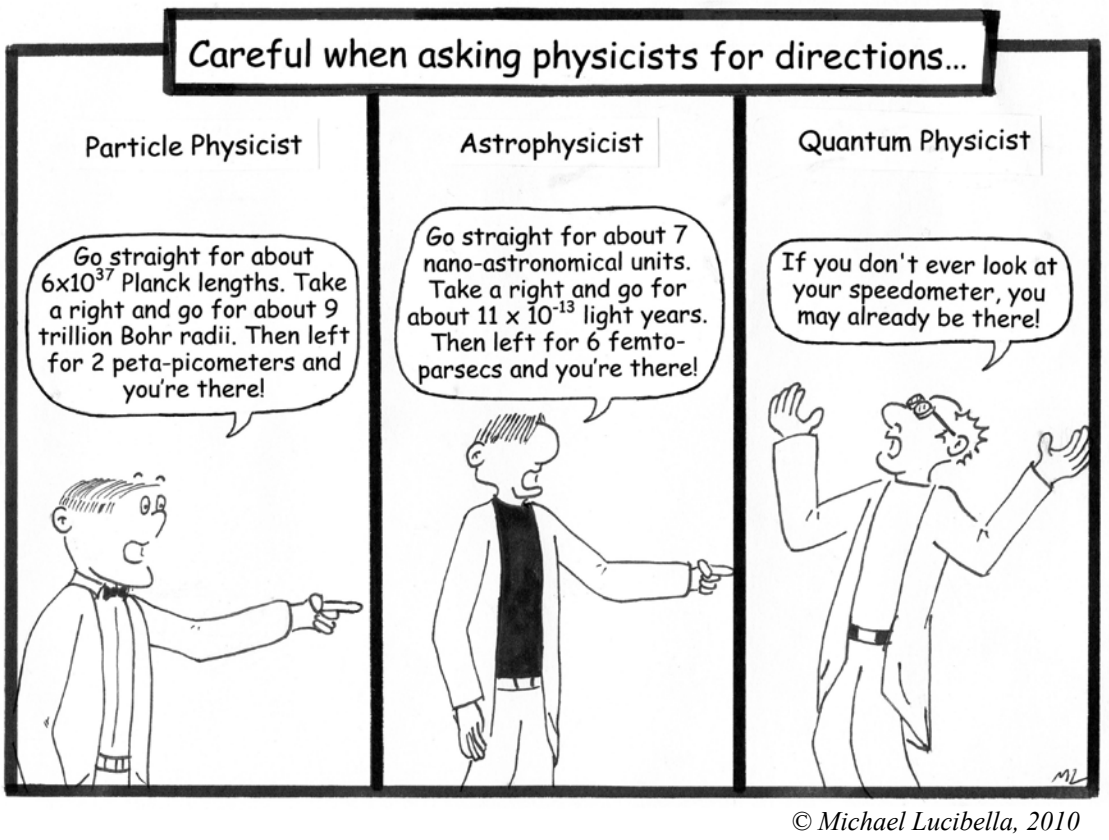
"Engagement to me implies a two-way interaction," Hammer said, "Not just enlightening the public, but to get non-physicists involved with physics."

The organizers said also that they are looking forward to working along with other forums such as the Forum on Education and the Forum on Physics and Society.

"There should be cross-fertilization, this forum should not be independent of everybody else," Dahlberg said. "It should be a synergistic relationship between these groups."

zero gravity

By Michael Lucibella



Education Corner

A column on educational programs and publications

Physics Departments Closing: What Can We Do?

The recent closures of a number of physics departments, as documented in a recent *APS News* article (December 2010), is an alarm that should cause physics departments to take note. Given significant budgetary woes, administrations are under a great deal of pressure to cut costs. Physics departments at smaller colleges and universities can seem like ripe targets, due to small numbers of majors, and consequently, typically a high cost-to-student ratio.

What can we do?

As a first step, we recommend reading the *Strategic Programs for Innovations in Undergraduate Physics* (SPIN-UP) report, available at www.aps.org/programs/education/undergrad/faculty/support.cfm. This report, written by the multi-society National Task Force on Undergraduate Physics, describes a number of steps a physics department can take to invigorate its undergraduate program and increase the number of majors it graduates. Major recommendations of the report include:

- Adopt interactive, student-centered introductory physics curricula like SCALE-UP, Modeling, Tutorials in Physics, or Workshop Physics. Physics major retention rates have substantially increased at departments that use these curricula.
- Pay attention to your students: have your best instructors advising and mentoring your majors, teaching the introductory sequence, and advising your Society of Physics Students chapter.

