Panel Pushes More Investment in Energy Research

By Michael Lucibella

An advisory committee to the Department of Energy has called upon both the private and public sectors to increase investment in advanced energy research. Constituted as a subcommittee of the Basic Energy Sciences Advisory Committee, the group put forward a series of recommendations to help curtail global warming and move the country’s energy needs at a February press conference at the Center for Strategic and International Studies in Washington.

At the press conference, a panel consisting of the BESAC chair and the two co-chairs of the subcommittee (all 3 of them APS Fellows) called for greater use of green energy technologies that would curb carbon dioxide emissions and use more renewable energy sources. Widespread use of these technologies has been hampered because their current capabilities lag far behind the country’s needs. Technologies such as solar power, carbon sequestration and superconducting electrical wires have shown promise in labs, but have not yet been fully developed for large scale commercial use.

“Virtually all of the potential—revolutionary technologies in the energy and environment area have what we call scientific roadblocks,” said BESAC chair John Hemminger of the University of California-Irvine, “Areas where we just don’t understand how nature works.”

The report, “New Science for a Secure and Sustainable Energy Future” (www.sc.doe.gov/bes/reports/l20.10) recommended that the Department of Energy’s Basic Energy Science Advisory Committee create research “dream teams” of the nation’s top scientific minds to hasten the pace of discovery. These teams would spearhead research in the cutting edge of energy technology to help protect US national and economic security.

“Someone over the next ten to fifteen, twenty years is going to invent new energy technology. If that is us, we’re going to be selling that to the world. If that is China or Japan or Europe, we’re going to be buying that from them,” Hemminger said.

The panel also called for greater financial investment in research and development, pointing to declining levels over the last two decades. In 1989 the US federal government invested on average 10% of its research budget in energy sciences compared to only 2% today. In the private sector, the energy industry reinvests on average 0.23% of its revenue to research, compared to 3.3% in the auto industry.

LaserFest Website Launched

A new website for LaserFest, the 2010 celebration of the 50th anniversary of the first laser, has been launched. The site, www.laserfest.org, contains information concerning LaserFest events and activities, the history of the laser and its impact on society, and its potential for the future.

Visitors to the site can sign up to receive updates and program announcements. Those with plans or ideas for events are encouraged to submit them through the online event submission form. LaserFest is being organized by APS and the Optical Society of America.

“Now that the website is up and running, we hope LaserFest will be an inviting place where hopefully visitors will find the site engaging and informative,” said Nadia Ramlagan, APS LaserFest project coordinator.

The site’s laser history section contains extensive information about the early history of the laser, from Einstein’s theory of stimulated emission to the demonstration of the first working laser.

APS President’s Message Stimulates Strong Member Response

Thousands of APS members responded to a letter from APS president Cherry Murray requesting that they contact their senators asking for support of science funding. The stimulus bill under consideration in the Senate in early February included less funding for physical science than the House version. Murray urged APS members to write to their senators asking them to include the same level of funding for science in their version of the stimulus bill.

“APS has been actively involved in promoting funding for science, Murray told APS members in her letter. APS recommended investments in scientific infrastructure that would create more than 100,000 direct and indirect jobs. “The investments we propose are principally in infrastructure in our national laboratories and universities, high performance computing, in procurements of scientific instruments and material for projects such as ITER, and in creation of jobs for young investigators at our universities to ensure that they have a place to go during these trying economic times. As a result of our efforts, many of our recommendations were used by the House and Senate in formulating their proposed stimulus packages,” Murray’s letter said.

Responding to Murray’s message, 2785 APS members had written to their senators, and 1342 had written to thank Pelosi as of February 10.

In early February, the Senate passed a stimulus bill that included much less funding for science than the House bill: $1.2 billion for NSF, $330 million for NIST, and $500 million for DOE Office of Science, $2.5 billion for DOE of Office of Science, $2.5 billion for NSF, and $500 million for NIST.

On January 28, Murray sent a letter to APS members asking them to thank House Speaker Nancy Pelosi for her hard work in support of science funding.

The stimulus bill under consideration in the Senate in early February included less funding for physical science than the House version. Murray urged APS members to write to their senators asking them to include the same level of funding for science in their version of the stimulus bill.

APS has been actively involved in promoting funding for
APS Debuts on Facebook and LinkedIn

The stereotypical physicist is not particularly socially adept. Whether or not his members that stereotype, APS felt it was time to take advantage of networking opportunities on the web, and recently created its own fan page on Facebook and a group on LinkedIn. Members can use these social and professional networking sites to start discussions, review articles, post comments, share photos, or check APS updates, all by simply logging in and searching for “APS Physics.”

APS researched multiple social media sites before deciding which to create APS groups. “There are many intriguing sites available, but after polling some of our members, we decided to begin with Facebook and LinkedIn,” said Margaret Black, Web Content Coordinator.

APS is working hard to play a more prominent role in how scientists communicate, APS hopes these social media groups will facilitate the exchange of information from casual to technical among members. Through Facebook and LinkedIn it is easy to leap geo- and institutional boundaries, meet new colleagues, reconnect with former associates, and maintain conversations long after APS meetings end.

