AIP Reorganizes its Publishing Operations

By Michael Lucibella

In February, the American Institute of Physics established a new wholly owned, but managerially independent, limited liability company to oversee publishing all of its research journals. The move comes amidst a broader restructur- ing effort by AIP to modernize its governance, and better respond to the changing publishing market.

“The AIP gets nearly all of its funding from publishing,” said Fred Dylla, the Executive Director of AIP. “It’s very important that the publishing be run as efficiently as possible.”

AIP is an umbrella organization, whose members are other societies, among the largest of which is APS. APS is the publisher of the Physical Review family of journals, including Physical Review Letters, Physical Review X and Reviews of Modern Physics, whereas AIP publishes a portfolio of 17 journals, many of which concentrate on applied areas of physics, as well as journals as sev- eral of its member societies.


The newly formed AIP Publishing LLC is designed to be leaner and more adaptable. “Publishing is a key compo- nent of journals, including Physical Review Letters, Physical Review X, and Reviews of Modern Physics, whereas AIP publishes a portfolio of 17 journals, many of which concentrate on applied areas of physics, as well as journals as several of its member societies.


The newly formed AIP Publishing LLC is designed to be leaner and more adaptable. “Publishing is a key component of all AIP efforts and we look forward to working closely with the two societies to further improve the efficiency and effectiveness of our publishing operations,” said Dylla.

March & April Meeting Talks Online

Full video coverage of two major sessions at the March Meeting has been posted on the APS website. Both the Kavli Foundation Session: Physics for Real World Problems, and the Nobel Prize Session featuring talks by David Wineland and Serge Haroche can be accessed at http://www.aps.org/meetings/march/index.cfm. At the same site there are also interviews, special features and live coverage of the meeting, produced by APS-tv.

Video from the April Meeting, including all the plenary sessions, is also available at http://www.aps.org/meetings/april/index.cfm.

Brinkman Looks Back on Good Science and Tough Decisions

William F. Brinkman stepped down last month as the Director of the Office of Science in the U.S. Department of Energy, the leading funder of physical science in the federal government. He had held this post since June of 2009, prior to which he was a Senior Research Physicist at Princeton, and before that Vice President for Research at Bell Laboratories. He also served as APS President in 2002.

As he left office, Brinkman took time to share some thoughts with Michael Lucibella of APS News.

What can you say were the highlights of your tenure as the Director of the Office of Science?

Well, several things. I think we moved ITER [the International Thermonuclear Experimental Reactor] forward very successfully, we moved the free electron laser to completion and it’s working. Those were very important accomplishments. NSF IL [National Synchrotron Light Source II] is moving forward. A lot of good science came out of things like the biofuel centers and the EFRCs (Energy Frontier Research Centers). I think they were very innovative and have produced a lot of very good science, whether it was on lignins (an organic compound that could be a renewable fuel source) or on breaking down cellu- lose and that kind of thing, but also on new types of solar cells with silicon pillars. A lot of good science came out and I feel pretty good about that. In addition, we’ve managed to build as good a staff as we’ve had in a long time. So I’m very pleased with that too, I think the people that I am leaving behind are very good.

How has the Office of Science changed under your watch?

BRINKMAN continued on page 6

March Meeting Prize and Award Recipients

At the ceremony, the recipients gathered for a group photo; three who unfortunately could not attend are pictured in the insets. In the photo, front row (l to r): Timothy Sanchez, Wilson Ho, Daniel Fisher, Costas Soukoulis, David Smith; Middle row (l to r): Mark Pittos, Brooks Pate, Jean-Luc Brédas, Robert Birgeneau (AIP), Mario Alfantaglia, Daniel Neumaark, Tetsuya Miwa, Michio Jimbo, Margaret Geller, David Yanges. Back row (l to r): John Wodick, Mahesh Maharathanapah, Stephen Cheng, Nergis Mavalvala, David McClelland, APS President Michael Turner. Insets (l to r): Yukiya Dozchenko, Geraldine Richmond, Roman Schnabel.

By Bushraa Khatib

This year’s annual conference of the Physics Teacher Education Coalition (PhysTEC) was held March 16-17 in Baltimore, Mary- land as a satellite meeting of the annual APS March Meeting. Over 75 universities and colleges were represented by 119 attendees.

