Report Presents Strategies for Nuclear Arsenal DOWNSIZING

Late in February, APS members received an email message from President Curtis Callan, soliciting their input on the issue of climate change. Members were asked for input on a proposed commentary to be added to the APS climate change statement, which was originally passed by Council in November of 2007. As APS News goes to press, the comment period is still open, and a subcommittee of the Panel on Public Affairs (POPA) is getting ready to analyze member input once the March 19 deadline has passed.

The series of events leading to this situation began at the Council meeting last May, when a motion was introduced by Councilor Robert Austin to substantially change the 2007 statement. The motion was tabled, and then President Cherry Murray appointed an ad hoc committee, chaired by Daniel Kleppner, to advise her. The Kleppner committee recommended sending the statement to POPA to address issues of “clarity and tone.” In response to this, an ad hoc subcommittee of POPA, chaired by Duncan Moore, produced a commentary of several paragraphs on the statement. That commentary has now gone to the full APS membership for their input.

In order to submit a comment, an APS member must click on the URL provided in the email. The link is unique to the individual member, and insures that he or she can submit a comment.

Closing In on Dark Matter and High-Energy Cosmic Rays

The vacuum of outer space is not quite as empty as one might believe. Exotic particles fly through the interstellar void, continually bombarding Earth from all directions. Physicists at the “April” Meeting presented the latest discoveries made here on Earth about these cosmological soujourners.

Cosmic Rays

High energy protons career through the cosmos as so-called cosmic rays. Though first identified early in the 20th century, their origins have largely remained a mystery. Now, Stefan Funk from the Kavli Institute for Particle Astrophysics and Cosmology thinks he might have discovered their source. Using data from NASA’s Fermi Gamma-ray Space Telescope, he has been able to pinpoint supernovas as the likely cause of this interstellar radiation.

The term “cosmic ray” is a misnomer, as the radiation detected on Earth is from high energy protons traveling through space, not electromagnetic radiation. Because these “rays” are in fact charged particles, interstellar magnetic fields deflect them, making it difficult to pin down their origins. Funk says that the key to finding their source lies in cosmic gamma rays. The force from exploding supernovas accelerates protons to velocities near the speed of light. When these high-energy particles collide with interstellar gases, they create short-lived pions that then decay into gamma rays. Funk says that the sources of cosmic rays would thus produce large amounts of gamma rays at the same time that gamma rays travel are unaffected by magnetic fields, the sources of cosmic rays can be inferred by looking for signature gamma ray emitters in space. Using the Fermi Telescope, the team found such strong gamma rays emanating from supernova remnants, including Cassiopeia A, W51C and W44.

“Shock waves of these giant stellar explosions in our galaxy are cosmic accelerators way...”

Visa Problem Keeps Iranian Physicist from Attending March Meeting

By Michael Lacocella

Visa complications prevented a renowned Iranian physicist from attending this year’s March Meeting in an apparent case of mistaken identity. Though these kinds of identity mix-ups are rare, long visa processing times are normal for physicists traveling to the United States.

Farhad Ardalan, a string theorist at Sharif University of Technology in Iran who helped establish his first doctoral program, was denied a travel visa by the United States consulate in Switzerland in January. Though the error was ultimately corrected and the visa was cleared six days before the meeting, the logistics to get the embassy to stamp his passport in time made it unfeasible for him to attend.

The first sign of trouble came when he applied for his J-1 visa at the US embassy in Bern where he was asked if he had ever been arrested. He responded that he never had been, “Not even in Iran.” He was then told that he had a US arrest record from 1983, despite the fact that he was in Iran for all of that year and at that time the Iranian government banned travel to the United States. He was told he would not be allowed in the United States and was asked to relinquish his green card. Ardalan refused to turn it over and left the consulate.

In a follow-up communication he had with the embassy, he was told that State Department found a record of deportation proceedings against him in 1962; however he has no recollection of any visa problems while he was an undergraduate at Columbia.

Visa continued on page 5

Panel Prepares to Weigh APS Members’ Input on Climate Change Commentary

The report breaks down the overall aim of nuclear weapons reduction into three main goals: verifying the dismantlement of nuclear weapons, ensuring the peaceful use of fissile materials, and ensuring the non-proliferation of nuclear weapons but might want to incorporate “the attitudes of countries that don’t currently have nuclear weapons but might want them” into any non-proliferation framework.