Maryann Tatum was vicious that helps—she had a way of popping with the perfect angle and timing.”

Timothy Gay, University of Nebraska, on the physics of the Thomson

This Month in Physics History

March 13, 1930: Clyde Tombaugh’s discovery of Pluto announced

In early 1930, Pluto was discovered by a farm boy from Kansas with no formal training in astronomy. When Tombaugh took his finding to the MPC, the discovery of a moment of existence for both scientists and the public.

Tombaugh was born on February 4, 1906, and grew up on a farm in Kansas. He became interested in astronomy as a teenager after observing craters on the moon and rings around Saturn through his uncle’s three-inch telescope. After high school, he decided to encourage his son’s interests. When he was 20, Clyde Tombaugh began building his own telescope. By 1928 Tombaugh had built his third backyard telescope and used it to make drawings of Mars and Jupiter. He sent these to Vesto M. Slipher, the director of the Lowell Observatory in Flagstaff, Arizona, asking for comments for a short paper. Slipher sent him a job at the observatory. His task would be to search for “Planet X.”

Tombaugh assigned the task to Tombaugh, who arrived in Flagstaff in January 1929. First, he had to use the telescope to make many photographic plates, systematically taking pictures of regions of the sky that might reveal a planet.

For each region, Tombaugh made two photos, taken several days apart. He spent many cold nights in the unheated observatory dome carefully making the observations.

After creating such many pairs of plates, he would compare the two members of each pair. Distinct stars would appear in the same position on both plates, but a planet would have moved in the several days between the two exposures. Tombaugh used a device called a blinking comparator to make the comparison. The device would present him with sections of the two photo plates to be compared, shifting between the two several times a second. Most of the time the photos were the same and Tombaugh would see nothing, but if an object reached the same position on the two exposures, Tombaugh would see a blink.

It was incredibly tedious work requiring intense concentration, but Tombaugh greatly preferred it to going back to work on the farm, so he persisted.

After months of searching, he found several asteroids, but nothing that fit the criteria for Planet X. By February 1930, while scanning the plates he had taken a few weeks earlier, he saw something that moved. He determined that the object had moved about 3 mm on the plates between the two exposures, indicating an orbital distance of about 40 AU, putting it outside the orbit of Neptune at about the right place to be the predicted planet.

Tombaugh and Slipher had found Planet X, and on March 13, 1930, the Observatory announced the finding of the new object. The current name was chosen to coincide with both the anniversary of Herschel’s discovery of Uranus in 1781 and Pecival Lowell’s birthday in 1855.

The public and astronomers were enthusiastic about the new planet. Later that month the observatory was dedicated to Pluto, after the Roman god of the underworld, who could make himself invisible. The name was suggested by an 11-year-old girl in England. A secondary reason for naming it Pluto was that the first two letters are Pecival Lowell’s initials.

Though exciting, the planet was tiny, just a dot on the photograph, and some astronomers doubted whether it was massive enough to affect the orbit of Uranus and Neptune.

Pluto’s mass was not known until 1978, when its moon Charon was discovered. Pluto’s mass is about 0.002 that of Earth, making it too much too small to influence the orbit of Neptune. Ultimately, Pluto lost its planet status. Other objects in the neighborhood of Pluto have been discovered in recent years, including several in size to Pluto. In 2006, much to the disappointment of children around the world, the International Astronomical Union redefined the term “planet.” The new definition of a planet requires an object to orbit a star, be large enough to assume a spherical shape, and be not gravitationally dominated by another body.

Pluto is now known as a dwarf planet. After the discovery of Pluto, Tombaugh received a scholarship to study astronomy at the University of Kansas. He began as a freshman in 1932 and continued to work in astronomy for many years. Tombaugh was later known as one of only a few scientists to take UFOs seriously. He died in 1997, mercifully before the demotion of his planet to the status of a dwarf.
**ITER and Fusion Energy**

By Robert J. Goldston and Ned R. Sauthoff

“Burning plasmas” are very hot fully ionized gases whose temperature is maintained dominantly by self-heating from fusion reactions within the plasma. The governments of China, Europe, India, Japan, Russia, South Korea and the United States (representing more than half the world’s population) have assessed that we are scientifically and technologically ready to explore the “burning plasma” state [see the report Bringing a Star to Earth, National Academies Press, Washington DC, 2004], and have embarked on an international partnership to construct the ITER Project, near Aix-EN-Provence, France. The mission of ITER (“the Way” in Latin) is to “demonstrate the scientific and technological feasibility of fusion energy for peaceful purposes.”

The basic nuclear reactions that are contemplated for use in ITER, and in future fusion power plants, are:

\[ D + T \rightarrow n + n + 17.6 \text{MeV} \]

**ITER** can enable research on key scientific questions that bear on the feasibility of fusion power as well as intellectually fascinating questions such as the dynamics of a complex self-organized system, and global stability at the physical scale of a fusion power plant.