The conference began with an opening plenary by Richard Stein- berg, Program Director of Science Education at City College of New York. Steinberg, a professor of physics and education, presented his experiences during a sabbati- cal year in which he taught physics in a New York City public high school with his colleagues. He took time to share some thoughts about the need for more opportunities to take courses that he himself had previously taught, and shared both frustrating and posi- tive experiences with his students.

Steinberg said his experiences as a high school teacher give him more credibility as a professor, and re- inforces his methods of teaching physics by inquiry.

PhysTEC continued on page 6

Parse the Data About Women in Physics

By Calla Cofield

At a press conference at the APS March Meeting, Louis Ama- ral from Northwestern University presented results from a paper in which he and colleagues care- fully examine what factors may influence publication rates among women in STEM fields. Roxanne Hughes of the National High Mag- netic Field Laboratory presented results from her study of the ef- fectiveness of a program targeted at providing more opportunities to female physics undergraduates.

Women Publish Less Than Men

A simple count of publica- tion numbers by gender shows fewer publications from women in STEM compared to their male counterparts.

Researchers at Northwestern University and Universitat Rovira i Virgili in Catalonia, Spain decided to ask the more dynamic ques- tion of whether or not male scien- tists were actually outperforming their female counterparts. Their results were published in December 2012 in the journal PLoS One.

The team created an equation for publication rate that incorporated variables such as the stage the person is at in his/her career, and the number of publications from the entire field or discipline in that year.

They also considered that some DATA continued on page 4
“It is the consensus of the Voyager science team that Voyager 1 has now left the solar system or reached interstellar space. In December 2012, the Voyager science team reported that Voyager 1 is in a new region called the ‘magnetic highway’ where energetic particles changed dramatically. A change in the direction of the magnetic field is the last critical indicator of reaching interstellar space, and that change of direction has now occurred.”

—Marc Kamionkowski, Johns Hopkins University, about the recent detailed map of the cosmic microwave background made by the European Space Agency’s Planck space telescope, The Washington Post, March 21, 2013.

“The standard cosmological model looks even stronger today than yesterday... The universe remains simple and strange.”


“We envision that one day small robots with legs will be sent on to Mars and other planets to help humans explore extraterrestrial exploration.”


“It was basically just this random mess of collisions, which is essentially how you want to think about the gas in the air that we breathe.”


“Just as DNA determines many individual characteristics, the map from the space probe shows the seeds from which our current universe grew.”

—Mike Bierbaum, Carnegie, on the physics of moss pits, Natural Public Radio, March 22, 2013.

“I am sure that it is a great joy for science that this experiment has been turned into a reality.”


“It took us 18 years to build this experiment. We want to do it very accurately.”


“What have you probably seen from the data is a significant new measurement... Unfortunately, the data wasn’t that conclusive.”


“I would bet against dark matter being the origin of these particles at this time.”


**This Month in Physics History**

**May 11, 1962:** Feynman’s “Brownian Ratchet”

In 1948, Sir Arthur Eddington famously described the second law of thermodynamics as holding only “as far as we know the conditions of the universe of nature,” lamenting that if one devised a theory found to violate that second law, “There is nothing for it but to collapse in deepest humiliation.” That has always been physicists from propounding occa- sional speculative thought experiment on how one might violate the second law, thereby deepening our understanding of the process. Nearly one hundred years later, Richard Feynman revisited the concept with his own thermody- namically-inspired thought experiment that ap- parently defied the second law. The 1948 work was followed up in 1959 by researchers with the Alpha Magnetic Spectrometer, and more recently Feynman would work on it until he figured it out. Over the course of the day, other students would present him with the same problem, and he’d solve it for them immediately, leaving a reputation as a “super-genius.” His entire career in physics was about solving ever-more-complicated puzzles.

Feynman joined the Manhattan Project in the early 1940s, while still a graduate student, evinc- ing a mischievous penchant for bending the Los Alamos security systems just for fun. He taught himself the art of safe-cracking and picked the locks on vaults containing the most sensitive sec- rets to building an atomic bomb. He never took any of the science, but left behind notes regarding the project’s law's secrecy. In his later years, he developed passions for painting and playing the bongos. In 1929, Feynman was a physics profes- sor at the California Institute of Technology, and found himself involved in a three-year project designed to improve the calculation of Caltech’s undergraduate students. The result was a classic series of lectures that eventually found their way into published form: The Feynman Lectures on Physics. The tome has since sold well over 1.5 million copies in English alone, and continues to inspire budding young physics students.