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This Month in Physics History

April 12, 1912: Victor Hess’s balloon flight during total eclipse to measure cosmic rays

Today we take it for granted that Earth’s atmosphere is constantly bombarded by high-energy cosmic rays originating far outside our solar system. But such was not always the case. It was a 29-year-old Austrian physicist named Victor Hess who officially “discovered” cosmic rays, and went on to devote an illustrious scientific career to studying the effects of radiation on the human body.

Born in Austria in June 1883, Hess was the son of the chief forester for the estate of Prince Oet- tingen-Wallerstein. He attended the University of Graz in 1901 and earned his PhD in 1903. He initially studied to be a physician but eventually went on to devote an illustrious scientific career to study radiation.

Hess immigrated to the US to become a professor at Northeastern University, describing his findings on cosmic rays in his 1908 paper, “Cosmic Rays.” Hess shared the 1936 Nobel Prize in Physics for this discovery, along with Carl David Anderson, who discovered the positron.

There is an interesting twist to Hess’s Nobel story. In February 1910, Italian physicist Alessandro de Angelis of the University of Udine published an idea claiming that Hess should not be solely credited with the discovery of cosmic rays. De Angelis was a student of the physicist, Domenico Paccini, who made the same discovery right around the same time. Paccini didn’t use a balloon to measure changing radiation levels in the atmosphere. Instead, he went under water, placing his instrument in a copper box and sinking it in the Bay of Livorno. His results: the radiation measured was significantly less than at the surface, so he argued, the Earth’s crust could not be the source of cosmic rays. De Angelis offered the very first English translation of Paccini’s paper on this experiment, and pointed out that Hess and Paccini knew of each other’s work. So why do we remember Hess, not Paccini? Chalk it up to an unfortunate twist of fate. Paccini passed away in 1934 and the Nobel Prize could not be awarded posthumously. So Hess alone was honored for cosmic rays.

Two years after Hess received the Nobel Prize, the Nazis invaded Austria and Hess and his wife were forced to leave their homeland. Hess immigrated to the US to become a professor at Fordham University. He participated in the first tests for radioactive fallout less than a year after the atomic bomb was dropped on Hiroshima, many conducted from the 87th floor of the Empire State Building in New York City. The following year Hess found the smoking gun in Manhattan, mesoscale. Hess continued on page 6
New Faculty Workshop

APS, the American Association of Physics Teachers (AAPt), and the American Astronomical Society will sponsor the seventeenth New Faculty Workshop for New Faculty in Physics and Astronomy from June 21–27, 2010, at APS in Physics in College Park, Maryland. More than 1,200 newly hired physics and astronomy faculty have participated in this series of workshops since the initial offering in 1994. The workshop is designed as a meeting for small breakout groups of new faculty to participate the permit the participants to exchange ideas with one another and with leading innovators in physics and astronomy education.

For more information see www.aapt.org/Events/newfaculty.cfm. New faculty should be nominated online by their Department Chair at www.aapt.org/Events/newfaculty_nomination.cfm as soon as possible and no later than April 15.

LaserFest Kits Available

As part of LaserFest, APS has developed a laser-based unit for high school physics classes. APS will provide kits to teachers wishing to teach this unit. The kits include a lesson plan that guides students through an exploration of the properties of laser light, an online laser simulation created by the PhET project, and a few applications of lasers. The kits were developed with National Science Foundation and Department of Education funds. If you provide professional development for high school physics teachers and would like to order laser kits, please write to Ed Lee at lee@aps.org.

APS will also run a High School Physics Teachers Day at the Division of Atomic, Molecular and Optical Physics (DAMOP) meeting for the first time in many years. This project will include hands-on workshops on diffraction and laser light, and a video on the LIGO gravitational wave detector.

ALPHA to Offer “Laboratory Immersions”

During the summer of 2010, the Advanced Lab Physics Association (ALPHA) will be inaugurating their “Laboratory Immersions.” Last year’s APS/AAPT-sponsored Topical Conference on Advanced Laboratory Instruction was a no small need for training opportunities that would broaden the expertise of advanced laboratory instructors. ALPHA’s Laboratory Immersions offer an opportunity to spend three full days in intensive hands-on, learning the details of a single experiment well enough to teach it with confidence. The 2010 Immersions are: June 1718, Dickinson College, PA; July 17, Reed College, OR; Aug. 2–4, Buffalo State College, NY; Aug. 11–13, Carthage, CA. For details, including topics and registration, please visit www.adlab.org.