Fusion is attractive as an energy source because the basic raw materials—deuterium and lithium—is ample, and because it is physically impossible for a fusion power plant to explode like Chernobyl. Deuterium and lithium-6, are key scientific questions that bear on the feasibility of fusion power as well as intellectually fascinating questions such as the dynamics of a complex self-organized system, and global stability at the physical scale of a fusion power plant.

Fusion is attractive as an energy source because the basic raw materials—deuterium and lithium—is ample, and because it is physically impossible for a fusion power plant to explode like Chernobyl. Deuterium and lithium-6, are key scientific questions that bear on the feasibility of fusion power as well as intellectually fascinating questions such as the dynamics of a complex self-organized system, and global stability at the physical scale of a fusion power plant.

Fusion is attractive as an energy source because the basic raw materials—deuterium and lithium—is ample, and because it is physically impossible for a fusion power plant to explode like Chernobyl. Deuterium and lithium-6, are key scientific questions that bear on the feasibility of fusion power as well as intellectually fascinating questions such as the dynamics of a complex self-organized system, and global stability at the physical scale of a fusion power plant.

When Barack Obama announced in December that Ranum Emanuel would be his White House Chief of Staff, I winced. Here was a President-Elect who had campaigned on defusing the partisan-charged Washington atmosphere selecting one of the most notorious Democratic bet-the-throwers as his second. What was he thinking?

I’ve known Rahm for the better part of two decades, and I’ve admired him as a brilliant tactician, despite his often over-the-top partisanship. Now, as I’ve watched my new President stretch his quest for bipartisanship to the breaking point, I only wish he would let a little of Emanuel’s bad temper escape from the West Wing, at least once in a while.

Washington, even in good times, suffers insufferably from a climate of backstabbing disguised as political rectitude. But when one party routs the other, as happened in 2008, the losing side looks for every opportunity to pummel the winning team right from the outset, without ever considering white-glove etiquette.

As Frank Luntz points out in his book, Words that Work, it’s not what you say that matters, it’s what people hear you say. “Jobs” and “stimulus” are easy for people to connect with at an emotional and visceral level. “American Recovery and Reinvestment Act” is not only a mouthful, it is an abstract concept that contains little emotional appeal for the average citizen.

Yet the new President continued to woo them, and his quixotic preoccupation with changing the culture of Washington, led to a lost opportunity—portraying the GOP as a band of obstructionists.

Disregarding the importance of words and their emotive content was only one of three errors President Obama committed. By broadening the focus of the bill, he also opened the door for House Democrats to co-opt funding for social programs that Republicans had blocked for more than a dozen years. And that gave the GOP ample ammunition to attack the “stimulus package” hyperbolically as a trillion dollar pork project.

Through its persistent use of the word “stimulus” to describe the recovery legislation, the media reinforced the public’s perception that Republicans, not Democrats, were balanced guardians of the purse. Given such a landscape Republicans had no political upside for supporting the legislation. Yet the new President continued to woo them, and his quixotic preoccupation with changing the culture of Washington, led to a lost opportunity—portraying the GOP as a band of obstructionists.

President Obama’s errors permitted Senate Republicans to utilize the threat of a filibuster to change the thrust of the legislation. And eventually, three moderate northeastern senators, Susan Collins (R-ME), Olympia Snowe (R-ME) and Arlen Specter (R-PA), found themselves in the roles of ultimate arbiters of the bill’s content.

By Michael S. Lubell, APS Director of Public Affairs

**It Takes Two to Tango**

By Michael S. Lubell, APS Director of Public Affairs

Fusion Power Gain Duration

<table>
<thead>
<tr>
<th>Fusion Power</th>
<th>Gain</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 MW</td>
<td>3x10^-7</td>
<td>0.01 sec</td>
</tr>
<tr>
<td>Today</td>
<td>10 MW</td>
<td>57</td>
</tr>
<tr>
<td>ITER</td>
<td>500 MW</td>
<td>10</td>
</tr>
<tr>
<td>Power Plant</td>
<td>2500 MW</td>
<td>25</td>
</tr>
</tbody>
</table>

Sorting abstracts for the April Meeting can get pretty tense, what with sorters competing over whose abstract goes in which session. Here Steve Detweiler of the University of Florida (standing), representing the Topical Group on Gravitational Phenomena, assembles an abstract for(simplicity’s sake) the April Meeting. The annual APS March Meeting is the largest physics gathering in the world, and APS members are invited to submit abstracts for it. The meeting will take place in Denver, May 2 through May 5.
Beller, Marshak Lectureships to Enhance March and April Meetings

Two named APS lectureships will bring distinguished foreign scientists to speak at the 2009 March and April meetings. The speakers were selected by the APS Committee on International Scientific Affairs (CISA) from nominations submitted by various APS units.

The Beller Lectureship was endowed by Esther Hoffm man Beller for the purpose of bringing distinguished physi cists to the United States. This year, the speaker at APS meetings. The lectureship provides support for speakers at the March and April meetings.

