In a process that began more than a year ago, APS Council has passed an addendum to the 2007 climate change statement. The vote on the addendum at the April 18 Council meeting was 31 in favor, 2 opposed, and one abstention. This document, which runs more than 1000 words, is now an official appendage to the 157-word statement, and appears as such in the “Policy and Advocacy” section of the APS website.

The addendum was crafted as a commentary on the 2007 statement by a subcommittee of the Panel on Public Affairs (PPA). The final wording of the Commentary involved input not only from the subcommittee, but also from PPA itself and from APS’s broad membership. Prior to consideration by Council, the Commentary had also been given unanimous approval by the APS Executive Board.

The subcommittee was chaired by Duncan Moore of the University of Rochester. Other members were John Browne, James Drake, and Frances Houle. Moore had been Chair of PPA in 2009.

The reason for the addendum is stated in its first paragraph. “There is a substantial body of peer-reviewed scientific research to support the technical aspects of the 2007 APS statement. The purpose of the following commentary is to provide clarification and additional details.”

Among other things, the Commentary addresses the use of the word “incontrovertible” in the original statement: “The evidence for global temperature rise over the last century is incontrovertible. However, the word ‘incontrovertible’ in the first sentence of the second paragraph of the 2007 APS statement is rarely used in science because of its very nature—its claim to absolute certainty.”

The observational data indicate a global surface warming of 0.74°C (+/- 0.18°C) since the late 19th century. (Source: http://www.ncdc.noaa.gov/oa/climate/globalwarming.html).

The last paragraph of the addendum contains a suggestion for further involvement by the physics community: “With regard to the last sentence of the APS statement, the role of physicists is not just ... to support policies and actions...” but also to participate actively in the research itself. Physicists can contribute in significant ways to understanding the physics processes underlying climate and to developing technological options for addressing and mitigating climate change.”

The full text of the addendum, and of the 2007 statement, is available on the APS website at www.aps.org/policy.

Last fall, an ad hoc committee of APS Council continued on page 5

Council OKs Constitutional Amendment, and approves Expansion at Ridge

In a busy meeting on April 18, APS Council did more than just approve the addendum to the climate change statement (see story above). Among other highlights of the meeting, they approved an amendment to the APS Constitution that would, if adopted, create 4 International Councilors. They also approved an expansion and renovation of the APS editorial office building in Ridge, New York, that would add more than 50% to the current space.

Last year, the APS Committee on International Scientific Affairs (CISA) recommended the creation of International Councilors, noting that 21% of APS membership resides outside the US (this rises to about 25% if one looks at the non-student component of membership). APS Director of International Affairs Amy Flatten developed this idea in a Back Page in the January APS News. The matter was referred to the APS Constitution and Bylaws Committee, chaired by Jeff Urbach of Georgetown. They recommended eliminating the current International Councilor, who serves a 2-year term, and replacing it with 4 General Councilors with International Councilors, who would be required to come from outside the US. These new International Councilors would serve 4-year terms; each year, the APS membership would elect one International Councilor and one General Councilor, instead of the 2 General Councilors that they now elect. The APS Nominating Committee would be responsible for recruiting candidates for International and General Councilor, paying due attention to geographic diversity.

Urbach said that this arrangement is preferable to simply instructing the nominating committee to include international candidates among those running for General Councilor, because people tend to vote for candidates they are familiar with, thereby giving the domestic nominees an advantage that would preclude the election of an appropriate number of international representatives.

Now that Council has passed this amendment, the text will be printed in a forthcoming issue of APS News, and will appear on the ballot for the Society election this summer. The amendment was approved by two-thirds of those voting, the amendment will become part of the APS Constitution.

The Ridge expansion is motivated by the inexorable rise in the number of manuscripts submitted to APS journals, which is now running in excess of 3% per year. The current space is inadequate to house the personnel needed to process the manuscripts and manage the editorial process. Because the facility is located in the Long Island pine barrens, the footprint of the building cannot be arbitrarily extended. Consequently, the plan is to add 18,000 square feet by building a second story. Careful scheduling will allow this construction to take place while work goes on in the building, without need for temporary relocation to another site.

In addition to the expansion, APS President Curtis Callan remarked that it is also important to renovate and redesign the entire space. He pointed out that the nature of scholarly publishing is changing rapidly, and that APS has to be on the leading edge of these developments. This requires a staff with an increased level of sophistication, which calls for an improved working environment that is not predicated on the old paper-based model of journal publication.