National Lab Day

The Obama administration has initiated efforts by science and education officials to improve STEM education. If you provide professional development for high school physics teachers and would like to order laser kits, please write to Ed Lee at lee@aps.org.

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April 2010

An Activity-Based Physics Chautauqua Short Course

Priscilla Laws, David Sokoloff, Ronald Thornton, and Maxine Willis are offering a 3 day Chautauqua Workshop at Dickinson College in Carlisle, PA from June 19-21, 2010. This hands-on course is designed for high school physics teachers. The program will incorporate hands-on workshops on diffraction and laser light, and a video on the LIGO gravitational wave detector.

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New Experimental Facilities

The Obama administration announced the effort in advance of the annual “State of the Union” address, and Congress is expected to move quickly to fund the projects. The projects have the potential to transform the way American students learn science and math, and to position the United States to lead the world in scientific research.

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The doctor has the patient’s medical history, including weight and heart data (blood pressure and electrocardiogram), showing an undesirable trend. If the doctor is careful, the heart data have to be somewhat discounted because they are taken only in office visits, with unknown distortion from daily life.

The physicist has the earth’s CO$_2$ and climate history, with similar or worse need for caution.

The one thing the doctor knows for sure is that the patient’s current weight is higher than in past years. The one thing the physicist knows for certain is that atmospheric CO$_2$ is higher now than in the last 100 years. The doctor thinks, but cannot prove, that the heart is showing worrisome symptoms, which will improve with loss of weight. The physicist thinks, but cannot prove, that global temperatures have risen and that the trend will be reduced by lowering CO$_2$ emissions.

Why does the doctor tell the patient to lose weight? There are excellent statistical correlations between obesity and life-shortening diseases. But the patient knows the difference between statistical correlations and prediction of a particular case. There is no proof that the patient’s particular case of obesity will adversely affect the patient’s life span, or, even if it does, there is no proof that the quality of life remaining will be adversely affected. Similar objections apply if we tell the world’s population to reduce CO$_2$ emissions.

The doctor’s confidence in statistical correlations is much improved by theory. Current medical science offers plausible scientific reasons why obesity harms health. Current physical science offers plausible reasons why anthropogenic CO$_2$ increases global temperature.

There are imperfections in this analogy. They tend to favor the doctor and disfavor the physicist. For a start, the patient is paying the doctor for advice. This can motivate belief. The doctor’s heart data, although imperfect, are hard to disqualify than data on mean global temperature. In the end, the doctor’s job is important, and no one expects the doctor to be fully scientific. The doctor has a responsibility to speak forcefully even if strict scientific standards are impossible to meet. What about the physicist? The analogy suggests two things. (1) It is important to acknowledge that physical science cannot provide perfect guidelines, and that scientists will seek a consensus about likely truth and still disagree with each other about the details. Just as people should ask their doctor (rather than their pastor, mayor, or astrologer) for advice about health, so they should ask physical scientists for advice about the earth’s climate. They should not expect greater certainty from physical science than from medical science. (2) When speaking forcefully, it should be done with at least as much modesty as we expect from our doctor, because we have at least as much reason for modesty.

Philip B. Allen Stony Brook, NY

Climate Change, Obesity and the Need for Modesty

The pitiful state of US industrial research has been addressed by Philip Wyatt in the December 2009 *APS News*. This was followed by substantial response in the February 2010 Issue by Ginzburg, Ouellet, Mendis and Myers. But a realistic practical path to resurrection and sustained maintenance is lacking.

Most successful industries have been founded by technical/scientific/idea people. But control of these companies has eventually evolved to “managerial” and “money” people with minimal relevant industrial knowledge and deficient innovative skills. The result is that these companies have “crashed” with limited lifetimes of ~50-100 years. To generate and sustain companies with much longer lifetimes, new strategies are needed.

Industrial companies should have internal “Entrepreneurial Centers” to continuously generate and sustain profitable new growth. These centers would establish new companies, under the corporate umbrella and with some internal corporate investment. Those innovative individuals would also invest their own personal money, assets and time, because personal commitment is the key to probable success. In addition to initial investment, the parent company would provide support in appropriate ways such as facilities, equipment, etc. These new operations would eventually evolve into separate free-standing operations, probably with additional external investment, and finally self-supporting sales income.