The Marshak Lectureship, endowed by Ruth Marshak in honor of her late husband and former APS president, Robert Marshak, provides travel support for physicists from developing countries or Eastern Europe invited to speak at APS meetings.

Two Beller lectures will be given at the March Meeting. Mikhail I. Dyakonov of the Université Montpellier II, France will present a talk on the spin Hall effect. Dyakonov was nominated for the Beller Lectureship by the topical group on Magnetism and its Applications. The other March Meeting Beller lecturer is Samuel A. Safra, of the Weizmann Institute of Science, Israel. He will give a talk on “Active response of biological cells to mechanical stress.” Safra was nominated for the Beller Lectureship by the Topical Group on Statistical and Nonlinear Physics.

Back Page Labeled Propaganda

I am appalled that Wasif Syed’s Back Page (APS News, January 2009), which ostensibly purported to deal with science and nuclear policy in Pakistan, was crafted hand in hand with shameless propaganda.

The article suggests that Abdul Qadir Khan, the illegitimate father of the Pakistani nuclear program, is a “scientist whose abilities are not in doubt.” Regardless of ethnocentric and personal biases, we can all agree that scientists and professionals in integrity are two of the greatest litmus tests for every scientist. For a scientist of his supposed caliber, why was Khan compelled to steal centrifuge technology from URENCO, with whom he worked in the Netherlands, to develop Pakistan’s nuclear program? Pakistan, after all, has produced eminent physicists such as Nobel Laureate Sahib Salam, after whom the International Centre for Theoretical Physics in Trieste, Italy is named! The clandestine nuclear program in Pakistan, and its fly-by-night operators, are the greatest source of nuclear proliferation in the history of nuclear weaponry, having sold nuclear technology to Iran, Libya and North Korea, all under the watch of General Pervez Musharraf. Pakistan is the epicenter of global terrorism and nuclear proliferation, a most dubious perfecta. Pakistan, a failed state, is every terrorist’s dream for obtaining nuclear weapons clandestinely as they were developed by the state itself.

Jai A. Pathak
Arlington VA

Blunder May Not Have Been Einstein’s

This Month in Physics History (APS News, January 2009) asserts that in 1929, “The cosmological constant had been in Einstein’s field equations for some time, although other cases (liquid ammonia, for example) could be found if one looked.” It is true that Einstein’s cosmological constant was included by W. A. P. Luck (1965), and several good pedagogical treatises, especially by C. F. Bohren. Paraphrasing Bohren, they mention that “Light scattering by suspended matter is required in order that the blue light produced by water’s absorption can return to the surface and be observed.”

Youns truly,
Phil B. Allen

Simultaneous Cross-country Conferences Host Women in Physics

Hundreds of women gathered at three simultaneous conferences for undergraduate women in physics held January 16-18 at Yale University, the University of Illinois at Urbana Champaign, and the University of Southern California. The conferences gave undergraduate women a chance to hear research talks, present their own research, learn about graduate school and career options, and network with other women in physics. These conferences have been ongoing for several years. The University of Southern Californi a held its first conference in 2000, and has been holding them annually since. In 2008, Yale and UIUC held their first annual conferences. The three conferences were organized separately but focus on the same goals. The conferences were supported by NSF, DOE, and the universities that hosted them.

About 130 women undergraduates from around the Midwest attended the conference at UIUC. In addition, a growing number of universities are forming conferences for women in physics. For instance, the Society for Women in Physics at UIUC has meetings and invites speakers to talk about career options and other topics. At the UIUC conference Monica Plisch, APS assistant director of education, gave a keynote talk in which she described the role of APS in improving education and promoting diversity, highlighting the many programs that make the authors’ names sound like the alpha, beta, gamma that open the Greek alphabet. Gamow should not be considered the most reliable source, particularly not for a specific quotation, and it appears to me that the “blunder”comment may not have really been made by Einstein.

Jai M. Paschoff
Pisac, Oregon

The Real Reason Water is Blue

Dear Editor,
“This Month in Physics History” is my favorite part of APS News, and the February column about Raman was particularly gratifying. It is easy to forget that the question ‘why is water blue?’ led Raman eventually to his great dis-covery. What is not mentioned in the subsequent discussion of this question, which has shown that water is selectively absorb-ing in the red. This is familiar to divers, who experience the ghostly blue illumination that sunlight provides at depths of 10 meters or more. Raman scattering is not a significant part of the answer to this wonderful puzzle. Impurities in water are not either. There are no electronic transitions in molecules until the ultraviolet, and vibrational transitions are surely deep in the infrared so what is the answer? The answer is a great surprise to students of optical properties of matter. It is so interesting that I think readers of APS News should be fascinated to hear it. Fourth harmonics of the symmetric and antisymmetric “O-H stretching vi-bration” lie just at the lower end of the visible energy spectrum, and are responsible for the weak absorption. It is the only familiar situation where vibrations are the primary cause of visible coloration, although other cases (liquid ammno- nia, for example) could be found if desired.