During one of those Caltech lectures, on May 11, 1962, Feynman described a “Brownian ratchet” device based on earlier work in 1912, by a French physicist named Ivan Smoluchowski. Smoluchowski proposed a machine capable of extracting useful work from heat in a system at thermal equilibrium. It features a small paddle wheel immersed in a fluid and a ratchet controlled by an axle. The molecules in the fluid exhibit ran- dom Brownian motion and those collisions cause the paddle to turn. The key is that a pawl prevents its rotation. The ratchet will continue to turn in just one direc- tion, and can be harnessed to perform some work. Feynman’s updated version of Smoluchowski’s thought experi- ment was to demonstrate to his under- graduates that the ratchet will not rotate continuously in one direction. The pawl will also exhibit Brownian motion, making it even in such a way that occasionally the ratchet wheel will slip backward rather than forward. In fact, Feynman performed the first quantitative analysis of the device and concluded that over time the machine will ratchet backward as much as it moves forward, thereby canceling any possibility for ex- tracting useful work most like a long run with no external energy source to keep it running. The only way to extract work from the system would be to create a tem- porary differential between the air on one side of the device—the same basic principle as a steam engine.

Feynman’s thought experiment has continued to interest physicists over the decades, even extend- ing it to scenarios involving multiple ratchets. Eventually it led to developing the concept of a ratchet, which turns even the tiniest machines capable of extracting useful work not from thermal noise, but from microscopic sources of nonequilibrium, such as chemical potentials. In 2010, physicists at the University of Twente successfully demonstrated a machine based on the Brownian ratchet, using 2000 bouncing beads whose Brownian motion rotates a paddle inside the machine, to generate a small net excess of energy. In order to ensure that the paddle turned in one di- rection instead of the other, the Twente researchers covered one side of each vane on the paddle. This caused the beads to lose more energy whenever they hit the taped side.

In a highly inefficient system; such of the energy is lost to heat and sound, and it doesn’t vio- late the second law. But it could shed light into the movement of biological molecules like RNA poly- merase and protein kinases. At these scale sizes, such molecules travel through the body along “tracks” in cells via a ratcheting mechanism—a phenomenon called back interaction. The Twente apparatus models that motion on a macroscale.

So while Eddington was technically correct in FEYNSION continued on page 4
**Guns, Salsa and Butter**

By Michael S. Lubell, APS Director of Public Affairs

What do gun control and immigration reform have to do with salsa and quinones? The two issues may seem far removed from each other until you read this article. The reason is that the way gun control and immigration are handled is beginning to open the door to new opportunities to improve the general “climate” of physics.

**Science Diplomacy**

By Calla Cofield

At last year’s March Meeting in Boston, the APS hosted the first session at a major physics conference to focus on issues facing LGBT+ persons in physics. That session drew over 100 audience members. At this year’s March Meeting, organizers of the volunteers hosted an evening roundtable discussion session attended by roughly 40 people. At the session, the volunteers report issues that has been in the last 12 months to address some of the issues brought up in last year’s session.

Both the 2012 session and the 2013 roundtable discussion were organized by members of the Networking Subgroup of LGBT+Physicists. The group partnered with members of the organization oSTEM, which is an organization that supports career development of LGBT+ students in the STEM fields. LGBT stands for lesbian, gay, bi-sexual, and transgender, while plus sign includes other sexual orientations or gender identities including intersexed, queer, questioning, asexual or pansexual. Some organizations also list het- erossexual and cisgender (anyone who identifies with the gender they were born with) to indicate the inclusion of all sexual orientations and gender identities.

At the 2012 APS session on LGBT+ issues, organizers asked attendees to fill out a survey asking them about their experiences in physics and what actions they wanted to see taken to improve support for and visibility of LGBT+ persons in physics. The results of that survey were published on the website arXiv.org in a paper titled “Gender and Sexual Diversity Issues in Physics: The Audiences Speaks.”

In early March, the LGBT+Physicists group published a “Best Practices Guide” on its website (lgbtphtics.org), which the group considers as the first website about LGBT+ physicists. The guide makes recommendations for “how to make the physics workplace more inclusive for LGBT+ scientists,” and is aimed mainly at academia. It offers specific recommendations at the individual, department and university level. These include actions that can be adopted immediately, such as using inclusive language and being visible, as well as longer-term suggestions, such as increasing networking opportunities for LGBT+ persons.