Other resources to help recruit and retain physics majors are available at www.aps.org/programs/education/undergrad/faculty

PhysTEC Conference Coming in May

The next Physics Teacher Education Coalition (PhysTEC) Conference will be held on May 23-24, 2011, with the theme of *Sustainability for Teacher Education Programs*. The PhysTEC Conference is the nation's largest meeting dedicated to physics teacher education, and features workshops, panel discussions, and presentations by national leaders, as well as excellent networking opportunities. The 2011 Conference will be held jointly with the UTeach Institute's annual conference. For more information, see www.ptec.org/conferences/2011

APS/IBM Research Internship for Undergraduate Women

APS and IBM co-sponsor a research internship program for undergraduate women, to encourage female students to pursue graduate studies in science and engineering. The deadline for the Summer 2011 internship is February 1, 2011. For more information and the application, go to www.aps.org/programs/women/scholarships/ibm

Education and Career Workshops at APS March Meeting

A variety of education and career workshops will be offered prior to the upcoming APS March Meeting in Dallas.

- *Teaching Quantum Mechanics* will explore strategies to improve the teaching and learning of quantum mechanics in undergraduate physics courses.
- *Physics Careers in Industry and Government* will focus on non-academic careers for students, early-career physicists, and career changers.
- *Improving Your Skills as a Research Mentor* is based on a research mentor training program developed at the University of Wisconsin-Madison and modified by APS, and is designed to help research physicists become more effective mentors.
- *Careers in Physics Workshop* will focus on skills and strategies to help physicists in their job search. Topics will include resume writing, interviewing, networking strategies, and more.

For more information including dates and times, see www.aps.org/meetings/march/events/workshops

Peter Muhoro Joins APS Education and Diversity

Peter Muhoro recently joined the APS Education and Diversity Department as the new Minority Bridge Program Project Manager.

Muhoro received his PhD in applied physics from the University of Michigan and is working to build collaborative relationships between minority-serving institutions and doctoral-granting institutions, with the goals of increasing the number of underrepresented minorities receiving doctoral degrees in physics, and of improving graduate education for all students.

National Academies Diversity Report

A recent National Academies report entitled *Expanding Underrepresented Minority Participation* explores the role of diversity in the science, technology, engineering and medicine (STEM) workforce and its value in keeping America innovative and competitive. According to the book, the US labor market is projected to grow faster in science and engineering than in any other sector in the coming years, making minority participation in STEM education at all levels a national priority.

The report is available at www.nap.edu/catalog.php?record_id=12984

High School, Summer School Gain Historic Site Designation

Photo courtesy of Robert Crease

Chair of the APS Historic Sites Committee Ben Bederson (center) gets help from Nobel laureate and Bronx Science graduate David Politzer (right) in hefting the plaque at the presentation ceremony on October 15. Bronx High School of Science Principal Valerie Reidy (left) looks on.

The APS Historic Sites Initiative honored two sites recently for their contributions to the advancement of physics in the United States. The Bronx High School of Science and the University of Michigan's historic summer school both have done much to inspire new generations of American physicists. The initiative marked each site with a ceremony dedicating a plaque commemorating the historical significance of each location.

Ben Bederson, chair of the historic sites selection committee said that the aim of the initiative was "to make physicists proud of what they've done and to enlighten the public…The best kind of historic site to identify is one that is important to physicists, but that the public can also understand and appreciate."

The first plaque, dedicated on October 15, honors the Bronx High School of Science, which has been a world renowned magnet technical school for science students. The school has a remarkable history; seven students who attended the school over the years have gone on to win Nobel Prizes in physics.

"It so happened that at the Bronx School of Science, who knows how it happened, seven of their graduates received Nobel Prizes. That's mind-boggling. How many countries have seven Nobel Prize Winners?" Bederson said.

The school was founded in 1938 as an institution focusing on math and science. Over the years, the school's reputation has grown and is now considered one of the very top science high schools in the United States and internationally.

Attending the ceremony was Nobel laureate in physics David Politzer, who himself attended the Bronx High School of Science. After the morning assembly where the plaque was dedicated, Politzer stayed for the day at the school, talking to classes and individuals and helping out in science labs. Politzer received the Nobel Prize in 2004 along with David Gross and Frank Wilczek for their work to discover asymptotic freedom in the theory of strong interaction.

The committee also dedicated a plaque at the University of Michigan to mark the historic summer school sessions it held in the early part of the 20th century.

"It was really a very important tipping point in the development of modern physics in America," Bederson said.

In the early part of the 1900s, the United States had generally not been seen as a world leader in the field of theoretical physics. Starting in 1928, Harrison Randall, then chair of the school's physics department, began hosting summer programs at the university to raise the stature of the United States in the field, ultimately devoting the program completely to theoretical physics.

"Every single important character almost without exception came to give lectures," Bederson said, adding that such notable lecturers included Niels Bohr, Hans Bethe, Enrico Fermi, Werner Heisenberg, and Wolfgang Pauli. "It was an inspiration for America."