I am sure not to whom this ex-planation should be attributed. Confirmation and popularization of the vibrational mechanism was done by Charles Braun and Sergei Smirnov. They have a delightful paper in the Journal of Chemical Education (v.70b), p.612, 1993), which is available on Prof. Braun’s web page at Dartmouth, http:// www.dartmouth.edu/~etm/eve/ water.htm. There you can see the spectrum of liquid H2O compared with D2O, which gives convincing evidence of the vibrational mecha-nism. Braun and Smirnov cite various earlier authors, the earliest being W. A. P. Luck (1965), and several good pedagogical treat-ments, especially by C. F. Bohren. Paraphrasing Bohren, they mention that “Light scattering by suspended matter is required in order that the blue light produced by water’s absorp-tion can return to the surface and be observed.”

Yours truly,
Philip B. Allen

APS News
Physics Teacher Video

APS and the Knowles Science Teaching Foundation recently produced a short video featuring Larry McJimsey, a physics teacher who graduated in 2006 from Cal Poly, San Luis Obispo, who received substantial funding under the APS-led PhyStEC project to improve its teacher preparation program. The video seeks to showcase a young, dynamic physics teacher who will inspire future undergraduates and high school students to pursue a career in teaching. In the video, McJimsey explains why she loves teaching physics, and describes the impact that PhyStEC and her Knowles Fellowship had on her preparation to be a teacher. PhyStEC is a partnership between APS, the American Association of Physics Teachers (AAPT), and the American Institute of Physics (AIP).

The video can be viewed on the PhyStEC website (www.PhyStEC.org) and also on YouTube.

Education special events at the April Meeting

Future Physicists Day

All undergraduates attending the April Meeting are invited to participate in Future Physicists Day. Events will include undergraduate poster and oral sessions, a “Careers for Physicists” lunch session, and an awards session recognizing the outstanding oral and poster presentations of undergraduates. Registration for the meeting is free for undergraduates. For more information, please see the April Meeting page on the APS website or contact Cathy Mader at mader@aps.org.

Nuclear Forensics Workshop at Teachers’ Day

The 2009 April Meeting Teachers’ Day will feature a new workshop on nuclear forensic science, sponsored by the American Physical Society (APS) and the American Association of Physics Teachers (AAPT). The workshop is part of an effort APS is leading to develop the first-ever nuclear forensics curriculum for high school students. The development team, which includes APS and AAAS staff members, high school science teachers, nuclear scientists, and experts in nuclear forensics, plans to produce 10 hours of classroom activities. At the workshop, participants will utilize gamma ray spectrometry to identify hypothetical unknown radioactive materials that have been interdicted at a border crossing.

For information and schedules for both the March and April Teachers’ Days, please see www.aps.org/programs/education/teachers.teachers-days. APS members are welcome to visit.

Course, Curriculum, and Laboratory Improvement Program

The next round of proposals to the NSF’s Course, Curriculum, and Laboratory Improvement (CCLI) program are due May 21st. The CCLI program has, for several decades and under a number of program names, been the most significant funding source for improvements of undergraduate science and math education. Innovations in physics education, the development of many of the most significant pedagogies in the field, and a significant portion of new classroom experiments and laboratories have received funding from this program. According to the NSF, the program “funds projects that develop faculty expertise, implement educational innovations, assess learning and evaluate improvements, prepare K-12 teachers, or conduct research on STEM teaching and learning.” APS Members are welcome to visit.

For more information, go to www.nsf.gov and search on “ccli.”

New Faculty Workshops

Department chairs are invited to nominate recently hired faculty to attend the next APS, AAPT, and American Astronomical Society (AAS) New Faculty Workshop, which will be held from June 25—28, 2009 at the American Center for Physics (ACP) in College Park, Maryland. “Recently hired” means faculty in the first few years of their initial tenure-track appointment. The ideal nominee would be one who has been hired in a position where it is likely that good teaching may be a more difficult enterprise than he or she originally thought.

The nomination deadline is April 1. For more information, see http://www.aapt.org/Events/newfaculty.cfm.

Education Research Report in Science

In the January 2, 2009 issue of Science, editor-in-chief Bruce Alberts wrote that the journal “now plan[s] to build on this strong beginning [Science’s ‘three-year-old Education Forum’] by recruiting high-quality articles on education from the world’s best experts for every section of the magazine.” Accordingly, the magazine included one of its first education research reports, entitled “Why Peer Discussion Improves Student Performance on In-Class Concept Questions.” The article, authored by a team of researchers from the University of Colorado at Boulder that includes Physics Nobel Prize laureate Carl Wieman, describes a study the team performed to determine whether peer discussion had any impact on the conceptual understanding of students in an introductory science class.

LaserFest continued from page 1

PANEL continued from page 1 and 16% in the semiconductor industry. The panel highlighted four areas that need technical breakthroughs in basic science in order to be commercially viable. These projects would allow for more efficient energy generation and transmission while reducing pollution at the same time. The process of transferring electricity loses between 8% and 14% percent of its energy to heat alone. In addition, the national power grid is spreading too thin, putting it under full capacity and suffering from some of the worst power outages in the history of the nation, costing the national economy nearly $80 billion a year. Proposed smart grid systems and high temperature superconducting power lines could go a long way to alleviate these problems. However, the superconductor’s cooling costs have been prohibitive, since they can only operate at temperatures up to 158 Kelvin so far.