The guide’s suggestions aim to improve the general “climate” for LGBT+ persons in physics, which can be influenced by how accepted and supported those persons feel by their colleagues and their institution. Similar issues face women and racial and ethnic minorities in physics. Research has shown that a negative climate toward minority groups can negatively impact individuals, which can lead to negative consequences for the department and the institution.

A second major step was the creation of an “out list” for physics, where LGBT+ members of the physics community may publicly identify themselves as such. There is also a list for ally physicists (who persons who openly support the LGBT+ community but don’t identify themselves as such). There is an out list for professional astronomers hosted by the University of California Santa Barbara website, and some universities have made their own public out lists.

Adam terrified, one of the roundtable session organizers and an associate professor in the physics and astronomy department at University of Virginia, said, “We hear again and again from people that perhaps the biggest problem is the lack of visibility of LGBT+ people and their allies in the physics. Out and ally lists are our attempt to directly address that. These lists help create a better climate by helping to alleviate the isolation that all minorities feel and also recognizing the important contributions of LGBT+ people to Physics. We’re all in this together.”

**LGBT+ in Physics**

By Michael Lucibella

Scientists at Harvard are developing an inexpensive, organic-based battery that could change how the nation generates electricity. At the March Meeting, researchers reported their initial results developing batteries that store charge using quinones, carbon-based molecules found frequently in nature.

They hope that with further development, their battery design could be scaled up to industrial levels, and help make solar and wind energy more economically viable.

While in Baltimore for the March Meeting, President Yee Hsing and Vice-President Fu-Fen Kao of the Physical Society of the Republic of China (PSROC) visited APS Headquarters at the American Center for Physics in nearby College Park, Maryland. They received a tour of the building, including the Niels Bohr Library & Archives and the Center for History of Physics. President Yee Hsing, PSROC Vice-President Fu-Fen Kao, APS’s Director of International Affairs APs Associate Executive Officer Alan Chodos. Photo by Adam Negus/APS Staff

**A Year of Progress for LGBT+ in Physics**

By Calla Cofield

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Both the 2012 session and the 2013 roundtable discussion were organized by members of the Networking Subgroup of LGBT+Physicists. The group partnered with members of the organization oSTEM, which is an organization that supports career development of LGBT+ students in the STEM fields. LGBT stands for lesbian, gay, bi-sexual, and transgender, while plus sign includes other sexual orientations or gender identities including intersexed, queer, questioning, asexual or pansexual. Some organizations also list het- erossexual and cisgender (anyone who identifies with the gender they were born with) to indicate the inclusion of all sexual orientations and gender identities.

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**Organic-Based Flow Batteries Could Enable Renewables**

By Michael Lucibella

Scientists at Harvard are developing an inexpensive, organic-based battery that could change how the nation generates electricity. At the March Meeting, researchers reported their initial results developing batteries that store charge using quinones, carbon-based molecules found frequently in nature.

They hope that with further development, their battery design could be scaled up to industrial levels, and help make solar and wind energy more economically viable.

Michael Aziz is the head of a team, sponsored by the Department of Energy’s ARPA-E program, that is developing the new batteries. Team members are starting work on a design of new “flow batteries,” which rely on quinones suspended in water, rather than existing designs that use expensive vanadium or dangerous chlorine.

The batteries work like fuel cells. Two large tanks of liquid circulate through a central cell stack divided by a thin membrane. One fluid in the flow battery is positively charged, while the other is negative, much like the electrolytes in a traditional battery.

The thin membrane in the cell BATTERIES continued on page 7
A Noether Letter

I was pleased to read your celebration of Emmy Noether and her fellow physicists and mathematicians in "Physics History" in the March APS News. Her theorem does not seem to have received the fame it deserves, in part because it is so technical, at least as you point out. I would like to relate an anecdote about her and mention the crucial importance her theorem made to my work.

