APS Membership Boosted by Student Sign-ups

The American Physical Society hit a new membership record in 2013 with students making up the bulk of the growth. After completing its annual count, the APS membership department announced that the Society had reached 50,578 members, an increase of 925 over last year, following a general five-year trend. “When we were able to get up over 50,000 again, that was good news. That keeps us moving in the right direction,” said Trish Lettieri, the director of APS Membership.

Students were one reason: The total number of student members increased by 1,075 over last year. Last year’s rate of growth went up to 3.2% and early-career members increased from 9,235 in 2012 to 9,305 in 2013, an increase of 70.

At the same time, the regular membership declined by 273 members, dropping from 23,138 in the beginning of 2013 to 22,865 this year.

MEMBERSHIP continued on page 6

BOUCHET continued on page 7

Bouchet Award Winner Followed a Parental Path to Science

Luz Martinez-Miranda, this year’s recipient of the Edward A. Bouchet Award, always knew she wanted to go into science. She was born in Maryland, moved to Puerto Rico when she was five, and is now a professor of materials science at the University of Maryland.

The Bouchet Award recognizes a distinguished minority physicist who has made significant contributions to physics research. Martinez-Miranda will receive a stipend and travel support to present a lecture at the APS March Meeting.

Growing up, she assumed she would follow in her parent’s footsteps. “I got interested in physics because I was originally interested in chemistry,” Martinez-Miranda said. “My parents were chemists.”

She also credits her grandmother with inspiring her career in science. Her grandmother’s formal education stopped at the third grade, but she always insisted Martinez-Miranda’s mother go to college.

“I think that…optics, which is more visual and more associated with physical phenomena…made it more attractive to me,” she said. “When she went to college she combined her parents’ love of chemistry with her own love of physics. At the University of Puerto Rico she majored in physics and minored in chemistry, which turned out to be a pre-science decision. By her sophomore year she knew she wanted to explore the experimental side of physics. In addition, Martinez-Miranda always had an eye for the artistic, rather an ear. As an undergraduate, she also studied piano and graduated with a bachelor’s of music from the Conservatorio de Música in Puerto Rico.

“Physics meant everything to him,” says his colleagues, was sci-entist and CEO of the Kavli Foundation, Fred,” says Robert W. Conn, President and CEO of the Kavli Foundation. “It was his twin worlds of Kepler-62e and 62-f to explore the inner workings of the universe." Kavli was 86 years old.

“In addition, the American Physical Society has selected its first fellow to send to the Department of Education as part of the new Science, Technology, Engineering, and Math (STEM) Education Policy Fellow-ship. Julia Mundy, who recently defended her PhD thesis in applied physics, will go to the Department of Education to work on science and math education policies.

“I think it’s a great opportunity,” Mundy said. “There hasn’t been a strong presence of scientists in the Department of Education so I’m really excited for the opportunity.”

The APS and AIP jointly announced the formation of the new fellowship in September 2013. The goal is to bring a PhD scientist into the Department for two years to consult on STEM education and policy issues. "It’s exciting," said Tyler Glembo, the APS government relations specialist who helped set up the new program. "The Department of Education is really the place to make important systemic changes."

Mundy will work with the department’s STEM lead, Cammie McAdams. Though specific plans are still being finalized, she’ll likely be working on new STEM initiatives at the department including the STEM Innovation Network, STEM Innovation Hub, the STEM Teachers Pathway Initiative, and the Department of Education for two years to consult on STEM education policies.

New APS Education Fellow Goes to Washington

In Memoriam: Fred Kavli (1927–2013)

The story goes that Fred Kavli, industrialist, philanthropist and physicist, would look up at the night sky in his native Norway as a child and gaze at the stars that salted the sky. Being so far north, he had unique visual access to the universe, with long, dark nights that included the Northern Lights, which signifi-
cantly influenced his decision to both study and support science.

“Physics meant everything to Fred,” says Robert W. Conn, President and CEO of the Kavli Foundation and an APS Fellow. “It was his love growing up. It was the under-
pinning for everything he did.”

On November 21, 2013, science, and more specifically physics, lost a great champion, when Kavli passed away due to complications from cancer. He was 86 years old.