A project management firm and an architectural firm have been engaged, and, in the wake of Council approval, bids for construction are set to go out in June. If all goes as anticipated, construction will start in the late summer of 2010 and will be completed sometime in 2011.
Lasers are ubiquitous in 21st century society, with applications in telecommunications, DVD players, and foundries, cutting, scanners, and medical surgery, to name just a few. Maiman discovered thousands of applications for the ruby laser, including in medicine, dentistry, and, famously, in the creation of the first working artificial heart.

Maiman discovered errors in those calculations, and found that artificial rubies (which had fewer impurities) worked very well. Thanks to the input of his assistant, Charles Asawa, he also used pulses of light to excite the atom to a very narrow range of energy—not a continuous concentrated beam of light, and far less powerful than many lasers today, but nonetheless, it was a working laser. More importantly, it was very easy to build, and extremely affordable to manufacture, a huge advantage over existing devices, including a flying movie projector lamp used in earlier experiments.

On May 16, 1960, Maiman succeeded in producing a short burst of coherent light from his humble device—no continuous concentrated beam of light, and far less powerful than many lasers today, but nonetheless, it was a working laser. More importantly, it was very easy to build, and extremely affordable to manufacture, a huge advantage over existing devices, including a flying movie projector lamp used in earlier experiments.

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He published his discovery in Nature. Townes later called Maiman’s paper “the most important word of any of the wonderful papers” that the journal had published in its 100 years. But at the same time, the question of patent rights was a major concern, and Maiman was less interested in developing applications. A frustrated Maiman left Hughes and founded his own company in 1961, dedicated to the research, development, manufacture and manufacture of lasers, and in 1968 he left that position to found another company, Maiman Associates. Ultimately he held patents not just for his first laser, but also related to masers, maser displays, optical scanning, and laser modulation.

The question of patent rights has proven to be a fairly litigious, most notably in the case of Gordon Gould, a graduate student under Townes at Columbia University in the late 1950s. He sued to earn patent rights based on his research, which contained an entry dated and notarized in November 1957, describing his own design for a laser. Gould fought for decades, and in 1973 the U.S. Court of Customs and Patent Appeals ruled that the original patent awarded to Maiman and Townes was overturned, and Gould was granted the patent. It was a battle that lasted over 20 years, and ultimately led to the creation of the first practical laser—Maiman’s humble device literally changed the world.

He received several honorary degrees, induction into the National Inventors Hall of Fame, membership in the National Academies of Science and Engineering, and won the APS Oliver E. Buckley Prize in 1966. But the one honor that eluded Maiman was the Nobel Prize: twice nominated, Maiman never won.

Maiman died from systemic mastocytosis on May 5, 2007. As for that first working laser, it is stored in a safe deposit box in a bank in downtown Vancouver, BC. The white box (wrapped in bubble wrap and Styrofoam) has a label screwed on top in bright red ink: “Maiman’s laser.”

This Month in Physics History

May 16, 1960: Maiman Builds First Working Laser

Theoretical Maiman contem- plated a charge-neutral ruby crystal. Theodore Maiman contem- plated a charge-neutral ruby crystal. Theodore Maiman contem-...
Gordon Conference on Physics Research and Education

The sixth in a series of Gordon Research Conferences exploring the connections between physics research and education will be held June 6–11, 2010 at Mount Holyoke College in South Hadley, Massachusetts. This conference will focus on experimental research and laboratories in physics education and will feature sessions on undergraduate research, upper-level labs, and experiments, simulations and modeling, among other topics. The application deadline is May 16, and partial support for attendees may be available. For more information, go to www.grc.org/programs.aspx?year=2010&program=physeuc.

APS Releases Educational Posters

The APS Education and Diversity Department has released two posters focusing on physics education. "The Top 10 Reasons Why You Should Study Physics" was co-designed with the American Association of Physics Teachers to recruit high school and undergraduate students into physics classes. "Gravitational Waves" was co-designed with the Laser Interferometer Gravitational-Wave Observatory (LIGO) and centers cutting-edge physics research at the high school or undergraduate level. Both posters can be downloaded or ordered from www.aps.org/programs/education/teachers.