The attempt to insert innovative ideas into existing corporate divisions has failed miserably, because these divisions have the same inflexible attitude as the parent company. Thus the need for Entrepreneurial Centers in addition to Research Centers. The view that we only need more research is not realistic.

Chuck Gallo
Lake Elmo, MN

APS Could Use Division of Global Climate

Since 1966, APS has become a federation of Divisions. There is no Division that has scientific jurisdiction over global climate, and therefore APS Council has no jurisdiction either. APS should have a clearly stated policy with respect to the scope of its statements on issues of public policy. Such a statement should acknowledge that physics is a scientific discipline with limited scope, and not a source of special expertise on every topic of public concern. If it aspires to enjoy public respect, it must recognize the importance of scientific standards on matters beyond its ken. At this time, global climate is a case in point.

Lawrence Cranberg
Austin, TX

The physicist thinks, but cannot prove, that the earth’s climate is higher now than in the last 100 years. To generate and sustain profitable new growth. The one thing the doctor knows for sure is that the patient’s current weight is higher than in past years. The one thing the physicist knows for certain is that atmospheric CO$_2$ is higher now than in the last 100 years. The doctor thinks, but cannot prove, that the heart is showing worrisome symptoms, which will improve with loss of weight. The physicist thinks, but cannot prove, that global temperatures have risen and that the trend will be reduced by lowering CO$_2$ emissions.

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Philip B. Allen Stony Brook, NY

RAYS continued from page 1

Beyond LHC energies.” Fuky said. “We can’t distinguish [the source] just from the gamma ray detection; we have to look at other data. But if you put all the pieces together it seems that we are looking at gamma rays from accelerated protons.”

Dark Matter

Gravitational observations of distant galaxies show that there is a tremendous amount of mass in the universe unaccounted for. Analysis has shown that this dark matter, so called because it doesn’t emit any detectable electromagnetic radiation, is five times as abundant as ordinary matter.

Dark matter is theorized to consist of Weakly Interacting Massive Particles, or WIMPs. Despite their abundant numbers, they have proven to be among the most difficult of all the exotic particles zipping through the cosmos to isolate. However, physicists think they are getting close.

The Cryogenic Dark Matter Search, with detectors located deep in an old iron mine in Soudan Minnesota, is set up to detect some of the subtle interactions these WIMPs have with normal matter. Similar to neutrinos, the theorized WIMPs can pass through tremendous amount of ordinary matter without interacting with any of it. However, once in a while a WIMP will impact the nucleus of an atom, sending it recoiling into other atoms. Sensitive detectors made of crystal germanium the size of a hockey puck, buried deep in the mine are looking for signs of this subtle reaction.

“One every once in a while there’s an interaction,” said Angela Reisetter from the University of Minnesota and a member of the dark matter search. “From a single nucleus recoiling, all this stuff happens which can be measured throughout the detector.”

In early February, the group announced that the detector had registered two anomalous signals. These readings were inconclusive as to whether the culprit was an elusive WIMP or merely background. “It’s simply a maybe,” Reisetter said at the “April” Meeting. “At two events, you just can’t say. You can’t call it background, but you can’t call it a signal.”

She said also that the search was continuing. The team was in the process of installing more sensitive detectors in the mine. After they’re in place and calibrated, the search will run for about a year starting in the fall, with new results expected at the end of 2011 or early 2012.

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Deep in the rural farmland of Mississippi, in the heat of the American Civil Rights Movement, driving a bus could be a dangerous thing. Robert P. Moses knew this as he got behind the wheel of a bus on a mission for the American sharecroppers from their rural homes to the nearest voting station. The long drives were often tense encounters, filled with people who opposed civil equality. More than once those encounters turned violent. In 1960, Robert P. Moses faced legal persecution for his efforts, though his actions were protected by the U.S. Constitution. Despite the difficult journey and the many obstacles that he faced, Moses continued, literally and figuratively, in his mission.

In the 1960's Moses served as field director of the Student Nonviolent Coordinating Committee (SNCC), which was the co-director of the Council of Federated Organizations (COFO), an umbrella organization for major civil rights groups in the South. Through his efforts, and by his own admission, Moses became recognized as one of the most influential and important leaders of the Civil Rights Movement. Over the past fifty years he has continued with his work toward racial equality, but he has also carried that work into the educational sector and is it through those efforts that he is gaining the attention of the scientific community.