Thanks in part to the Michigan summer school, the United States soon became one of the world leaders in theoretical physics. APS President Curt Callan unveiled the plaque honoring these summer sessions at the university on December 11. The dedication coincided with the school's prestigious Ta-You Wu Lecture where Nobel laureate Samuel C. C. Ting spoke about the Alpha Magnetic Spectrometer on the International Space Station.

Bederson also emphasized that the selection committee is always looking for more suggestions for future sites from the membership (see the story in the October 2010 *APS News*, available online). On the initiative's website, http://www.aps.org/programs/outreach/history/historicsites/index.cfm, there is a nomination form where members can submit their ideas for potential sites to the selection committee.

At Play, Day and Night in the Museum

By Alaina G. Levine

Paul Doherty was very direct on the phone. "I have the best job in the world. Wait until you hear what I get to do in physics."

It didn't take long to figure out why he would tender such a declaration. As Senior Scientist at the Exploratorium in San Francisco, Doherty is a consummate salesman of science, and he peddles his wares every day to an enthusiastic customer base. The physicist is involved in a multitude of arenas within the world-famous science museum, from designing and building exhibits, to teaching teachers how to use the museum's tools to inspire their students, to advising others about how to build their own less-expensive versions of the exhibits. He was the Founding Director of the Center for Teaching and Learning, and has traveled to Zambia, Greece, the Gobi Desert, and Antarctica leading Exploratorium trips to teach and excite others about science. He has written dozens of articles and books, including the *Explorabook*, which has sold more than one million copies.

Paul Doherty demonstrating electrostatic levitation for a museum audience

Doherty is constantly contemplating and orchestrating new ways to motivate kids and adults to pursue science, either as a career or an avocation. And although "I have been approached by recruiters [for other jobs]," he attests, he just can't leave. "I can't get any better than this."

Luke Donev, another PhD physicist who ventured into museums, is the Educator/Applied Science Lead for the Dallas Museum of Nature and Sci-

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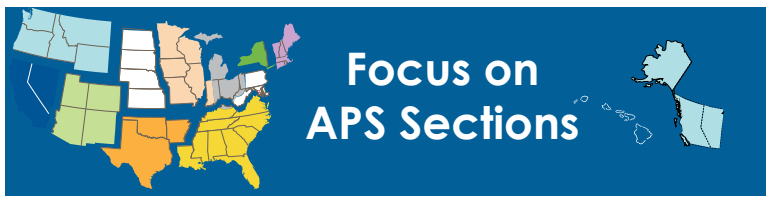

Students Are Key at Southeastern Section

By Mary Catherine Adams

Editor's Note: *This is the second of an occasional series of columns highlighting the history and achievement of APS Sections. The first column appeared in October. There are currently nine geographical sections, covering most of the United States and parts of Canada.*

Students are at the heart of the Southeastern Section of the APS (SESAPS), and physicists serving in the various chair positions of the section's executive committee see students' interests as paramount in the section's annual meeting.

"What can you do that bigger meetings can't do?" one asked. Focus on students, was the answer.

This year, at the section's 77th annual meeting, in Baton Rouge, nearly half of the attendees were undergraduate students.

The section tries to make the meeting student-friendly, Vice Chair Roxanne Springer of Duke University said, giving students the opportunity to interact with physicists in an environment that's less intimidating than a national meeting.

For Laurie McNeil, the section's chair-elect from the University of North Carolina, the smaller regional meetings are ideal for students. "It's the first meeting I take my students to," she said. "It's good for them to get the experience of going to a real APS meeting," without all the pressure of a national meeting, she said.

At this year's meeting, three popular sessions focused on the relationship between physics and education, including a new session on physics education research. Four speakers, one of them the current SESAPS chair, gave talks on "What can we do about the dearth of qualified high school physics teachers (and high school physics students)?"

The third education-based session addressed the issue of diversity in physics, a discipline of science where minority groups are significantly underrepresented. In this session, David Ernst, the section's past chair, described how the bridge program he helped to establish ties the masters program at Fisk University, a historically black university, into the PhD program at his own Vanderbilt University.

By establishing what he calls a "great working partnership," the universities are able to admit students that show promise through hard work and intelligence but who have holes in their academic records because of lack of opportunity early on, giving them the chance to pursue a PhD.

Forty-three minority students have been admitted to the bridge program since its inception in 2004 and 18 have gone on to pursue PhDs at Vanderbilt. About six of those students are expected to graduate in 2011.

"If we add up to three or six a year," Ernst said, "It's a significant contribution," to the 25 or so minority physicists who earn PhDs each year.

Although the annual meetings revolve largely around students, they also give the society the opportunity to celebrate excellence in physics. The section gives out three awards each year, one for teaching, one for research, and one for service. The awards, current chair Paul Cottle of Florida State University said, are a "fascinating snapshot of the region in action."

In 2010, the awards went to Amer Lahamer, chair of the Berea College physics department in Kentucky, who is making a difference for students with disadvantaged backgrounds in a less-affluent region of the country; Beate Schmittmann, a Virginia Tech physicist doing condensed matter research; and Florida State University's Kirby Kemper, a nuclear physicist whose work has had an influence across the nation.