Teacher Recruiting Video Released

The APS/Association of Physics Teachers-led PhysTEC project recently produced a five-minute video designed to inspire physics majors to pursue a career in teaching. The video features four young physics teachers who talk about what excites them about their jobs, as well as narrative footage from these teachers' classrooms. It is available on DVD as well as online at www.PhysTEC.org/video and on YouTube at www.youtube.com/user/physicseduc.

Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (STEM)

The National Science Foundation’s Course, Curriculum, and Laboratory Improvement (CCLI) program has been recently transformed to Translating Undergraduate Education in STEM (TUES). According to NSF, "the title of the program was changed in order to emphasize the special interest in projects that have the potential to transfer to undergraduate STEM education. The additional review criteria have been modified to emphasize the desire for projects that (1) propose materials, processes, or models that have the potential to enhance student learning and to be adapted easily by other sites and (2) involve a significant effort to facilitate adaptation at other sites." Proposals are due May 26. For more information, go to www.nsf.gov and search on "TUES".

Correction

The April Education Corner gave the impression that LaserFest kits are available to all teachers. In fact, the kits are available only to physicists providing professional development for high school teachers.

Researchers Pursue Advances in Electronics, Photonics

Physicists at the March Meeting reported on their work focusing on ways to keep the exponential growth in computing power from tapering off by researching possible new materials and techniques. While computing power has exponentially increased over the last several decades, many in the field have worried that it could saturate at some point. Moore’s Law predicts that the number of transistors that fit on a computer chip, and its corresponding processing power, will double every 18 to 24 months. Though not a law of nature, it has been generally accurate over the last forty years. However as transistors have shrunk, many are worried about hitting a point where the transistors can’t scale down any further and will start to become less efficient.

Graphene, thin sheets of hexagonally arranged carbon atoms, has garnered a lot of attention for its remarkable electrical properties. Some physicists say that it could be the material that in the future will replace silicon as the semiconducting basis of transistors. "Over the past five years researches have been looking into different materials...and graphene is considered one of the most promising," said Helen Xiayong Chen of Stanford University. At the meeting, Chen announced that her team has made a significant leap forward in developing a workable graphene transistor. They have been able to successfully integrate graphene interconnects into commercially used complementary metal-oxide semiconductor (CMOS) technology and achieve processing speeds as fast as a gigahertz.

At the meeting, Phaedon Avouris of the IBM Research Center announced that his team has taken an important step towards overcoming a major impediment researchers have encountered in graphene-based transistors. In order to function, semiconductors need a band gap where current completely stops flowing when in the “off” position. Creating a graphene transistor with the necessary band gap has been one of the most promising topics in physics, with Cohen of the Futurama of Physics with David X. Cohen

The Futurama of Physics with David X. Cohen

In the episode “Bender’s Big Score” of Futurama, the animated television comedy, the character Professor Farnsworth contemplates paradox-free time travel. "I believe this 'paradoxical' equation to be unsolvable," he says, pointing to the equation, $E=mc^2$. Cohen has a bachelor’s degree in physics from Harvard and a master’s degree in computer science from UC Berkeley, and is married with two children. With an omnipresent devotion to physics, and many writing colleagues on the show with backgrounds in applied math, electrical engineering, computer science, and chemistry themselves, Cohen is always looking for places in stories where he can insert “an in-joke” relating to science and technology. He is extremely proud of the fact that Futurama is one of the few shows that can put in a joke for a physics graduate student,” he says. "And with an animated show, you have much more opportunity to do those kinds of things. In a live action show, it’s kind of hard to put in a floating holographic equation.”

The Futurama of Physics with David X. Cohen

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Letters

Is “Seminal” Sexist?

A listerv for college educators that I belong to recently had a post rephrasing a “seminal article.” A response gently suggested that we try and avoid sexist and sexual words such as “seminal” and use alternatives such as ground-breaking, cutting edge, leading edge, and foundational. This struck many as particularly dubious in this usually decorous forum, with levels of passion usually reached since many did find the word dis run amok. The other side said that the issue trivial, and the reaction a symptom of political correctness run amok. The other side said that perhaps we could suggest to prize committees that they use these alternatives whenever possible.