Oil was discovered off the coast of Norway and the country became rich with petrol. But his real pas- sion, says his colleagues, was sci-ence and support of discovery. “He said ‘if I ever get wealthy, I want to leave it all to science to help pro-
duce a better future for mankind,’” recalls Conn.

And that’s just what he did. Af-
ter receiving a degree in applied physics from the Norwegian Institute of Technology, Kavli emigrated first to Canada and, after a year, to the United States. Three years later, in 1958, he launched Kavli Corporation, which designed and sold sensors for myriad industries including the automobile, aerospace, and home appliance sectors.

KAVLI continued on page 6

In Memoriam: Fred Kavli (1927–2013)
February 1932: James Chadwick’s Letter to Nature on the Neutron

A mong the many scientists who witnessed the famous Trinity test on July 16, 1945, was a modest British physicist named James Chadwick. While many physicists contributed to this remarkable achievement, it was Chadwick’s discovery of the neutron in 1932 that made atom-splitting—and the nuclear bomb—a very real prospect in the first place.

Born in Cheshire, England, to a family of modest means, Chadwick relied on scholarships to pursue physics. He eventually won a fellowship to work in Berlin under Hans Geiger. When World War I broke out, Geiger reported for active duty, and Chadwick was awarded to return to England as soon as possible. Chadwick tried, but only by then international travel had become too difficult. He was briefly arrested and spent ten days in jail, falsely accused of having uttered treasonous statements. The laboratory orchestrated his release and he was allowed to work in Berlin—_a decision he would soon regret_.

The war progressed, all British citizens were soon conscripted as called Ruhleben inmates, including Chadwick. It was a former racing track, and the prisoners were housed in the stables, six to a cell, sleeping on mattresses on the floor. Food was scarce, and the first winter in the camp was especially brutal: Chadwick had been rounded up with just the clothes on his back, not sufficient for the harsh winters. __"I can remember the agony when my feet began to thaw out about 11 AM," he later recalled.__

There were handful of other scientists, like Chadwick, and they were given permission to set up a crude laboratory in one of the abandoned barracks in the camp. The materials and built their own equipment from whatever materials were at hand. Chadwick once fashioned a makeshift coating, mill for the salvaged copper wire by hand one sweltering summer evening. He found that toothpaste with thorium powder was mildly radioactive, and also explored the photoschemical reaction of carbon monoxide and chlorine.

After the war ended in November 1918, Chadwick returned to Manchester to recuperate at his parents’ house. He was physically weak, and the severe conditions of his internment meant that for years afterward, he had difficulty digesting fats. He was also broke. Chadwick found himself in a financial position for him, and when Rutherford succeeded__-ed J. J. Thomson as head of Cambridge's famed Cavendish Laboratory, Chadwick opted to follow his mentor, working on experimental nuclear fission to disprove the Zeeman effect (shifts in atomic energy levels in a magnetic field, but it didn’t seem to fit the prevailing model for the atomic nucleus, believed to contain just protons and neutrons).

Chadwick replicated a German experiment in which bombarding a beryllium target, and the unusual form of radiation produced provided evidence of a new kind of chargeless particle. Encouraged, Chadwick devoted the next seven years to further experiments, often working through the night, and his efforts paid off within weeks.

In February 1932, he submitted a letter to Nature detailing his experimental results as evidence for the existence of a neutron. He followed with a second paper in May, providing more of the technical details. The discovery was quickly championed by Nils Bohr and Werner Heisenberg, and Chadwick worked with Maurice Goldhaber to measure the mass of the neutron, and concluded the neutron is a nucle- ar particle rather than a proton-electron pair. The ongoing economic depression made funds for scientific research, even at the Cavendish lab. Chadwick wanted to build a cyclotron so the lab could keep pace with the cutting-edge nuclear physics now being done at Rutherford, but Rutherford was old school, and didn’t want to invest in one, believing bulky, expensive equipment wasn’t necessary to do good science. Frustrated, Chadwick left in 1935 for the far less prestigious University of Liverpool to take over an old laboratory so out-date it still used direct current. He won the Nobel Prize that same year, and used part of the prize money to finance a cyclotron, relying on grants and donated materials to make up the difference. _CHADWICK continued on page 3_
Diversity Corner

By Michael Lucchella

This year, APS presented its Maria Goeppert-Mayer Award to Ana Maria Rey of the University of Colorado. The award recognizes outstanding achievements by a woman physicist in the early years of her career. The award is named after German-American physicist Maria Goeppert-Mayer, who, in 1963, became the second woman to win a Nobel prize in physics (after Marie Curie).