"The awards reflect the remarkable range of things physics educators in our region do," Cottle said.

Although the 2,700-member section that encompasses 10 states in the southeastern US only started giving awards as recently as 1971, it has been active in education since its inception in the 1930s. Some in the section claim that it is the oldest of the APS sections although it was, admittedly, the second section to join the Society. They argue that the southeastern group had existed as an independent physics organization before joining the APS in 1937, making it older than the New England Section, the first to join APS.

The one concern that remains primary to each of the leaders is the future of physics. In upcoming years, section leaders plan to focus increasingly on career development for physics students by reaching out to them at annual meetings.

McNeil wants to remind students of the broad range of career opportunities that lie ahead. Young physicists, she points out, can go on to be video game developers, industrial physicists, science writers, museum curators, high school teachers, technical lawyers, technical salesmen, public outreach proponents and more.

"Everyplace you go, you'll find a physicist," McNeil said.

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ence. Although he has only been at the museum for a year, designing and performing outreach programs for up to 1500 youngsters a week, he too is crystal clear about his future goals: "I hope to continue to go up in front of children and shock myself and blow things up and do anything I can to get them excited and into science." he says. "I feel a PhD in physics has given me a toolbox of training that has allowed me to enjoy a vast array of jobs…I picked this job because that's what I want to do."

Luke Donev

Both Doherty and Donev launched their museum-centric careers by volunteering at facilities near their previous universities, and recommend physicists explore this route. "You can always start by helping out at your local museum," says Doherty. "Don't be a theoretician about [working in] museums. Get a sense of it before you leap."

He began by volunteering at the Cranbrook Institute of Science, a center that was close to Oakland University in Michigan, where he was a professor of physics. He helped to improve existing exhibits and liked it so much that he spent his sabbatical at the Exploratorium. That led him to recognize he enjoyed the Exploratorium much more than the university. He "dumped tenure" after the sabbatical and got a full-time position with the center. He's now been there for 25 years.

Donev's penchant for playing led to his future career path. He was an undergraduate at UC Davis when he started performing outreach programs and realized "I study physics because I think we have the best toys." While pursuing his PhD at Cornell, he volunteered at the Sciencenter in Ithaca. "The most fun I had in grad school was doing science outreach," says Donev. "I could be a researcher, but I had more fun with this. So after grad school I said maybe I should look for a job that is what I've been volunteering to do all along."

Donev found his present job by scrutinizing the website of the Association of Science-Technology Centers (http://www.astc.org/), which lists open positions at science museums worldwide. He used the site as a jumping-off point for virtually every science center in the US, and researched job possibilities with 200 museums. When he got the job in Dallas, he considered himself lucky –during the six month period he was researching positions, he saw only four advertised openings for fulltime educators at museums, he says.

Robert V. Steiner, who received his PhD from Yale, is the Director, Online Teacher Education Programs at the National Center for Science Literacy, Education and Technology at the American Museum of Natural History (AMNH) in New York. He took a slightly different road to his museum career. In the early 1990s, he was on the faculty at Adelphi University when "a civil war developed between the faculty and administration," he recalls, "and it became a place that was very difficult to earn tenure."

Although a short while later the president and the board of trustees either resigned or were dismissed, "it was too late for me," says Steiner, and he started investigating other options. At the time, institutions were becoming increasingly interested in online education. He went to Columbia Teachers College where he developed their first web-based course, and in 2003, AMNH hired him to oversee their online science education program for K-12 teachers.

Today, 1100 educators per year take the online courses that AMNH provides. "We take great pride in the scientific rigor of these courses," says Steiner. "We spend a great deal of time and effort to create rigorous, intelligent courses that are relevant and useful to the teachers."

Photo courtesy of AMNH/D. Finnin

Robert V. Steiner

"I've always enjoyed teaching," says Steiner. "Physics is traditionally known as being scary, intimidating [among students]. Many students only take it because they have to, and it's a trial by fire. If I can help them understand that it's cool and beautiful and wonderful and worth spending time learning, it's very satisfying."

AMNH has over 200 scientists across different academic units. With 32 million cultural and scientific artifacts, "the scientists are the stewards," says Steiner. "Our goal, for the teachers, is to increase understanding of science and the process of scientific inquiry, and connect them with valuable educational resources."

In addition to curriculum development, management and execution, Steiner is also expected to pursue external funding for his program. He currently serves as a PI on a $500k grant for the NASA Global Climate Change Education program, an opportunity he counts as one of his proudest professional achievements. "There is enormous satisfaction and privilege in being given the opportunity to help address the ongoing crisis in science education in this country," he says. Recently he was appointed the Vice-Chair of the Committee on Educational Technologies of the American Association of Physics Teachers, an organization which can be an important resource for information about museum careers.