With the difficult economic climate, both employers and job seekers seem to be reluctant to attend career fairs. As of mid-February, the number of job seekers registered for the job fair at the APS March Meeting and the number of employers registered were lower than in previous years. In 2008, there were 30 employers attending the March Meeting job fair; as of mid-February, there were 12 employers registered for this year’s event. However, more were expected to sign up closer to the deadline, according to job fair coordinator Aliz Brice. The deadline for employers to register is March 10.

About 300 job seekers had registered for the job fair by mid-February. Job seekers may register on-site and many are expected to do so. Last year, 488 job seekers attended the March Meeting job fair. A job fair was also held at the American Association of Physics Teachers winter meeting in Chicago, in February. At that event, the numbers of both job seekers and employers were down from recent years.

‘Job seekers are finding it hard to make the trip,’ said Brice. Some employers also cannot afford to attend.

Employers at the AAPT meeting are primarily colleges, universities, and secondary schools. Employers attending the APS March Meeting job fair represent a wider range of employers from industry, academia, and government. The list of employers attending the 2009 job fair is expected to be similar to those who attended in recent years.

The 2009 APS March Job Fair will be held in the David L. Lawrence Convention Center in Pittsburgh. Recruitment booths will be open Monday, March 16 and Tuesday, March 17. More information about the March meeting job fair is online at http://www.aps.org/meetings/march/events/jobfair/.

The APS Executive Board met for the first time this year on February 7 at the APS editorial offices in Ridge, New York, and, following tradition, past-President Arthur Bienenstock of Stanford (left) handed the gavel, symbolic of the APS Presidency, to his successor, Cherry Murray of Livermore National Laboratory.
This year’s March Meeting marked the twenty-fifth anniversary of the Group on Instrument and Measurement Science (GIMS), which will celebrate their quarter century with a variety of artistic ventures, from the paintings of Van Gogh, Monet, and Pollock, to the architecture of medieval Islam and contemporary China (such as the Olympic Water Cube in Beijing), to the overlap of science, scientists, and the making of movies in Hollywood.

10th Anniversary

Right now, only about 1.4% of STEM graduates are in physics. Both the American Physical Society (APS) and the American Association of Physics Teachers (AAPT) have issued statements calling for doubling the number of undergraduates majoring in physics. (Roughly 5,700 physics baccalaureate degrees are presented annually.) Theodore Hodapp, APS director of education and human resources, issued the following statement:

That excitement within the confines of the dot constitutes an artificial hydro- dromen, with a unique energy content and the potential to have two such excisions in the dot and you have an artificial helium atom. McGill University physicist Patanjali Kambhampati will report on the first detailed studies of a “helium” quantum dot. Artificial “lithium” and indeed many other atoms seem to be in the offing. (H10.2)

Quartz-like CO₂

Pressures of 100 GPa, equivalent to a million times atmospheric pressure, can stabilize chemical structures of solids made of molecules, such as H₂, CO₂, and N₂. Much higher pressures than that can be brought to bear on materials either through static methods, such as with diamond anvil cells, where pressures can reach 500 GPa, or dynamic methods, such as with lasers, pulses or explosions that can reach pressures over a trillion Pascals (TPa). Choon-Shik Yoo, a scientist at Chung-Ang University, will discuss TPa chemistry and will report on specific quartz-like and silica-like forms of carbon dioxide. (P13.4)

Focus on Topical Groups

Meeting on Instrument and Measurement Science

By Michael Lucchella

Caltech are shaping carbon nano- tubes into minuscule soldering iron. The researchers used electron beams to carve the world’s smallest- est electrical conductor into a tube, and then used an electron beam to etch sharpened out the nano-soldering iron should be ideal for linking together molecular-scale mechanical and electronic devices (J24.2). Keith Brown of Harvard will present an innovative proposal to move components with the sharp tip of an Atomic Force Microscope (AFM). The researchers use objects from sticking to the AFM tips, Brown and his fellow researchers observed that nanotips can capture small objects while keeping them a small distance away from the AFM tip (V27.2). Andreas Huismans of the Max-Planck-Institute for Biochemistry will describe an imaging system that provides nano-scale information. This system is well suited to analyzing supercon- ductors, semiconductor devices and even individual molecules. The new technique will be a key tool in the field.