Moses grew up in New York City in a small housing development project. He earned a scholar- ship to Hamilton College, in New York, and continued on to attain an M.A. in philosophy in 1957. He settled into teaching math at a nearby high school, but was called home for family matters. Upon returning to New York, Moses became involved in the civil rights movement, which was bringing up across the nation. He reached his own boiling point in 1960 and traveled down South to fight the tide of civil inequality.

Of all the obstacles that Moses faced as he worked for Afri- can American students and teachers in the south, none seemed as great or as powerful as illiteracy. In some states, illiteracy rates continued to rise, and yet underprivileged and illiterate people continued to vote. It gave them freedom to rise above their economic class, and to participate in the national and political discus- sions that would change their lives.

Over the next twenty years, na- tional literacy rates continued to rise, and yet underprivileged and impoverished minority groups re- mained chained to the economic and social situations they were born into. Watching his own chil- dren grow up in the developing in- formation age, Moses recognized that the ability to read was even more important, and he was determined to change the course of these people’s lives. Mathematical literacy was now the key.

"I had experienced what it meant for the sharecroppers in the delta not to be able to read and write, even the most minor, even in kinder- garten, industrial age," said Moses in an interview. “That is the equivalent, in this information and technology age, of mathematical literacy.”

In 1982 Moses became a MacAr- thur Foundation Fellow, and used the money to start The Alge- bra Project. The program builds algebra curriculums that is specific to the location and the lives of the students learning it.

"I could not have done this if I majored in math," Moses said in an interview at the 2010 APS April Meeting. "Majoring in phil- osophy and under someone who was both a math logician and a phi- losopher of math put me in touch with ideas which I was able to use when I got into looking at the ac- tual learning of algebra.”

"The Algebra Project is chang- ing the questions that students ask when they try to solve problems. When learning the number line, as opposed to asking “how many?” students are taught to ask “which way?” Algebra Project students from Brooklyn, New York, took a trip across the Brooklyn Bridge and took pictures of their journey (teachers from these schools say many of the students had never crossed the bridge). Those pic- tures are then arranged on a num- ber line, and students learn to read and write in numbers on those familiar locations. The meth- od teaches important core concepts like adding and subtracting nega- tive numbers.

The program goes beyond sim- ply teaching the math concepts to convincing the students that their education will make a difference in their goals. One part of the project is to have teachers from the stu- dents’ community come to school and then to encourage the students to go into teaching careers as well. The Algebra Project holds that the educational system does not come from their same geographic, racial, and economic background, this does more to convince them of what careers they have within their reach, than when teachers come from outside the student’s own community.

"We started with the lessons that we learned in getting the sharecroppers to demand their rights that we are now working on in this country," said Moses. "We’re not talking about teachers and their practices. We’re talk- ing about what is happening to their students and their curriculum.”

The Algebra Project was in 200 schools by the late 1990’s, and now in ten states. Students from the Project’s earlier years are now old enough to come back and picture their progress by their new generation. In an interview after his talk Moses said that this will finally allow the Algebra Project to begin evaluating the long-term impact the program has on students.

Moses is currently serving as a Frank H. T. Rhodes Class of 1956 Visiting Professor at Cornell Uni- versity. He has received honorary doctorate degrees from more than seventeen institutions including Harvard University and Princeton Univer- sity. He continues to speak about the current civil rights issues. He de- scribes the questions our society must answer as he got behind the wheel of a bus to vote. The Department of State did not respond to submitted questions before deadline.

"As to what the State Depart- ment should do in these cases, it is not for me to speak," said Ar- dalan, “However, my advice, for whatever it is worth, to our gov- ernment agencies is to rely more on the expertise of the respective scientific organizations, when it comes to security issues related to the scientific community.”

"As to what happened to Ar- dalan is unusual, setbacks and de- lay at US embassies around the world are not uncommon in recent years. Over the last decade security concerns have dramatically increased the wait times for visa requests to receive vis- as. Identity mix-ups are common, but slow processing times are more common.”

"His case was something be- yond just a simple delay," said Amy Flatten, APS director of in- ternational affairs, “His visa delay was unusual.”