Physicists who want to work for science centers have a number of options within the industry. Certainly there is opportunity within the education and exhibits departments, but larger centers such as AMNH also offer full-scale research divisions. For example, the Hayden Planetarium, part of the Astrophysics Department at AMNH, is headed by physicist Neil deGrasse Tyson. Scientists at museums are encouraged to publish, attend conferences and collaborate across institutions. Administrative career paths are also available, once you establish yourself, gain experience, and understand how museums operate, say the sources. "There are no boundaries to advancement," notes Steiner.

But before you leap from the ivory tower to a castle filled with dinosaur bones and ping-pong balls, be forewarned: "The culture of museums is not like the culture of academia," Doherty warns. "I had culture shock for the first three years." He says this is especially apparent in the use of vocabulary across the industry. "Museums take words and give them new meanings," he explains, especially in exhibit management and teaching evaluation. Phrases like "hands-on learning" or "educational standard" have different definitions and uses in museum-speak.

Doherty also points out other bewilderments–when he first arrived at the museum, he was surprised to learn that the education department at the time was so small–it housed only three physics teachers. Another shock: "Most science museums don't have scientists on staff. They have a lot of staff who are afraid of science."

Donev notes how astonished he was to learn how much bureaucracy it takes to sustain a science museum's operations. "I was used to a research university. I didn't realize how many people are behind the science, coordinating schedules, HR, accounting. There's infrastructure that doesn't even interact with the public."

But the payoff is significant for these museum-based scientists. "The range of challenges here is much greater than at the university," remarks Doherty.

"There are many paths to professional satisfaction with a physicist's background," reflects Steiner. "I consider myself very lucky although this is not the career I chose entirely on my own volition… It has infused my professional life with a meaning that… I could never have imagined."

Alaina G. Levine is a science writer and President of Quantum Success Solutions, a leadership and professional development consulting enterprise. She can be contacted through www.alainalevine.com.

ANNOUNCEMENTS

2011 Katherine Weimer Award

The Weimer award is open to any female plasma scientist who received her PhD within the ten-year period prior to April 1, 2011. Nominations are active for one selection cycle (three years).

The award consists of $2,000 and funds for travel to the annual meeting where the award is to be presented. The recipient will be invited to give a talk at the Division's annual meeting.

To nominate a candiate, send the following to **women@aps.org**:

- *A letter evaluating the nominee's qualifications and identifying the specific work to be recognized*
- *A biographical sketch*
- *A list of the most important publications*
- *At least two, but no more than four, seconding letters*

Deadline is April 1, 2011.

www.apsdpp.org/prizes_awards/katherine_weimer.php

Division of PLASMA PHYSICS

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ing's session will feature John Johnson of Caltech with an update on the ever-expanding hunt for planets outside our solar system, Carl Wieman, Associate Director for Science at the Office of Science and Technology Policy, talking about science policy, and Yang Shao-Horn of MIT expounding on the latest in energy storage and battery technology. At Tuesday morning's plenary session, Brookhaven National Lab's Bill Marciano will cast some light on the confusing and seemingly conflicting results about the radius of the proton, Stuart Henderson from Fermilab will talk about how particle accelerators have had a major impact on physics and society, and Nergis Mavalvala from MIT will discuss quantum mechanics and gravitational wave detection

The recipients of many of APS's prestigious prizes and awards will be honored at a special ceremonial session on Sunday evening, which will also feature the retiring presidential address by Curtis Callan of Princeton, who served as APS President in 2010..

On Sunday, graduate students are invited to Lunch with the Experts. Graduate students can sign up to dine with known experts in a field that interests them, in an atmosphere of informal discussion. The list of topics will be available on the April Meeting website in January, and signups, on a first come, first served basis, will be at the meeting itself starting at 1:00 on Friday April 29.

Also for students is the APS Student Resource Room, open Saturday through Monday, 10 am to 3 pm. There students with free entry stickers can interact with fellow students, peruse society literature, and enjoy complimentary refreshments.

Throughout the hotel, booths with tabletop displays will be set up for exhibitors to show off their products.

As always, attendees are invited to stop by APS's Contact Congress booth to send letters to their members of Congress about the importance of federal research funding.

Abstract deadline: January 14
Early registration deadline: February 25
More information: http://www.aps.org/meetings/april/

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search and education to revive the economy and keep it humming. But every dollar that other policy changes add to the federal debt make that commitment harder to keep.

Make no mistake about it: the days of privilege for science may be coming to an end. Already, the National Science Foundation, which boasts of almost universal support on Capitol Hill, is finding itself in the crosshairs of political snipers. Eric Cantor (R-VA), who will become House majority leader on January 5, has issued a challenge to voters on his website (republicanwhip.house.gov/YouCut/Review.htm). Find NSF grants that are "wasting" taxpayer money, and the House leadership will see to it they are cut.