When running for Common Core Math in 1980, I was going door-to-door introducing myself and requesting support. From the voter list I cut, I noticed I was at the home of a Noether family. When the man who answered the door exhibited a nervousness I mentioned that he was a physical chemist, it was enough for me to break in by asking, "Are you related to the famous physicist, Emmy Noether?" He gestured, he said, "Yes, she was my aunt! How do you know of her?" I replied with a whole chapter in my PhD thesis on the theorem and my use of it, and he couldn't then stop telling me of Emmy's professional success, such as receiving the "Noether Prize" in Physics History. Finally, I hurried on, hoping I had garnered a vote by a very uncommon veneration.

My use of Noether's theorem is an outgrowth of my interest in polymerization reactions. I found that as a polymer grows, it is not just one molecule but a large number that is produced, a reaction that is not seen with typical chemical reactions. I was able to show that the use of Noether's theorem predicted this behavior. That was my first, and still only publication of Noether's theorem in polymer chemistry. I am proud of this finding, which was related to polymer synthesis.

However, Science's "Physics Today" recently devoted a whole issue to the 100th anniversary of Noether's theorem. It is clear that her theorem has had a profound impact on our understanding and use of science. It is truly a remarkable achievement, one that I am proud to have been a part of.

Although I am amused at the imaginary play on words with "Fische" and "Physsics," I am not thrilled that APS News is discussing tricky dicey financial models for the benefit of a few growth stock market players in the guise of everyone else and our Nation. A discussed example is hedge fund managers, who gamble with other people's money. This is a seamy, seedy, artificial contrived system where they are guaranteed to make huge personal fortunes while every one else, businesses and our Nation lose.

This system is there no positive benefit to society or our Nation. These hedge fund managers are given special tax breaks to further break their huge personal fortunes. However, this system does not result in a significant increase in public welfare. Another concern is that these hedge fund managers may be more productive working in fields that are truly in need of help, such as healthcare or education. I have no interest in defending Wall Street, my thesis was derived from an argument for the first time that the general conservation law of pseudo (or quasi) or crystal momentum. Let this allow me to resolve the Abraham-Minkowski controversy contributed by a derivation of Noether's theorem and the markets but then quickly degenerates into why physicists are good at predicting market behavior or predictions. However, Wall Street doesn't care about this because its identity as a financial entity is a principle of being self-perpetuating, it simply serves a marketplace. The question is, are physicists needed to make the marketplace operate more efficiently? If the answer is "yes" then solving the most pressing issues of our day, such as understanding global climate change/disruption, development, cleaning energy sources, and developing the next generation of electronic devices. The problem is one of priorities. As a nation, we invest tremendous time, effort, and money in training these young scientists but our tax policies and government regulations do not stimulate development in these crucial areas. What then would be the best use of our highly trained physicists? I would argue that it would be to employ them in solving the most pressing problems of our day, solving the most pressing problems of our day, such as understanding global climate change/disruption, de
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Wall Street is now just a contrived artificial system for personal profit that does not have a useful contribution to society.

Chuck Gallo
Lake Elms, MN

James Owen Weatherall replies:

There are several different questions one might raise regarding the role of physics and physicists in finance. One question concerns whether physicists' talents serve the greatest good in finance, as opposed to other fields. Another concerns whether modern finance physicists should have better support in other fields. A third question is whether physicists are more productive working in finance. For the next, I have no interest in defending Wall Street. For the first, I agree that basic science should be central to any view of the financial industry. As pointed out in a recent article in the New York Times, Wall Street does need to change. But I am concerned about the practical implications of such a change. What would happen to the financial industry if physicists were to leave it? I believe that physicists could have a positive impact on the financial industry. For example, by developing new models and techniques that could be used to analyze financial data more accurately and efficiently. In this way, physicists could help to make the financial industry more stable and secure.

I would also like to point out that physicists have a unique perspective on the world. They are trained to think critically and analytically, which can be a valuable asset in the financial industry. For example, physicists are adept at analyzing complex systems and identifying patterns and trends that are not immediately obvious to others.

However, I also believe that physicists must be aware of the potential conflicts of interest that can arise in the financial industry. They must be careful to avoid any appearance of impropriety and to ensure that their work is conducted in the best interests of their clients and the public.

In this way, physicists can play a valuable role in the financial industry, provided that they are willing to work to achieve the greatest good and to avoid conflicts of interest. I believe that physicists can make a significant contribution to the financial industry, providing that they are willing to work hard and to be aware of the potential risks and challenges that they may face.