One such material: a polymer gel containing a very small amount of a red-light-absorbing molecule, such as erythrosin B, can be made to turn red by deflection. But the electronic properties of these materials are still unclear. What is clear is that these red polymer gels are different from that in liquid helium. (W1 and V16)

A Polymer That Beats Like A Heart

The overall function of certain biological tissues like the heart emerges from the fact that the cells can connect together in coordinated movements like a heartbeat in re- sponse to a triggering signal. Now, the group of Pradeep Verma at the University of Australia have now found that they can tell the difference between normal and cancerous cells that may be used to design polymer materials that can do the same sort of thing. Anna Balazs of the University of Pitts- burgh and her colleagues showed how titanium dioxide produces peroxide when exposed to a light source when exposed to a light source. (W9.1)

Titanium dioxide is a common semiconductor in material in which electrons are confined to an essen- tially zero-dimensional point. A lone electron, freed from an atom in the dot by laser light, along with the migra- tion of zero-dimensional electron, form a composite “quantum dot.” That exciton within the confines of the dot constitutes an artificial hydro- dromen, with a unique energy content and the potential to have two such excisions in the dot and you have an artificial helium atom. McGill University physicist Patanjali Kambhampati will report on the first detailed studies of a “helium” quantum dot. Artificial “lithium” and indeed many other atoms seem to be in the offing. (H10.2)

Quartz-like CO₂

Pressures of 100 GPa, equivalent to a million times atmospheric pressure, can stabilize chemical structures of solids made of molecules, such as H₂, CO₂, and N₂. Much higher pressures than that can be brought to bear on materials either through static methods, such as with diamond anvil cells, where pressures can reach 500 GPa, or dynamic methods, such as with lasers, pulses or explosions that can reach pressures over a trillion Pascals (TPa). Choon-Shik Yoo, a scientist at Chung-Ang University, will discuss TPa chemistry and will report on specific quartz-like and silica-like forms of carbon dioxide. (P13.4)

Focus on Topical Groups

Meeting on Instrument and Measurement Science

By Michael Lucchella

Caltech are shaping carbon nano- tubes into minuscule soldering iron. The researchers used electron beams to carve the world’s smallest- est electrical conductor into a tube, and then used an electron beam to etch sharpened out the nano-soldering iron should be ideal for linking together molecular-scale mechanical and electronic devices (J24.2). Keith Brown of Harvard will present an innovative proposal to move components with the sharp tip of an Atomic Force Microscope (AFM). The researchers use objects from sticking to the AFM tips, Brown and his fellow researchers observed that nanotips can capture small objects while keeping them a small distance away from the AFM tip (V27.2). Andreas Huismans of the Max-Planck-Institute for Biochemistry will describe an imaging system that provides nano-scale information. This system is well suited to analyzing supercon- ductors, semiconductor devices and even individual molecules. The new technique will be a key tool in the field.

One such material: a polymer gel containing a very small amount of a red-light-absorbing molecule, such as erythrosin B, can be made to turn red by deflection. But the electronic properties of these materials are still unclear. What is clear is that these red polymer gels are different from that in liquid helium. (W1 and V16)

A Polymer That Beats Like A Heart

The overall function of certain biological tissues like the heart emerges from the fact that the cells can connect together in coordinated movements like a heartbeat in re- sponse to a triggering signal. Now, the group of Pradeep Verma at the University of Australia have now found that they can tell the difference between normal and cancerous cells that may be used to design polymer materials that can do the same sort of thing. Anna Balazs of the University of Pitts- burgh and her colleagues showed how titanium dioxide produces peroxide when exposed to a light source when exposed to a light source. (W9.1)

Titanium dioxide is a common semiconductor in material in which electrons are confined to an essen- tially zero-dimensional point. A lone electron, freed from an atom in the dot by laser light, along with the migra- tion of zero-dimensional electron, form a composite “quantum dot.” That exciton within the confines of the dot constitutes an artificial hydro- dromen, with a unique energy content and the potential to have two such excisions in the dot and you have an artificial helium atom. McGill University physicist Patanjali Kambhampati will report on the first detailed studies of a “helium” quantum dot. Artificial “lithium” and indeed many other atoms seem to be in the offing. (H10.2)

Quartz-like CO₂

Pressures of 100 GPa, equivalent to a million times atmospheric pressure, can stabilize chemical structures of solids made of molecules, such as H₂, CO₂, and N₂. Much higher pressures than that can be brought to bear on materials either through static methods, such as with diamond anvil cells, where pressures can reach 500 GPa, or dynamic methods, such as with lasers, pulses or explosions that can reach pressures over a trillion Pascals (TPa). Choon-Shik Yoo, a scientist at Chung-Ang University, will discuss TPa chemistry and will report on specific quartz-like and silica-like forms of carbon dioxide. (P13.4)
**ANNOUNCEMENTS**

**Call for Proposals: India-U.S. Travel Program**

The Indo-U.S. Science and Technology Forum (IUSTF) and the American Physical Society (APS) are pleased to announce the launch of two new programs: 1) the India-U.S. Physics Students Visitation Program, and 2) the India-U.S. Professorship Awards in Physics.

Through the Physics Student Visitation Program, U.S. and Indian graduate students may apply for travel funds of U.S. $3,000 to pursue opportunities in physics. The travel funds could be used to attend a short course or summer institute, to work temporarily in a laboratory, or for another opportunity that the student and the host professor believe is worthy of support. The Physics Student Visitation Program aims to support graduate student travel to India by U.S. citizens, while enabling some students of Indian citizenship to travel to the United States.