As much as domestic science may be ripe for increased scrutiny, international projects could become even more suitable for the chopping block. During the 2010 campaign, third party advocacy ads repeatedly attacked federal spending on research taking place on foreign soil.

As increasing numbers of Tea-Party-backed Republicans question the bang the country gets for each federal buck invested in science, the President may once again be faced with the choice of deal or no deal. How he responds and whether former GOP stalwarts join him in their traditional support of research and education remain open questions. If they don't stand up for science, Europe and Asia will be eating our innovation dinner as well as our lunch.

Reviews of Modern Physics

Recently Posted Reviews and Colloquia

The galactic center massive black hole and nuclear star cluster

Reinhard Genzel, Frank Eisenhauer and Stefan Gillessen

The center of our Milky Way can be assessed by observations with exquisite resolution and sensitivity covering 18 orders of magnitude in energy of electromagnetic radiation. The orbits of more than two dozen stars and the measurements of the size and motion of the central compact radio source, Sgr A*, demonstrate the presence or existence of a massive black hole of about 4 million solar masses. This review summarizes the recent progress in observational and theoretical work on the central parsec, emphasizing the empirical evidence for a central massive black hole and the processes in the surrounding dense nuclear star cluster, including the apparent recent star formation.

http://rmp.aps.org

Accepting Applications: India – U.S. *Travel Grants*

The Indo-U.S. Science and Technology Forum (IUSSTF) sponsors and the APS administers the exchange of physicists and physics graduate students between India and the U.S.

Through the **Physics Student Visitation Program**, U.S. and Indian graduate students may apply for travel grants of up to $3,000 to pursue opportunities in physics. The funds can be used to attend a short course or summer institute, to work temporarily in a lab, or for another opportunity that the host professor and student believe is worthy of support. The program primarily supports travel to India by U.S. graduate students, while enabling some Indian graduate students to travel to the U.S.

The **Professorship Awards in Physics** funds physicists in India or the U.S. wishing to visit overseas to teach a short course or provide a physics lecture series delivered at a U.S. or Indian university. Awards are for up to $4,000.

IUSSTF
Indo-US Science and Technology Forum

Application deadline is 15 March 2011.

www.aps.org/programs/international/us-india-travel.cfm for more details, including application guidelines.

APS physics

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Society's role on international issues?

It is a fact that the APS membership has become more international, as the practice of doing science has become more international. As I said above, we must be responsive to this important and growing constituency in our membership, and beyond that, there are selective opportunities in the world where the APS can make a difference. Emerging countries are developing an increasingly educated scientific community, but have little tradition and few local organizations like the APS to provide the type of home for physicists that are provided by the APS. For that reason, we are beginning to look at possible partnerships in such countries that can be mutually beneficial and can help them develop their own equivalents of the APS. Another important area of concern relates to the globalization of science research, such as the large international collaborations needed to build and operate large facilities. The APS can help assure that such facilities can be carried out in ways that as much as possible are responsive to international needs of scientists to participate and are free of politics.

Q: In recent years, APS has been increasing its focus on education and outreach. What do you think of these efforts and how will you guide them?

We have a very active and effective education outreach program. The opportunities are much greater than what we can do, however, with our small staff and effort, so we must make sure we choose areas with the largest impact. We are active in efforts that educate the public, and this can have a large payoff. We are also making efforts toward broadening the diversity of our discipline and more generally in improving physics teaching. I am enthusiastic about these efforts and hope that I can help us focus on efforts where they will make a difference.

Q: How will you guide APS through the current difficult economic times?

APS finances are stable. We are a non-profit and the services we provide are matched to our income, and are monitored carefully by the treasurer with advice from our budget and finance committees. Our reserves have largely recovered from the losses during the economic downturn. The biggest uncertainty is the future support of our journals. University libraries are under growing financial pressure, and publishing is becoming more electronic and open access. It will be a challenge to maintain our high-quality journals and respond to these changes.

Beyond the APS, there are a larger number of financial issues facing science and science funding. I believe the role of the APS in this area is to help enable our membership to educate our government officials and funding agencies of the value and importance of science and support for physics research in particular.

Q: How did you become interested in physics?

As a young child, I had two distinguishing passions, first an early love of mathematics and second, an intense curiosity to understand the world around me. Little did I know that physics represented a wonderful merger of these two passions, with mathematics being the crucial underlying tool to understand the physical phenomena that interested me so much. Eventually, I put that together and the rest is history!

Q: What have been some of your career highlights?

I have had the fortune to have been involved in a series of forefront fundamental physics experiments in particle physics and gravitation. Being able to learn about the physical world through ambitious forefront experiments from the idea stage, to a concept for addressing the questions, to an experimental design, and finally to an actual experimental device leading to new science has been and remains the highlight for me. I have had the good fortune to have gone through this process several times on forefront physics experiments.

Q: Why did you choose to run for the APS presidential line?