Over the last decade, national security concerns by the federal government have caused major holdups for nearly all visa applications. Especially affected are applications that go through a visa mantis check, which aims to identify individuals from countries that legally transfer sensitive technol- ogy. Most requests from scientists who work with classified information have not been processed through, adding to their visa’s processing time.

As of March 2009, it took on average sixty days for a visa to be processed with a visa mantis check, the last six time current numbers were available on the processing. In late March, a request from the department was able to begin evaluating the long-term impact the program has on students. Some applicants, like Ardalan, encounter long un- expected delays, while others are processed quickly. The nation’s agencies place some role in visa delays, as people from countries about which the State Depart- ment has security concerns are often subject to closer scrutiny. However the wait times that come with this additional scrutiny are also subject to change, and it is difficult to predict precisely how long a wait time will be.

The most important thing is to apply early,” said Flatten, adding that the APS website has information for physicists applying for visas, what to do if the visa is delayed, and lay, and links to the State Depart- ment’s consular office with up-to-date average wait times.

"Flatten also noted that she and the APS have been working with the State Department and other agencies to help streamline the visa process in general. She and others from the scientific community met with the Assistant Secretary of State for Consular Affairs Janice L. Jacobs about the issue.

"Creating a system that balances scientific mobility and national security has been the goal, but has encountered the obvious chal- lenges," Flatten said. “I believe the State Department is working to do just that.”
Teacher Preparation Conference Focuses on Diversity

By Gabriel Popkin

The sixth annual Physics Teacher Education Coalition (PTEC) Conference took place in Washington, D.C., in February, just prior to the APS “April” Meet ing. The conference is the largest gathering in the country dedicated to physics teacher preparation, and for the fourth straight year attract ed over 100 participants, many of whom battled record-breaking snow storms and travel difficulties to get to the event.

The theme of this year’s conference was “Diversity in Physics Education: Preparing Teachers for the 21st Century.” In two panel discussions on Friday that focused on issues in urban and minority-serving schools, participants got a chance to hear the perspectives of young teachers in urban class rooms as well as faculty members at urban institutions. Another workshop led by Duane Merrell of Brigham Young University tackled the very different challenges of rural physics education.

Other conference sessions fo cused on the persistent achieve ment gap between richer and poorer students, as well as between underserved minority students and the rest of the US population. A panel of faculty and teachers discussed the preparation not just of teachers but of teacher leaders who will address such ine qualities by becoming change agents in the educational system.

Michael Marder, a physics pro fessor at the University of Texas at Austin, presented data on the achievement gap in Texas, a state that often sets national standards in education. A group of graduate and undergraduate students from the UC Berkeley, discussed their Compass Project, which aims to increase diversity in the physical sciences.

The conference also featured a number of highly visible national efforts in science and mathem atics teacher preparation. Marder, who co-directs the University of Texas’s UTeach Program, led a workshop on the UTeach replication effort, which supports thirteen universities to develop programs modeled on the University of Texas’s UTeach effort. The program has produced a number of highly visible national efforts in science and mathem atics teacher preparation. Marder, who co-directs the University of Texas’s UTeach Program, led a workshop on the UTeach replication effort, which supports thirteen universities to develop programs modeled on the University of Texas’s UTeach effort. The program has produced a significant number of highly visible national efforts in science and mathematics teacher preparation.

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**M. Hildred Blewett Scholarship for Women Physicists**

This scholarship has been established to enable women to return to physics research careers after having had to interrupt those careers for family reasons. The scholarship consists of an award of up to $45,000. The applicant must currently be a legal resident of the US or Canada. She must be in her final year of graduate study in the US or Canada and must have an affiliation with a research-active educational institution or national lab. She must have completed work toward a PhD.

Applications are due June 4, 2010. Announcement of the award is expected to be made by August 2, 2010.

Details and on-line application can be found at http://www.aps.org/programs/women/scholarships/blewett/index.cfm

Contact: blewett@aps.org

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**PTEC Topical Workshop: Pedagogical Content Knowledge**

Rutgers University, New Brunswick, NJ

April 19-20, 2010

Rutgers University, in cooperation with the Physics Teachers Education Coalition (PTEC), invites you to attend a workshop that will change how you think about preparing physics teachers. This two-day topical workshop will highlight the unique Pedagogical Content Knowledge (PCK)-based curriculum developed at Rutgers.