In addition to a certificate honoring her achievement, Rey will receive a $2,500 stipend plus $4,000 in travel allowances to be used towards an up to four-year trip to the US universities and as an APS meeting.

Rey is an atomic, molecular, and optical physicist working at JILA and the University of Colorado. Her research focuses on optically trapping alkaline atoms and polar molecules. This work could serve as the basis for future atomic clocks, as well as quantum simulators, which are possible stepping-stones to quantum computers.

She was born in Bogota, Colombia, and has enjoyed physics since she was young. “I love to be able to write an equation, and nature behaves as I predicted,” Rey said. She liked solving these kinds of equations, Rey said. In her teen years, she found herself needing more than physics from her high school. “I was in high school, I loved physics and I asked the high school teacher to give me more problems,” Rey said. “He borrowed a physics book for me that I used to do more problems besides the ones assigned from the class.”

She attended the Universidad de los Andes in Bogota where she majored in physics. It was there she also met her husband, Juan. After finishing, she decided to travel abroad to continue her education. “I wanted to come to the United States to learn more,” Rey said. “At that time there was no graduate program in Colombia.”

Ana Maria Rey

She set her sights on the University of Maryland and as luck would have it both she and her husband were accepted into the school. The two moved to the US in 1999. However, at that time, the university had limited options for the field she wanted to go into. “When I graduated the formal program started in atomic, molecular and optical physics,” Rey said.

To compensate, Rey took a job in NIST near Gaithersburg, Maryland to get experience in this field. There she worked on the theory of optical lattices and cold atoms. She received her PhD in 2004.

She did her postdoc work at the Harvard-Smithsonian Center for Astrophysics. After three years there, she left for Colorado and is now a fellow at JILA and an associate professor in the University of Colorado’s physics department. Rey has been awarded a MacArthur Fel low in 2013.

As a theorist, she is noted for her willingness to work closely with the experimentalists. “The groups are downstairs so you can just go into the basement and talk to them,” Rey said. “This collaboration has been strong in the last couple of years.” In addition to her work, she also spends time raising her four-year-old son Nicholas.

Rey said that she was honored by the recognition of her work, and looking forward to using the Maria Goeppert-Mayer Award to help advance her research. “There are collaborators around the world, in Europe especially, that are doing experiments that are of the highest quality and collaborating more closely with them could be very interesting,” Rey said.

With the Olympics starting this month in Russia, one can’t help but think of the significant role physics plays in those spectacular events. From equipment design, to ticketing and scoring algorithms, to the physics of the ice itself, physicists are uniquely qualified to study ice friction as it relates to bobsledding, “I was in high school, I loved physics and I asked the high school teacher to give me more problems,” Rey said. “He borrowed a physics book for me that I used to do more problems besides the ones assigned from the class.”

Goeppert-Mayer Award...
Remembering the Bomb

Jeremy Bernstein closes his No-

vember 2013 Back Page article “Learning to Love the Bomb” with the phrase “Perhaps there shouldn’t be one more explosion in the desert of Nevada to remind us.” This re-

minded me that the late Harold Aubrey, former director of Los Alamos, made a similar suggestion. He suggested, I believe, that when the Limited Test Ban banning nu-

clear tests in the atmosphere and elsewhere went into effect, an H-

bomb should be detonated every year over the Pacific and all the world’s heads of governments should be invited to watch, for the same reason Bernstein gives, “to remind us.”

Michael May

Stanford, California

Women and the Nobel Prize

I read with great interest the ar-

ticle in APS News, December 2013, about women and Nobels Prizes. One

person who should have been men-

tioned is Isabella Karle, a chemist at the Naval Research Laboratory. I have spent a career at NRL, although in a very different field, and had one

too with her. She was a very impressive individual. Her husband, Jerome, also at NRL, had won the Nobel Prize for his development of the “direct method” of ana-

lyzing x-ray diffraction to determine molecular structure. His work was theoretical, but Isabella was the prin-
cipal experimentalist that made it all real. There is a web story about her on the following link: http://narra-

tive.ly/the-nonagenarians/isabella-

karle-carusus-crystal-method

Wallace Manheimer

Allendale, New Jersey

Controversy Continues Over Picking Nobel Winners

The naming of Nobel Prize win-

ners always raises the question of who may have also contrib-
uted but who were not included in the award. This year’s physics prize is no exception (APS News, Novem-

ber 2013, page 1). This year’s winners, François Englert and Peter Higgs, developed the

oretical mechanism for the origin of mass of subatomic par-

icles. Others that proposed what is now known as the Higgs field were the late Robert Brout, Carl Hagen, Gerald Guralnik, and Tom Kibble. Perhaps it was not posted post-

humously and may not be shared among more than three people. These criteria may explain why