I was nominated and asked to run for office. I had never thought about it before and despite my initial reluctance, due to having many other commitments, I decided to run because I thought I could make a difference (in a positive way). I hope I am right!

The Back Page

Teachers in the Crosshairs: The Impact of "School Choice," "Reform," and "Accountability."

By Sheila Tobias

The physics community is understandably committed to raising the quality of the nation's physics-trained teachers. But *caveat emptor*: the path the current "reform movement" is taking could drive out the very best teachers with the bad.

First, there was No Child Left Behind–ushering in a blame game particularly directed at inner-city schools–a policy that took poverty off the table and deemed schools, teachers and their administrators wholly responsible for pupils' "underperformance," as measured by standardized tests.

When that policy sputtered (*U.S. News and World Report* dubbed NCLB "the Race to the Bottom"), Arne Duncan, the newly selected Education Chief (2009), shot back with a promised infusion of $4.2 billion to be distributed to states that meet strictly enforced "accountability" measures, which, without acknowledging the irony, he calls Race to the Top.

The operative element in the new policy is to hold teachers mainly responsible for pupils' gains and failures in school.

"When the team loses," Duncan, a former professional basketball player is reported to have said more than once, "you fire the coach." But every teacher knows the coach recruits the players and no teacher gets to choose which "players" are going to play on his/her team.

The middle and long-term effects of "Race to the Top" will take years if not decades to assess.[1] But while only 11 states and the District of Columbia have so far met the strict criteria for funding (including the introduction of data systems designed to align teachers' performance with that of their pupils), 40 additional states have written proposals that promise to achieve the three goals of Race to the Top: school choice (lifting numerical and any other restrictions on the establishment of charter schools), *reform*, in the manner of the new Administration's model, and *accountability*, which imports from the corporate culture a means of assessing teachers by student outcomes, specifically the *value added* to the aggregate pupils' performance over the course of the school year.

Science is not singled out in the new policy. Indeed, the No Child Left Behind regime had not yet gotten around to setting "student performance standards" in science, the whole focus being on reading and mathematics. But under "outcomes-based assessment" or "value added," science teachers can expect a significant loss of control over what they teach and how. Whether those among them who have more out-of-school employment options decide as a result of the assessment frenzy not to remain in teaching is a significant down-side risk.

"Value Added"

"Value added" (known more formally as VAM, Value Added Assessment Methodology) is intended to calibrate "teacher effectiveness" as a function of "productivity," supplanting more traditional measures of teachers' skills, such as experience, courses taken, even National Board Certification. VAM burst onto center stage of the education landscape with a suddenness that leaves one breathless. It had its origin in the mid-1980s in a series of papers from outside the education establishment, and early adoption in only one state, Tennessee in 1992-1994. In the past five years, however, the idea, if not yet the complex data systems needed to implement VAM, have become national policy. Is it a takeover, or just a sign of the times? Proponents openly acknowledge that VAM is modeled on an assessment methodology commonly deployed in the private sector.

In the same way that "the labor market differentially rewards skills and productivity," argues Dan Goldhaber, director of the Center on Reinventing Public Education at the University of Washington-Bothell and a strong proponent of VAM (in a power-point presentation available on line), "so must education free itself from a focus on teacher training and licensure and move toward quantitative assessment of teacher effectiveness."

Effectiveness becomes a quantifiable entity by comparing anticipated pupil achievement in a particular subject in a particular year (given demographics, prior achievement, reasonable expectations) to actual achievements at the end of the year–measured often only by a single test result. The teacher is then judged by the "value added," or not added, as the case may be. If the means of assessing value smacks of a corporate model, it should. The proponents are for the most part, like Dan Goldhaber, economists or professors of business management.[2]

[1] For a more general critical overview see Diane Ravitch (2010), *The Death and Life of the Great American School System: How Testing and Choice are Undermining Education,* Basic Books.

The "Ceiling Effect"

It is of course too soon to anticipate the immediate and long-term effects of Race to the Top, since so few states (12) have been funded to implement the full range of the policy. But value added has already found its way into certain school districts for the purpose of assigning bonuses. In Houston, where a new value-added formula is being used to grade teachers' skills, *N.Y. Times* education writer Sam Dillon found a high school physics teacher out of the running for high bonuses because, as she reported, "My kids come in at a very high level of competence, scoring well before the semester begins." After she teaches them for a year, they continue to score well on a state science test but show less measurable "gain" than other classes, so her bonus is small compared with those of other teachers.

The teacher has invented a term of her own to characterize this distortion. She calls it the "ceiling effect." We might call it a saturation effect.

More to the general point of this article, if value-added measures are to be used to recognize effective teachers (and to punish or to dismiss ineffective ones), the public needs to have confidence in the statistical validity of the technique. Since students are not assigned randomly (as in a clinical trial) to one classroom or another, VAM can test students coming and going without definitively answering the question: "How would these same students have fared if they had not had X or Y as a teacher?"