For more information, please see www.ptec.org/conferences/PCK2010

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steps for the US to take to accomplish this is not clear. It recommends that the United States classify the number of nuclear weapons in its arsenal, establish sites to test verification technologies, and fund the development of “nuclear archeology” to examine a suspected site’s past nuclear use. So far, the report has been well received, with the Department of Energy setting up a center near the old Nevada testing sites to research possible verification technologies. The report also emphasizes that US policy must address the country’s capability and expertise while decreasing the number of weapons. Those that remain need to be maintained properly, so that in the unlikely event they are needed, they function correctly. Additionally, the US should

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**ANNOUNCEMENTS**

**Reviews of Modern Physics:**

Recently Posted

Reviews and Colloquia

Particle physics is at a crossroads. The next decade will see the standard model (SM) has been successful in describing all known elementary particles and their interactions. However, the SM cannot account for all of the phenomena in the mass range from 100 GeV to several TeV. This article reviews the current state of experimental searches for supersymmetry, the most widely studied extension of the SM. Beyond the Higgs boson that has yet to be discovered, there are strong motivations for supersymmetry, including the need to explain dark matter and the desire for unification of all fundamental forces.

http://rmp.aps.org

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In the history of the United States there are events that have become part of the folklore of the nation. They bind us together as a people, they remind us of who we are, and they inspire us to think about our immediate concerns. Here is a personal example. One day, walking along Vanderbilt Avenue toward 44th Street in mid-town Manhattan, I saw a plaque on the wall of the Yale Club. I went over to see what the plaque was about. It informed me that “At the Benjamin Franklin Park near this site Nathan Hale...” was executed on the morning of September 22, 1776. His last words were, ‘I only regret that I have but one life to lose for my country.’

I was struck by that message. I do not remember what was going on in my mind when that plaque interrupted my thoughts, but I do know that for some minutes after continuing on my way, I was thinking about Nathan Hale, the Revolutionary War, and the forefathers of the United States. The plaque had done an important job: it reminded me that people sacrificed to establish the United States and that I am the beneficiary of that sacrifice.

In 1966, the National Historic Preservation Act established the National Register to honor sites of historical significance and place a plaque at the site. The American Physical Society has initiated a similar program that has the potential of doing for the public what the Nathan Hale plaque did for me. In January 2004, the APS Historic Sites initiative was established on an ad hoc basis, a committee was named, and site selection began. Bronze plaques were put on display before an audience of some 1,500 people, and soon plaques were being mounted at the honored sites.

On November 16, 2008, it all became official: the APS Council made the Historic Sites Committee (HSC) a standing committee, and it awarded the committee the authority, as was granted to the first ad hoc HSC in 1966, to help launch the initiative.

In the history of physics there are ample examples of experimental and theoretical discoveries that have expanded the conceptual domain of physics, triggered the explorations of new and challenging frontiers, and changed in fundamental ways our understanding of the natural world. Experience demonstrates that this makes physics interesting to the public—the same public on which physics depends. Let us take advantage of the organizational infrastructure that is now in place.

Or consider a person spotting the plaque at Caltech. On reading the plaque, that individual—perhaps an undergraduate or graduate student, a chemistry major, or a computer programmer—may imagine that this represents the opportunity to have a plaque mounted at a site that is meaningful to him or her, perhaps to have a plaque at a site of significant historical and personal importance.

I believe that physicists underestimate the public’s interest in fundamental physics; that is, physics that tells them how the world works. The physics department at the Washington University in St. Louis sponsors a series of lectures on four consecutive Saturdays in both the fall and spring terms. These lectures, organized by Professor Michael Friedlander, go back many years. Every Saturday, a large auditorium fills with 200-300 people. From 10:00 to 11:00 am the audience listens; after 11:00, the people ask questions and the going on until the speaker says, “Enough.” The people are fascinated. When Friedlander circulates a questionnaire to find out what people want to hear about, they often say fundamental physics or physics that tells us how the world works. In other words, they want to hear about physics—as physics—a foundation of the material world. Are these kinds of questions representative? Are these kinds of questions of interest to a general public?