Thoughts on how to think

On the Back Page (APS News, May 2013) I mentioned some things that worry physicists are especially good at financial modeling. I believe that it is because Physicists have a distinctive way of thinking about mathematical problems. They are experts in approximating and using clever techniques to arrive at a good answer. I believe physicists are good at recognizing patterns and understanding complex systems. I believe physicists can help to make the financial industry more stable and secure.

The current system of financial speculation is based on the belief that it is possible to predict the future with a high degree of accuracy. However, I believe that this belief is misguided and that financial speculation is not a useful activity.

In this system, there is no positive benefit to society or our Nation. These hedge fund managers are given special tax breaks to further break their huge personal fortunes. However, this system does not result in a significant increase in public welfare. Another concern is that these hedge fund managers may be more productive working in fields that are truly in need of help, such as healthcare or education. I have no interest in defending Wall Street, my thesis was derived from an argument for the first time that the general conservation law of pseudo (or quasi) or crystal momentum. Let this allow me to resolve the Abraham-Minkowski controversy contributed by a derivation of Noether's theorem and the markets but then quickly degenerates into why physicists are good at predicting market behavior or predictions. However, Wall Street doesn't care about this because its identity as a financial entity is a principle of being self-perpetuating, it simply serves a marketplace. The question is, are physicists needed to make the marketplace operate more efficiently? If the answer is "yes" then solving the most pressing issues of our day, such as understanding global climate change/disruption, de

make it tractable. I would also like to wonder, whether such a "distinctive way of thinking" or even any thinking about how to think and what that means is ever expressly addressed during a physics student's education. I have to wonder if the only individuals optimally able to perform such intellectual tasks are those who in
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In this way, physicists can play a valuable role in the financial industry, providing that they are willing to work hard and to be aware of the potential risks and challenges that they may face.
Nowhere in the February article did Kirby express such a position. As Director of the International Tsunami Information Center (ITIC), he possessed expertise that was desperately needed by countries that previously never would have even thought of a tsunami. “Definitely, most countries in the Indian Ocean didn’t know what a tsunami was and what it could do,” she says. Further complicating the problem, “back then there was no real-time data in the Indian Ocean.”

Kirby and PTWC scientists on duty gathered what information they could from news reports as they urgently tried to contact Indonesian government officials. “In the chaos, all communication lines were down and no one answered the phone,” she recalls. By 8 p.m. Hawaii time, about 5 hours after the earthquake, Asian governments were starting to realize there was a problem. “It was clear that a major natural disaster was occurring,” she says. “From their conversations, it was immediately evident that this was a tsunami event.”

For over a month, she and her colleagues continued working on the campaign to provide the kind of information a tsunami warning system should make available to the public. “We encode what we know, and people are able to solidify information and data about what had occurred. And from that point on, her life was consumed by the catastrophe.

New System Could Send Entangled Photons into Space

By Michael Lucibella

A research team from Italy is developing a system that will allow physicists beam quantum information a large distance away. At the March Meeting, the team described a system that allowed them to transmit a signal through a kind of polarized light, to an imperfectly aligned detector in order to achieve quantum entanglement. Their new system can send signals from one detector to another, even when the two detectors are at opposite ends of the country.

Scientists have not quite gotten to the point where useful messages can be sent through such a system. However, they are making significant strides transmitting entangled photons over great distances. Tests so far at the University of Padova's University of Padova known as “ITIC”, a joint partnership between UNESCO and the U.S. National Oceanic and Atmospheric Administration (NOAA), serves the world’s 28 countries. “There is a requirement, we help,” they say. “Opportunities to assist range from simple data sharing, to more complex capacity building, training, and resource allocation for designing and installing warning and tsunami response and preparedness systems. The team worked with the UN to develop systems that could be used around the globe as the new CENTER on page 7.

The after day Christophe 2004 began in a non-eventful manner for most of the planet. But in the early morning hours in Indonesia, an earthquake with a magnitude of 9.1-9.3 struck off the west coast of Sumatra. Resulting von 5 of the worst disasters in recent human history, an estimated 14 nations surrounding the Indian Ocean.

In Honolulu, Hawaii, Laura Kong, a geophysicist by training, received a phone call 30 minutes after the earthquake from the Pacific Tsunami Warning Center (PTWC). A research team from Italy is developing a system that will allow physicists beam quantum information a large distance away. At the March Meeting, the team described a system that allowed them to transmit a signal through a kind of polarized light, to an imperfectly aligned detector in order to achieve quantum entanglement. Their new system can send signals from one detector to another, even when the two detectors are at opposite ends of the country.