Brou, longtime collaborator of Ein-

gert, was not included and thus why only two were awarded the Prize.

The recent passing of Kenneth Wilson (Physics Today, November 2013, page 65) reminds us of a similar case regarding the 1982 Nobel Prize in Physics awarded to Wilson for the development of renormalization group as applied to critical points and phase transitions. The names of Michael Fisher, Leo Kadanoff, and Benjamin Widom come to mind as possible contribu-

tors. Surely, the three-person crite-

ria may have been used in this case. No doubt, there are many more cases of contention. However, a

case that stands out is that of Ray-

mond Vahan Damadian, an Ameri-

can medical practitioner and inven-

tor of the first magnetic resonance imaging machine. Damadian was the first to perform a full body scan of a human being in 1977 to diagno-

sce cancer. Damadian has received a multitude of awards for his dis-

covers. In 2005, the Nobel Prize in Physiology or Medicine was awarded jointly to Paul C. Lauterbur and Peter Mansfield for their dis-

covers concerning magnetic reso-

nance imaging. Surely, there was room here for a third winner.

Moorad Alexanian

Wilmington, North Carolina

Digital versus Analog

In “Doing Science” Online (Let-

ters, APS News, November 2013)

David Lee credits the telegraph with the first “digital” communication. Unfortunately, the only thing digital about the telegraph is that it oper-

ated by the fingers (digits) as defined by the Oxford Dictionary. Frequently contrasted with analog, Relat-

ing to, using, or storing data or in-

formation in the form of digital sig-

als: digital TV. A digital recording involving or relating to the use of computer technology: the digital revolution. 2. (of a clock or watch)

showing the time by means of dis-

played digits rather than hands or a

pointer. 3. of relating to a finger or
digits.

The telegraph is a form of ana-

logue communication as defined by Oxford and other dictionaries. Lord Rayleigh may have communicated and collaborated using the telegraph, but he did not live to see the “Digital Age” in which we are now embed-

ded. Even the ciphers, such as Morse Code, are analogue communications. As defined in the Oxford Dictionary: analogue (adjective): relating to or using signals or information rep-

resented by a continuously variable physical quantity such as spatial position, voltage, etc.: analogue sig-

nals the information on a gramos-

phone record is analogue. Often

contrasted with digital (sense 1), (of a
clock or watch) showing the time by means of hands or a pointer rather than displayed digits.

If the telegraph were true digital communication, I seriously doubt that Rayleigh would have been the first to use it as such.

My doctoral research advisor frequently resorted to the Oxford and other dictionaries for clarification.

Spelling and grammar checks often do not spot such word misuse. This is another differentiation that is basic to understanding the physi-

cal world today.

Victor S. Alpher

Austin, Texas

Zero Gravity

the lighter side of science

By Michael Lucchella

www.alainalevine.com, or followed on twitter @

AlainaGLevine

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This extra layer of lead shielding will further reduce false positives.

While the new germanium detectors will reduce our margin of error to an additional ten-millionths of a percent.

Does that mean you were actually able to actually detect dark matter?

Not yet but we are now really good at not detecting it.
There’s nothing like six to nine inches of snow piling up on the Connecticut hills, with 40 mile per hour winds and temperatures of five below, to take the starch out of you—unless you live in Minneapolis, in which case it’s a day at a balmy winter spa.

So, faced with the prospect of venturing outside and chilling my body to the bone, I decided to catch up on some books I’ve had on my reading list for a while. Curled up in an armchair, what I encountered was just as chilling. But, in fact, these gloomy snapshots of today were rays of hope for the future, especially for science.