Mano Singham
Cleveland, OH

What to Do When the Oil Runs Out

Everything Fris de Wette says in his letter “The Sun is a Wild Card” [APS News, January, 2010] is valid and sensible, but heating due to anthropogenic activities is nevertheless possible, even likely if you look at the combustion of about one-half of Earth’s stored oil in about fifty years. Should there be an anthropogenic threat, dealing with it will get more difficult year-by-year.

The best arguments against a solar car cause are the steepness of the increase and the physical changes in the planet. Tree records do not show such past natural increases.

This is an extremely complex question, and we may not have good answers for a decade or more. Further, we may not be chasing the right question. If the increase is solar per de Wette’s letter, are we going to sit back and watch our agriculture severely damaged, our environment altered, and do nothing?

The proposed solutions are to increase efficiencies and to find new renewable, non-solar trapping, energy sources (or if not renewable, more plentiful) since we have used approximately 50% of the stored oil in less than 100 years, and since our usage is ever increasing, a day of reckoning comes, when the soda straw will suck air. Recovery techniques get better every year, and there is still some oil to be found, but this only has to do with the date of the day of reckoning—not its certainty.

When the oil runs out, we are going to need nuclear. Wind, water, thermal, and solar, even coal (with carbon capture) are all good, but no way we power Earth with them. Using the US as a standard, most of Earth is extremely underpowered right now. Our nuclear reactors take forever to build and approve, create too much radioactive waste, are not safe enough, and do not breed new fuel. We need a new design. We have about a decade or two to get a new reactor design done, tested, and approved and another decade to build reactors. This has to do with post-oil power, not with global warming, but the design of all new energy must address global warming.

Let’s get on with solving the problems.

Richard A Karlin
Pittsburgh, PA

Lasers Are Creative Tools for Education, Outreach

Demonstrating the importance of lasers to the public is one of the goals of LaserFest, the 50th anniversary celebration of the invention of the laser. At the March Meet- erng and Education Outreach” session, physics teachers showed off how they use lasers as outreach and education tools.

“A key audience for LaserFest is kids,” said APS’s head of public outreach Becky Thompson, who organized the session. “We wanted to highlight both what APS was doing for laser education and give meeting attendees a chance to learn about successful outreach in general.”

Lasers have been a big part of undergraduate research labs for years. Chad Orzel, a professor at Union College, described at the meeting how he often uses laser experiments to show his students their importance to scientific measurements.

“The most impressive applications in science and physics are in precision measurement,” Orzel said at his talk. “The world’s best measurements mostly involve lasers.”

During lab sessions, Orzel has his students conduct experiments designed to explore the same fundamental premises that are used in current cutting edge research. Some of these experiments can use speed of light by timing how long it takes to reflect back from the far side of the moon, to measure the distance from Earth to the moon with laser range finders and retro reflectors. His more advanced students build their own interferometers that are essentially simpler versions of LIGO, and take the laser spectrum of rubidium using the same principles that atomic clocks operate on.

“It’s something that can get the attention of all students, even high school students. We teach optics,” said Harold Metcalf, a professor at the university and one of the founders of the center. “You can see light, it’s an extreme important for the students to see what’s going on without a lot of equipment in the way.”

At the APS summer camp, “The whole point of camp is to set stuff on fire.”

More importantly, she said, the camp is working to help to close the gender gap in the physical sciences. Research has shown that exposing girls to college level science concepts as early as middle school greatly improves the likelihood they’ll stay in the sciences. Though no male applicant has ever been turned away from the SPICE program, the organizers primarily recruit girls in middle school to participate.

Paul Guéye at Hampton University is also working to bring more underrepresented groups into the physical sciences. Working with both the National Society of Black Physicists and National Society of Hispanic Physicists, Guéye has brought the science ambassador program to hundreds of elementary school students in dozens of predominantly minority and underprivileged classrooms across the country.

“The most important thing is fun. You don’t want to do something boring,” Guéye said.

These science ambassadors travel with physics demonstrations to classrooms in areas with limited resources, in order to show students the fun of physics experiments. Since its inception, the class has expanded from reaching 20 students in 2005 to over 400 in 2009. Guéye said that they hope to continue to expand the program using funding from LaserFest on the Road grants to incorporate more original careers as well. Most of the speakers at the conference were “one degree” away from Nico in some way, either as his former student or colleague, and with their unique perspective by Mar lyn Scully as the “Nicollettes.” Nico, who served as President of the APS in 1991 and published more than 200 papers, has been a trailblazer in nonlinear optics. A highlight of the meeting was when all of the attendees sang Happy Birthday to the physicist, followed by the cutting of an enormous cake. Many pictures of the event can be found at http://www.optics. arizona.edu/.