Despite the conceptual and practical challenges to value-added methods of evaluating teachers, states inhibiting (or, worse yet, prohibiting) linkages between student data and teacher evaluation are not eligible to compete for Race to the Top funds as determined by the Department of Education which manages the program. In effect, the government has found a way to hold states hostage to demands set forth in its new model of accountability. In such an environment, science teaching could well become less attractive as a lifelong profession.

Teacher Autonomy and Teacher Accountability: Must We Choose?

Physicists don't have to be reminded that the nation is woefully short of physics-trained teachers. Indeed, based on projections of the numbers of existing and available science, technology, engineering and mathematics (STEM) teachers, a 2006 National Academies report, *Rising Above the Gathering Storm*, called for an increased production of 10,000 *new* science and mathematics teachers per year for the next decade.

Since *The Gathering Storm* had virtually nothing to say about STEM teacher attrition, Anne Baffert, a local (Tucson) high school chemistry teacher, and I proceeded to examine what scholars know about attrition and then to check those findings by way of a web-based "listening tour" of secondary science teachers around the country. The result is our book, *Science Teaching as a Profession. Why it isn't. How it could be*.

[2] The seminal paper, "Objective component of teacher evaluation: A feasibility study" was published by W.L. Sanders and R. A. McLean in 1984, both professors at the College of Business Administration at the University of Tennessee. For a more recent rationale, see Steven G. Rivkin, Eric A. Hanusek, John F. Kain (March 2005), "Teachers, Schools and Academic Achievement, *Econometrica* , Vo.73, Issue 2, 417-458.

Teachers who responded to our call claimed to be more concerned with erosion of autonomy, professional status, and control, than with salary. Already, the testing required by NCLB and locally controlled Annualized Yearly Progress (AYP) plays havoc with class scheduling and with students' perception of the value of science. Teachers want recognition, support, relief regarding daily preps and a sense that science and math is a priority in their school and in their state. Specifically: 1) control over curriculum, especially pace, pedagogy, and student assessment (in-class exams) within overall state standards; 2) the power to co-determine (at the very least) their own effectiveness; 3) above all, assessments they can trust.

"Science is Different"

The problem with outsiders measuring science teachers' "effectiveness" is embedded in what is different about science. Our conclusion from multiple interviews is this: Secondary science teachers are nervous and not just because their standing, their value to their schools, and their salaries and tenure will become linked to their pupils' achievement on standardized tests.

They are nervous because the problems an able science teacher presents his or her students are not like (elementary) mathematics problems yielding to a single right answer, but more like puzzles inviting discussion and dissent. Above all, and students need to learn this early, science knowledge is made up of both knowns and not-yet-knowns, both certainties and matters in dispute.

The science teacher's responsibility is not only to convey these facts and insights but also to enable the "ah-ha" reaction to occur as often as possible in his or her classroom; above all, to structure tests as a way of underscoring how varied the routes to scientific understanding can be.

Every science teacher interrogated for our book knows and tries to do all this. But as their range of instructional strategies narrows (and with states imposing value-added assessment it will narrow still more), science teachers may be forced to sacrifice everything they and their students love about science for a regimen of drill-and-practice not even of their own design.

What Physicists can do

Secondary science teachers want to be thought of as valued members of three professional communities: teachers in general, secondary science teachers in particular, and as members of a wider community of science professionals. There are a burgeoning number but still too few programs aiming to engage secondary science teachers in science–with paid summer research and other kinds of internships. But these are not yet reaching the thousands of teachers who could benefit from them.

Our inquiry found that teachers want scientists to know them, provide work for them to do in real-world science, and to defend them against those who threaten their professionalism. But until now, the science community has shown more interest in science pedagogy and school science content than in the status and well-being of science teachers.

That must change.

- If your state has written an RTOP proposal, whether or not it's been funded, read it, and go public if you and your colleagues believe the new accountability standards will limit science teachers' effectiveness ;
- Get to know the secondary science department chairs in your local school district. Organize a sounding board that exposes your colleagues to their lives and work;
- Invite science teacher leaders to make presentations at area physics conferences to discuss the impact of the latest reforms on the quality of their teaching, their professional status, and their overall ability to recruit the next generation of scientists;
- Ask to participate in the construction of alternate systems of evaluating teachers. Examine end-of-course examinations, if you have access to these systems, even if you're not asked. Make known your judgment as to what extent they will promote meaningful instruction;
- At the minimum have a look at student tests. If we are going to teach to the test, it had better be a valid test!

Sheila Tobias has been writing about what we teach and how since the 1990s. Best known of her books are: They're not Dumb, They're Different: Stalking the Second Tier, Revitalizing Undergraduate Science: Why Some Things Work and Most Don't, and Breaking the Science Barrier *(see www.sheilatobias.com). Her latest book (with Anne Baffert),* Science Teaching as a Profession. Why it isn't. How it could be. *was published in March 2010 by NSTA Press.*

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