Scientists have not quite gotten to the point where useful messages can be sent through such a system. However, they are making significant strides transmitting entangled photons over great distances. Tests so far at the University of Padova’s "ITIC" have set a new distance record in 2012, with a team from the University of Padova known as “ITIC”, a joint partnership between UNESCO and the U.S. National Oceanic and Atmospheric Administration (NOAA), serves the world’s 28 countries. “There is a requirement, we help,” they say. “Opportunities to assist range from simple data sharing, to more complex capacity building, training, and resource allocation for designing and installing warning and tsunami response and preparedness systems. The team worked with the UN to develop systems that could be used around the globe as the new CENTER on page 7.

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AIP continued from page 1

Building on its involvement in the 2012 PhysTEC conference, the American Chemical Society (ACS) had a more prominent role this year as a conference cospon- sor with Clark Blackburn, AIP Teacher Education Program man-ager and a conference organizer, said, “I was very pleased with the participation, especially with the inclusion of chemistry teacher educators in this conference.”

Featured workshops on chemistry included parallel sessions on the Chemistry Teacher Education Co- alition, course design, and learning chemistry in cooperative groups.

“We really had a much better ple- nary titled, “Nothing Makes Sense in Physics Education Except in the Light of Poverty,” included data on the many factors that affect teacher preparation. Mardon, the Associate Dean for Science and Mathematics at the University of Texas at Austin, emphasized that trends are more striking when data are compared across different groups, such as women versus higher income students.

The conference featured a num- ber of parallel sessions and work- shops on topics including induc- tion and mentoring, course reform, innovative practice, recruitment and retention, and sustaining re- form.

Clark Blackburn noted that Catherine Good’s talk on stereo- types of engineers and the growth of interest in the community. Good, an Assistant Professor of Psychol- ogy at Butte College, addressed stereotypes that affect the achieve- ment of females and minorities in STEM disciplines, and described research-based interventions to help students overcome the impact of these negative stereotypes.

The conference concluded with a panel session on the implications of the Next Generation Science Standards for teacher preparation. Panelists included Helen Quinn of SLAC, Melanie Cooper, Andy Jackson, and Ramon Lopez of the University of Texas at Arlington.

The PhysTEC conference is the na- tion’s largest single event focusing on physics teacher preparation, and is a major component of the Phys- TECP project. The PhysTEC proj- ect, a partnership between APS and the American Association of Physics Teachers (AAPT), strives to improve and promote the edu- cation of future physics teachers. It does so primarily by selecting high quality regional sites that effectively use student project support to develop their physics teacher preparation programs into something that will be more important to mankind than the rest. We’re trying to reach out more to the country is going in? (ACS) had a more prominent role this year as a conference cospon- sor with Clark Blackburn, AIP Teacher Education Program man-ager and a conference organizer, said, “I was very pleased with the participation, especially with the inclusion of chemistry teacher educators in this conference.”

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The PhysTEC conference is the na- tion’s largest single event focusing on physics teacher preparation, and is a major component of the Phys- TECP project. The PhysTEC proj- ection is something I worry about in the future. We are a long way from where we need to be. Some of these countries are happening out there. The X-ray free electron laser is great, it’s leading the world, but there are four more that are going to be anywhere and we’re going to be substantially over the last few years. That’s the thing that I tell people, that’s the thing that I tell science to have to be built. 

You look at Europe; there’s a lot of money going to be spent and we’re promised a doubling and it’s going to have a real impact. It’s $250 million worth of research that won’t be going on. We have these great new fusions and we’re going to be able to travel, and we have certainl...
ANNOUNCEMENTS

APS Nicholson Medal for Human Outreach

The Nicholson Medal for Human Outreach is awarded to a physicist who either through teaching, research, or science-related activities,

1. has demonstrated a particularly giving and caring relationship as a mentor to students or colleagues, or
2. has succeeded in motivating interest in physics through inspiring educational works, or
3. has demonstrated the ability to inspire, motivate, and involve students through their teaching, research, or science-related activities.

Applications are available online. Nominations are due by 23 May 2013.

Further Information: www.aps.org/programs/honors/nicholson.cfm

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like everyone to join!”