Lasers Pioneer Turns 90

In March, on a bright and sunny day in Tucson, Arizona, 18 eminent laser pioneers and optical physicists came together to celebrate the 90th birthday of Nobel Laureate Nicolas Christodoulou. Sponsored by the University of Arizona College of Optical Sciences where he holds a faculty appointment, the Nicolas Bloembergen Nobel Laureate Scientific Symposium featured talks by fellow laureates Roy J. Glauber, John L. Hall, and Charles H. Townes. The scientists gathered to congratulate and express gratitude to “Nico” for not only his contributions to science, and

By Michael Lucibella

It’s not EMPTY! It’s full of neutrinos, cosides of dark matter, a couple of cosmic rays, a bunch of vacuum fluctuations and virtual particles! Laser Field is the most important gift of all, the wonderland of science!

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The funding cuts around the lab have been pretty hard haven’t they?

LASERS continued on page 7

4 · May 2010

APS NEWS
A monthly update from the APS Office of Public Affairs

**Washington Dispatch**

**ISSUE: Budget and Authorization Environment**

Another Continuing Resolution Likely this year

Following the bruising fight over healthcare, and public anxiety over the still lagging economy, the Democratic majority in Congress will have to overcome significant hurdles to complete a FY 2011 Budget Resolution. Rep. Steny Hoyer (D-MD) has announced that all appropriations bills, according to “The Hill,” a newspaper that follows Congressional developments, “House Democrats are facing a much tighter vote on the budget resolution in 2010 because of big deficit projections and the looming mid-term elections.” A result, centrist Democrats will have a harder time voting for the resolution.” The bottom line: It is likely that there will be Continuing Resolutions again this year to keep government agencies running once the fiscal year ends.

America COMPETES Reauthorization

The tight fiscal environment will also have an impact on reauthorization of the America COMPETES Act. Staff for the House Science Committee, earlier this year, forecast that reauthorization of the bill would be bipartisan and somewhat easy to accomplish. However, the mood has since changed. During a March 25th markup of the DOE Authorization bill, the House Representatives offered seven amendments in an attempt to cut back authorization levels over concerns about spending. Included among the amendments was the one offered by APs President Curtis Callan, which was later withdrawn when Committee Chair Bart Gordon pledged to work with the committee to lower some of the authorization levels prior to consideration by the full Committee. The National Science Foundation (NSF) portion of COMPETES will be marked up on April 14th, and the full House Science Committee is expected to mark up the full reauthorization bill by the end of April.

With regard to the Energy and Water appropriations bill, which funds the DOE Office of Science, funding levels for FY 2011 could be particularly difficult. Because a number of water projects would not be funded in the President’s budget, Congress is likely to strip money from DOE/SC to make up the shortfall.

To be sure to check the APS Washington Office’s Blog, Physics Frontline (http://physicsfrontline.aps.org/), for the latest news on the FY 2011 Budget.

**ISSUE: POPA Activities**

The Energy Critical Elements Study group, which is examining the scarcity of critical elements for new energy technologies, held its first meeting in late April at MIT. Featured keynote speakers included Anthony Marano, the chief consultant; David Eaglesham of Solar, Inc.; James Lancaster of the National Research Council; Cyril Wadia of UC Berkeley; Scott Sibley of the U.S. Geological Survey; and Tian-Chan Bae of the Korea Institute of Industrial Technology (KITECH).

The Electric Grid Study group, which is examining the technical challenges and priorities for increasing the amount of renewable electricity on the grid, is in the final stages of drafting its report, which will be presented to POPA for approval in June.

A POPA subcommittee, comprising Duncan Moore, John Browne, Frances Houle, and James Drake, continued its work on the 2007 APS Statement on Climate Change. In February the subcommittee— with APS Associate Director of Public Affairs Frances Slakey and POPA Chair Rob Socolow serving as resources—had prepared and circulated an Addendum to the Statement in response to a November APS Council motion. In March, the subcommittee reviewed and considered more than 1,700 comments sent by APS members, and updated the proposed Addendum. In April, POPA unanimously approved the updated Addendum and sent it to the APS Executive Board and Council for final action. See story on page 1 for further details.