At Case Western Reserve, Lawrence Krauss organized an outstanding event. The plaque ceremony was embedded in a program of well-known speakers and a panel discussion. The program was held in Severance Hall, home of the Cleveland Symphony. Physics was put on display before an audience of some 1,500 people. (At the other extreme, one plaque was presented before an audience of two—both physicists!) Another audience that witnessed the presentation of the APS plaque was noteworthy: this audience, all high school students, filled a large auditorium. When Joseph Henry discovered self-induction in 1832, he was a high school teacher at the Albany Academy. For eleven months of the year, Henry’s laboratory was a classroom. He could do his research only during the month of August. He was right on the edge of his discovery in 1831 when, once again, he had to interrupt his research and transform his laboratory back into a classroom.

Each plaque contains a brief citation that identifies what happened at the site. Following are three illustrative citations:

**Holmdel Township/Bell Labs**

With this large horn antenna, Arno Penzias and Robert Wil-sons discovered the cosmic background radiation in 1964. This unexpected discovery, the first evidence that the universe began with the Big Bang, ushered in experimental cosmology. Historic Physicists Site, Register of Historic Sites American Physical Society.

**Albany, New York: The Albany Academy**

In the second round of the HSC, members received the names of more than 200 sites, among which was the Albany Academy. On reading the plaque, that individual will be reminded that the material world is made of new and challenging frontiers, and changed in fundamental ways our understanding of the natural world. Experience demonstrates that this makes physics interesting to the public—the same public on which physics depends. Let us take advantage of this organizational infrastructure.

**University of Illinois: Born of Physics**

In this building, the home of the University of Illinois Phys-ics Department from 1909 to 1959, John Bardeen, Leon Cooper, and J. Robert Schrieffer created the “BCS” Theory of Supercon-ductivity, a great achievement of theoretical physics, in 1956-57. Historic Physicists Site, Register of Historic Sites American Physical Society.

**Harvey Mudd College**

People are curious, and many individuals who see a plaque mounted on a building will want to learn what it says. If plaques with citations like those above are located where pedestrians—pedestrians other than physicists—can see them, they are like-ly to wander over to learn what the plaque is all about. While reading the words on the APS plaques, these individuals will be reminded of the, over the years, physicists have opened the cup-boards of Nature and have learned the mysteries that Nature offers. People reading the plaque near the horn antenna will remember the work of bell that included the Big Bang and that evidence for it is the cosmic microwave background radiation discovered with the big horn they are standing near. That horn’s large size will impress many viewers, and they might wonder whether something big is required to discover something big, such as the radiation that fills the whole universe. Whatever they think, the experience will stick with them for some time.

**The Johns Hopkins University**

In a ceremony at these sites, a bronze plaque is presented by the APS President or President-Elect to a top-level administra-tor at the site, and the event is recorded in the APS Register of Historic Sites. The ceremony itself is an opportunity for the site being honored to put physics on display and to connect with both the campus and local communities. Sadly, however, this opportunity has often been ignored. Although we do not need to showcase physics to other physicists, unfortunately it is physi-cists who typically make up the audiences at the plaque-presen-tation ceremonies. There was one notable exception.

In 1966, the National Historic Preservation Act established the National Register to honor sites of historical significance and place a plaque at the site. The American Physical Society has initiated a similar program that has the potential of doing for the public what the Nathan Hale plaque did for me. In January 2004, the APS Historic Sites initiative was established on an ad hoc basis, a committee was named, and site selection began. Bronze plaques were put on display before an audience of some 1,500 people, and soon plaques were being mounted at the honored sites.

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In the history of physics there are ample examples of experimen-tal and theoretical discoveries that have expanded the conceptual domain of physics, triggered the explorations of new and challenging frontiers, and changed in fundamen-tal ways our understanding of the natural world. Experience demonstrates that this makes physics interesting to the public—the same public on which physics depends. Let us take advantage of this organizational infrastructure.

**The APS Register of Historic Sites**

By John S. Rigden

At the presentation ceremony in honor of Joseph Henry, John Rig-den, on October 28, at The Albany Academy, Caroline B. Ma-son, signs the APS Ledger of Historic Sites.

In the history of the United States there are events that have become part of the folklore of the nation. They bind us together as a people, they remind us of who we are, and they inspire us to think about our immediate concerns. Here is a personal example. One day, walking along Vanderbilt Avenue toward 44th Street in mid-town Manhattan, I saw a plaque on the wall of the Yale Club. I went over to see what the plaque was about. It informed me that “At the Benjamin Franklin Park near this site Nathan Hale...” was executed on the morning of September 22, 1776. His last words were, ‘I only regret that I have but one life to lose for my country.’

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