Atheist also stressed that LGBT+ physics is looking for

more volunteers, and that some of the group organizers are allies and

not LGBT+ themselves.

During the session at the 2012 March Meeting, speakers pointed out that the APS Policy on Equal

Professional Opportunity, adopt-

ed by Council in 1994, includes

non-discrimination on the basis of

sexual orientation, but does not

explicitly mention gender iden-

tity. APS Director of Education

and Diversity Ted Hodapp, who

was in attendance, responded by

saying that APS would like its

members to initiate such changes
to policy. At this year’s roundna-

tion, participants were encouraged to
take the petitions back to their home

institutions to gather signatures, which

are being compiled by

LGBT+Physicists.org
It has been clear for quite a while that physicists can't get away with educating only white men. Since 2001 there have been more foreign citizens in our PhD programs than US citizens. We've broadened our admissions to keep quality, high, to keep our physics programs strong. Of course, these foreign students are often European or Asian men, so in some sense, our embrace of diversity has not changed the face of physics very dramatically. For graduate physics education in the 21st century, we will have to expand our “big tent” to include more diverse participants if we hope to keep quality at the highest possible level.

As the population becomes more diverse, it also becomes increasingly difficult to justify the selection effects that result in an overwhelmingly white, male student population in our graduate classrooms. Women remain below 10% of active physicists, and no more than 20% in the youngest, most diverse ranks. The latest AIP data, from 2008, show women now receive 18% of the physics PhDs granted in US institutions. People of color represent a much smaller fraction; for example, fewer than 3% of US citizens receiving PhDs are African-American and Hispanic. For comparison, two-thirds of the Fortune 500 CEOs and 36% of the newer Fortune 500 CEOs are non-white Americans (16.4%) represent more than a quarter of the US popula- tion. By 2043, according to the U.S. Census Bureau, our country will be majority minority.

I am suggesting graduate education must diversify not just because of fairness or equal opportunity, although that certainly ought to concern us, but because it's vital for physics.

Why Diversity is Vital for Physics

The first statement of the problem is simple: if we for any reason exclude a segment of the population—say, women classed more than 60% of the population (roughly, half being women, a quarter being racial minorities), we are limiting the bright minds that can bring their talents to bear on some really tough questions. About compelling evidence that those ex- cluded are less capable, is this not true.

But there is an even better argument for increasing diver- sity and inclusion, based on research on the roots of innova- tion. In discovery fields there is a cost advantage to greater diversity among practitioners. As Sheila Tobias pointed out to me 20 years ago, great civilizations have of- ten arisen at the intersection of trade routes, where people of different societies encountered new ways of thinking. That is, the conflict of ideas stimulates new and better ideas.

More concretely, research shows that diverse groups are more creative and develop solutions to problems that are judged—by people unaware of the origin of the ideas—to be better. Much of this research has been done in a business context rather than an academic or intellectual one. How- ever, the same principles apply. In small research groups and business organizations are probably more aware than slowly changing academic physics departments of the influ- ence of workplace culture on performance. So I believe this research is highly relevant to what we do.

A typical experiment is to create small groups that are, or are not, diverse in gender, race, class, or other variable(s). Each group works independently on a set problem. For ex- ample, in their article on “Ethnic Diversity and Creativity in Small Groups,” McLeod, Lobel and Cox* posed a simple problem related to tourism and asked experimental subjects to brainstorm answers. Experts from the travel industry that graded the responses, not knowing which groups produced each idea; they judged ideas from ethnically diverse groups to be “of higher-quality more effective and feasible—than the ideas produced by the homogeneous groups.”

Experiments also report more strife in diverse groups. It’s much easier to talk to and work with someone who is just like you. But talking to yourself about a difficult problem doesn’t add as much value as talking to someone with a different perspective.

Many experiments, with different boundary conditions, collected the following results.

1. Diverse groups experience more conflict.

2. If diversity is welcomed (i.e., well managed), diverse teams are more productive.

3. If diversity is unwelcomed, diverse groups fail.

What is behind these results? As McLeod et al. (1996) explained, heterogeneous groups hold a variety of per- spectives and ideas, good or bad, that come into play when a problem has to be solved. You can’t solve the problems of the world, that physics tools are useful and that analytic thinking is essential. Look at climate change; biological systems; even finance. Physicists are there in the thick of it, for better or worse.