If you have suggestions for a POPA study, please visit http://www.aps.org/policy/reports/popa-reports/suggestions/index.cfm and send in your ideas.

**ISSUE: Media Update**

USA Today, Global Security Newswire, Science Magazine, and the Physics Today blog were among the many media and online news organizations that published stories on the release of the APS report, “Technical Steps to Support Nuclear Downsizing.”

The April edition of the APS newsletter, Capitol Hill Quarterly, features an op-ed by Congressman Frank Wolf (10th-VA) on investing in basic research to keep America strong.

Log on to the APS Public Affairs Web site (http://www.aps.org/public_affairs) for more information.

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**Indo-US Student Visitation Program: Graduate Students Building Collaborations**

By Danielle Lieske and Sunita Srivastava

In 2008, the APS and the Indo-US Science and Technology Forum (IUSTIF) issued its first call for proposals to sponsor the exchange of physicists and physics graduate students between India and the United States. The Professorship Awards in Physics permit professors from India and the United States to deliver short courses or a lecture series in the other country. The Physics Student Visitation Program provides both scientific training as well as cultural experiences while graduate students pursue a breadth of opportunities such as attending a summer institute or conducting research in a host professor’s lab. The first round of proposals yielded two especially interesting applications in order to build an ongoing collaboration between their two laboratories, two professors applied to sponsor their graduate students between Stanford and the Indian Institute of Science. Each new to the other’s country, the two students have given an account of their studies and impressions of their host country.

Danielle Lieske: From Palo Alto to Bangalore

In the fall of 2008 I received email from pradeep reddya, a PhD advisor, with the text “would you be interested in visiting India” and attached information about the Indo-US Physics Student Visitation Program (co-sponsored by APS and the Indo-US Science and Technology Forum). Gerry had just returned from a visit to the Indian Institute of Science (IISc) in Bangalore. During his visit, he met Jaydeep Basu and they realized that each lab specializes in characterizing interfacial phenomena from a different perspective. After some discussion, they agreed that it would be mutually beneficial for each of them to send a student to a two-to-three week visit to the other’s lab. A couple many graduate students would be, I was very excited at the prospect of visiting another lab, particularly one in India. I began to work on the application immediately. A few months later we heard that both Sunita (Professor Basu’s COUNCIL continued from page 1)

... who could be reached by email; each message contained a unique URL that enabled the member to access the text of the statement and proposed Commentary, and, if desired, to provide input. The system was designed so that each member could comment only once during the 3-week period that the site was open.

Of those who received the email, 5,805 viewed the material, and 1,767 submitted comments by the deadline of April 19. Each of the 1,767 messages was read by at least one member of the Moore subcommittee. The subcommittee members categorized each comment as either favorable to the addendum, or unfavorable, or neutral. They found that 55% of the comments were in the favorable category, and 26% were unfavorable. As several Council members pointed out during the discussion on April 18, it is probable that these percentages are not representative of the APS membership as a whole.

In addition, the subcommittee collected those comments that they deemed potentially useful in modifying the addendum, and used them to produce a revised version. This version, which contained substantial differences from the original, was presented to POPA and approved by that body on April 2. It was this version that was forwarded to the APS Board and Council, and approved by the latter on April 18.

This entire sequence of events began at the Council meeting last spring, when Councilor Robert Austin introduced a motion to replace the 2007 climate change statement. Austin’s motion was tabled, and Murray appointed the Kleppner committee to advise her on how to proceed. In the run-up to the Council meeting in fall of 2009, Council members were bombarded with email messages from the APS membership, expressing their opinions of the 2007 statement and the Austin motion. Council then adopted the recommendations of the Kleppner committee, which led to the formation of the Moore subcommittee and the subsequent developments culminating in the approval of the addendum.
The Dawn of the Demo: Demonstrations Are Changing Physics Outreach and Education

By Calla Cofield

The science au courant at Rutgers University only sees 330, but once it hits the lobby and squeezed into the aisles for two hours, just to see Dave Maiullo perform. He’s no movie star and he doesn’t have any guitar, but Maiullo does know how to put on a show. And he’s just one of a growing number of people who are packing in science centers and universities with the power of physics demos.