The Professorship Awards in Physics funds physicists in India or the United States wishing to visit overseas to teach short courses or provide a physics lecture series delivered at a U.S. or Indian university. Awards will be up to U.S. $4,000.

Further details about both programs, including proposal guidelines, are provided at www.aps.org/programs/international/us-india-travel.cfm.

The upcoming deadline is 31 March 2009. Recipients will be selected by a joint APS-IUSTF Review Committee.

**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 currently in Canada or the US 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 1, 2009. Announcement of the award is expected to be made by August 1, 2009.

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

Contact: Sue Otwell in the APS office at blewett@aps.org

**APS Provides Childcare Assistance to Meeting Attendees**

The APS Committee on the Status of Women in Physics (CSWP) has received a grant from the Elsevier Foundation’s New Scholars program that will allow CSWP to make awards of up to $400 to APS Meeting attendees who are bringing small children or other dependents to the meeting and must pay expenses in leaving them at home. This is the second year that CSWP has made these grants available. The grant from Elsevier Foundation awarded five grants to enable scholars to balance childcare and family responsibilities during the early stages of their careers in science and technology. The grant recipients represent a range of international institutions pioneering new approaches to childcare, mentoring and networking.

A parent-child quiet room is also available at the March Meeting for attendees with children. Details on APS CSWP childcare grants are at http://www.aps.org/meetings/april/services/index.cfm.

**IN A RECESSION...**

...employers must hire highly skilled employees and jobseekers must set themselves apart.

Register for the upcoming APS March Meeting Job Fair and give yourself an edge.

Employers will have access to hundreds of highly skilled candidates and jobseekers will have access to their ideal jobs.

Register today at: http://www.aps.org/careers/employment/jobfairs.cfm

**BELTWAY continued from page 3**

The swing-gang whacked away the House priorities and by the time they were done, Collins, Snowe and Specter, joined by a cadre of conservative Democrats, had remodeled more than $6.5 billion for science, much of it related to infrastructure projects that would create several hundred thousand blue collar jobs. But the last chapter of the stimulus saga was still to be written. House Speaker Nancy Pelosi (D-CA) rejected as unacceptable the Senate’s insistence that its verdict be final, and in a powwow of ten, the science funding was restored.

Science escaped narrowly, but bipartisanship didn’t. President Obama may want to change the partisan culture of Washington, but it takes two to tango.
Four hundred years ago Galileo turned a 2-cm telescope to the sky and increased the sensitivity of human eyes on the Universe by a factor of 100—an increase only matched since by that other sensory enhancement—the advent of the digital image. The image quality of optical telescopes has improved by another factor of 100 million, and we have added radio, infrared, UV, x-ray, gamma-ray, and neutrino eyes on the Universe. These new and more powerful eyes have continued to deliver stunning discoveries.

Because physicists have contributed so significantly to the advancement of the performance of “our eyes on the Universe” and in shaping the science of astrophysics, it is appropriate that our Society take part in the celebration of this anniversary (the International Year of Astronomy) through the theme—New Eyes on the Universe: 400 Years of Physicist Astronomers.

As the pre-eminent telescope builder of the 20th century, George Ellery Hale, the MIT-educated solar-physicist, started the expansion of the telescope, revealing our big bang origin. The 200-inch was used to discover quasars, now known to be the most distant objects in the Universe, the quasar era has only just begun. This discovery, featured on the cover of Time Magazine in March 1966, opened our eyes to the “extreme Universe” of relativistic objects like neutron stars and black holes.

Physicist Albert A. Michelson not only showed that the speed of light is frame independent, but he also introduced interferometry to astronomy. The use of an interferometer to combine the light from two telescopes to create a telescope of larger effective diameter—the separation of the two telescopes—vastly increases its resolving power. Today, interferometers are in operation at Mt. Wilson and the 200-inch reflector at Mt. Palomar, and he left a great scientific legacy in the discoveries made by these telescopes.

Edwin Hubble used the 100-inch Hooker telescope to study the Andromeda Nebula and found that it was moving away from us. This had been catalogued for more than 100 years. He showed that they were “island universes” and not gas clouds within our Milky Way. He also catalogued the known Universe by a factor of 100 billion. Hubble went on to discover the expansion of the Universe, revealing our big bang origin. The 200-inch was used to discover quasars, now known to be the most distant objects in the Universe, the quasar era has only just begun. This discovery, featured on the cover of Time Magazine in March 1966, opened our eyes to the “extreme Universe” of relativistic objects like neutron stars and black holes.

And finally, 400 Years of Physicist Astronomers, since Galileo’s time has come from increasing telescope mirror size. Physicists Jerry Nelson and Roger Angel have made innovative mirror designs that have enabled today’s large telescopes. Angel introduced molded honeycomb mirrors. These giant telescopes will add an- other factor of 100 to our ability to see the sky enabling marvelous discoveries.

By Michael S. Turner