The word “demo” was once just a short way of saying “demonstration,” but in physics outreach and education, it’s taken on a new meaning. A “demo,” according to Maiullo, is a system or a physical set-up where one parameter can be easily adjusted, and all others remain the same. The demo leader adjusts that parameter, playing with high and low and in between, in order to illustrate some physics concept.

“There’s a lot of teaching that goes on if demos are done correctly,” he said. “You don’t want to just have them doing a procedure. You can jazz it up in lots of different ways and make something that’s eye-catching. That creates a memory trigger, and those are great for educating.”

Take, for example, a demo that Maiullo did in a video for The New York Times online. He set up a glass beaker placed next to a speaker that lets out one steady note with an adjustable frequency. Maiullo tunes the frequency of the sound waves until they reach the resonant frequency of the glass, and in a startling burst, the beaker shatters.

But that’s one of the more mild demonstrations that Maiullo performs. There’s the smoke ring cannon built out of a garbage can, or the liquid nitrogen trapped in a plastic bottle that explodes and lifts nearly a garbage can ten feet in the air. One of Maiullo’s specialty demos is wrapping himself between two beds of nails, having someone walk on the top one, and then having someone smash a brick that’s placed on top of him. There’s smoke, fire, flashy lights and explosions. There’s one demo known simply as “the glowing pickle” that involves two electrodes and usually leaves behind an odd smell. “Are some of the things we do bigger and flashier than they need to be? Probably,” stated Maiullo. “Is there a way to have better insight into the bigger and bigger? Definitely!”

Maiullo is officially the Physics Outreach and Education.

In summary, Maiullo said that while the potential opportunity and in the process of understanding the interfacial stress rheometer’s home and showed me around his food. She took me to Prof. Ger and showed me around his home and showed me around the country and the culture that made my trip so amazing.

On a professional note, I was thoroughly impressed with the level of science and the facilities present at IISc. Although IISc is a much smaller university than Stanford, they have access to most major pieces of equipment and I could think of (within my field, anyway). Professor Basu’s group also had a wonderful atmosphere. Not only did the students continuously engage in discussions about their research, but they were all clearly good friends, an attitude that was extended to me the first day I arrived. My experiences were smoothly thanks to the assistance of several students in the group, and I collected enough data for a publication.

Although I had entered this adventure with some trepidation, the overall experience was incredible. I can see that alone and without the guidance of a local, India would be a difficult and sometimes frustrating place to navigate. But as it was, my trip was wonderful, mostly thanks to the generosity of Sunita and her friends. In addition to getting acquainted with a small piece of India, I most appreciated about this experience was the reciprocity. Getting to see her home in Bangalore created a much stronger bond between us than if only one of us had traveled. It was an experience that I will always cherish.

Sunita Srivastava: Indian Institute of Science to Stanford

I came to know about the Indo-US student visitation program, when Prof. Gerry visited our lab after giving a very interesting talk on interfacial rheology in the Physics Department of the Indian Institute of Science. At this time I was working on the very difficult and challenging experiment of understanding the rheology of polymer monolayers under mechanical strain. We (and Prof. Basu) were amazed with the results that I had gotten and were in the process of understanding the physics of the obtained data. There was no scientist better than Prof. Gerry to discuss them with, and for that reason Prof. Basu had invited him to visit the lab. I explained all the results to him and he was interested in us. We realized that further interfacial stress rheometer (ISR) measurements would be useful to have better insight into the physics. During this conversation Prof. Gerry came to know about the advanced facilities at IISc, which he thought were required for the work of some of his graduate students. This is how the seed of collaboration was sown between the two labs. After discussions with Prof. Gerry, Prof. Basu suggested that I find out the details of the visitation program. I was really excited about the potential opportunity and in the excitement it did not take me much time to find the details and place the application.

It was the month of December and I was enjoying official holidays at home when I got an email from Michele Irwin that my application had been approved and I would be able to make holidays by this news. After my leave, when I was back at IISc, I began scheduling the trip and made arrangements. One day I was Prof. Basu’s office and showed him the trip. I was his first very much involved interaction with an international group and I had a very good and satisfying experience. I visited Stanford first. Danielle was there at the airport to pick me up in her car. She was very careful to take me to the Indian grocery store so that I was comfortable with my food. She took me to Prof. Ger’s house and showed me around the house. I spent the first day in the house. As she was a very good friend. I spent a very happy time there. She took me to visit the Mystry Spot, and Santa Barbara. It was a very nice and relaxing trip. We discussed wide areas of science. She lent me her four gear bike to ride, which was again a very exciting experience. She gave me lots of time to discuss my ISR results in spite of her many engagements at her home and in the office.

All of my travel was full of learning new experiences. The most important thing that I cherish now is the cultural experience and the way of life. It was a wonderful experience. Now she is not just a professional collaborator of mine but also a very good friend. I spent lots of quality time with her and had many discussions and sharing opinions. She took me to visit Yosemite National Park, The Mystery Spot, and Santa Barbara. The two most wonderful experiences were the volleyball match at Stanford University and the visit to the park. I also enjoyed cooking Indian food at Danielle’s home and getting introduced to her sweet pets.

From the professional side this trip was again very productive for me. I got to learn the advanced tech- nique of interfacial rheology and interacted with a few group members in Prof. Gerry’s lab and others. I did several experiments and am now in the process of writing a manuscript for publication.

Altogether the exchange program helped to build up a strong collaborative bond between both the institutes. More importantly, we now have an exchange program between the two institutions, which is a great step forward. We got to know the working culture and scientific environment more closely, which would not have been possible without this program. It is hoped that in the near future we will actually be able to travel to the place and share the experience. It was an experience of a life time for both of us, and Prof. Gerry will always appreciate and make an effort to carry forward in our scientific careers.
Dilapidated: A man's life and career were shaped by his choices as a student. He chose to pursue a career in entertainment, and this decision has led to a life filled with success and fulfillment.

ERRATUM: In the April APS News story about Iranian Physicist Farhad Ardalan’s visa problems, there was an unfortunate error in the sentence “In 1998, he was arrested and released without charges.” The sentence should have read “In 1998, he was arrested and released without charge.”

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Training Physics Professionals for the Nonacademic Workforce

By Eleanor L. Babco, M. Nancy Vincent, and Donald N. Langenberg

Physicists can do almost anything if they put their minds to it. Most physicists would probably agree with that claim, but when it comes to the academic preparation of young physicists, they focus almost entirely on traditional PhD programs aimed at training them for research careers in physics. That is changing. In this article we introduce the reader to some young physicists who are alumni of a new type of graduate program, the Professional Science Master’s (PSM) degree program.

“Effective to apply innovative science towards technology in a business setting one should not only be proficient in the science... but also in skills required to excel in a business environment,” says Wilfred Kittler, a Magnetic Resonance Applications Engineer at Magritek Ltd. Mr. Kittler is a graduate of the PSM program in Nanoscale Physics at Rice University, and one of a growing number of science students interested in training for a career outside of academia.

PSM programs are cropping up across the country as students seek careers in business, government, or nonprofit sectors, and employers want hires who are productive from day one. These new and innovative programs combine an internship and rigorous study in a science or mathematics discipline with highly valued workplace skills such as communication, management, regulatory affairs, and entrepreneurship. After only a dozen years in existence, there are nearly 170 PSM programs underway at 86 institutions, including 16 in physics fields such as engineering physics, health physics, nanoscience, medical physics, and applied physics, (see Table 1).1

A hallmark of PSM programs is the involvement of employers who provide insight on the skills sets and academic preparation they would like to see in new hires, and provide guidance to ensure that PSM programs are responsive to the changing demands of the 21st century workforce. At the institutional level, employers may serve on PSM program advisory boards, as adjunct professors, as mentors, and provide feedback on curriculum development. At the student level, employers may offer internships or sponsor team projects giving students an opportunity to interact with potential employers in “real world” settings outside of the lab. The internship is often a springboard to full-time employment.

Typically, individuals who are interested in pursuing a PSM degree are looking for an alternative career path in science and mathematics, not a stepping stone to a PhD. PSM programs attract students who: (1) want careers in the business, government, or nonprofit sectors; (2) find the two-year full-time-equivalent time-to-degree appealing; (3) thrive in rapidly changing demands of the 21st century workforce. At the institutional level, employers may serve on PSM program advisory boards, as adjunct professors, as mentors, and provide feedback on curriculum development. At the student level, employers may offer internships or sponsor team projects giving students an opportunity to interact with potential employers in “real world” settings outside of the lab. The internship is often a springboard to full-time employment.

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Table 1: Professional Science Master’s Programs in the Physical Sciences

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