I started with Joe Scarborough’s beautifully written new book, The Right Path: From Ike to Reagan, How Republicans Once Mastered Politics—And Can Again. I’m a “Morning Joe” junky and rarely miss the MSNBC show that Scarborough, a former conservative Republican House member, hosts on weekends along with Mika Brzezinski, who provides a Democratic counterpoint.

Scarborough’s message simply distilled is that Republicans have lost their way. The party of Abra- ham Lincoln, Teddy Roosevelt, Dwight Eisenhower and Ronald Reagan has strayed from its preconceptions to ideological intransigence, so much so that it is marginalizing its national appeal and prospects. That party once had a tent large enough to attract moderates like Nelson Rockefeller and conservaties like Robert Taft, but Scarborough asserts it has now become so insular that it is ceding the future of the nation to liberalism embodied by an ascendant Democratic Left.

One-party polity, which he sees as a serious possibility absent Republican redirection, poses an existential threat to American demo- cracy in his view. And in a not-so-veiled warning to Tea Parti- sans, Scarborough exhorts the GOP leadership to push back against the inflammatory rhetoric of the far right and embrace pragmatic conser- vative accommodation. And if Republican poobahs take his advice, I believe science—historically a bi- partisan venue of common ground—will find itself with an ideal opening gambit.

Saving an ailing Republican Party is a serious matter. But saving an ailing nation is even more cru- cial. And that is what Thomas Fried- man and Michael Mandelbaum address in their 2011 book, That Used to Be Us: How America Fell Behind in the World It Invented and How We Can Come Back. It’s hard to summarize 356 pag- es in just a few sentences, but here is the essence of their analysis and prescription for national recovery: American exceptionalism—a term that finds its roots in Alexis de Toqueville’s 19th century two-volume treatise, Democracy in America—is not immutable, Friedman and Man- delbaum assert. And without ad- dressing four major challenges: glo- balization, the IT revolution, deficits and debt, and energy and the envi- ronment—they say the United States is in the process of ceding its status in the world—a bad outcome for all nations, in their view.

To recapture its exceptional po- sition, they argue, America will have to draw on its historical capac- ity that de Toqueville termed excep- tional and sharply focus policies and spending on three strategic areas: education, infrastructure, and re- search and development. They could not have connected American science to American success more vividly. Of course, to see that our nation and our politics are in trouble, you don’t have to read Scar- brough, or Friedman and Mandel-baum. You simply have to look around you. And that is what George Packer helps you do with a series of gripping narratives of contem- porary American life in his recently published book, The Unwinding. It is eerily reminiscent in style and substance of John Dos Passos’ Depres- sion-era trilogy, U.S.A., which occupied a prominent place in my parents’ extensive library, and which I hadn’t seen for more than 50 years when I was still in high school.

Packer, whom I first met sev- eral years ago and saw again re- cently, is an extraordinarily tal- ented writer with progressive leanings. His book, as New York Times columnist David Brooks, a Republican, pointed out in a large- ly positive review, is really about three unwrappings: “the stagnation of middle-class wages and widening inequality…the crushing recession that began in 2008…[and] the unraveling of the national fabric.”

Although Packer doesn’t say so explicitly, science and technology played a role in all three of these unwrappings. Technologies enabled globalization and IT-driven work- force reductions helped produce the first. Complex mathematical algo- rithms known as derivatives helped bring Wall Street to its knees and led to Main Street’s great recession. And the average person’s inability to prosper in the modern techno- logical world helped fray the tradi- tional American fabric.

But if you think about it, as Friedman and Mandelbaum have done, investments in research, educa- tion and infrastructure—all with substantial payoffs, they re- quire can spawn a new era of American exceptionalism. The re- sult won’t be a complete rewinding, but in the end, it could provide a renascence of the American dream. As the second session of the 113th Congress begins its work, I only hope that at least a few mem- bers took some time during their holiday break to reflect on the issues Scarborough, Friedman, Mandel- baum, and Packer have illuminated so poignantly.
**ENVELOPE continued from page 1**

Kepler-62f, planets about the size of Earth, covered that the three planets orbiting this star are likely habitable. They are one in five sun-like stars in the galaxy. Scientists estimated that there could be an inhabited planet within 100 light-years of us.

**Planck Telescope**

The European Space Agency reported on new results from the Planck Space Telescope in March. The spacecraft took the most detailed picture yet of the cosmic microwave background, and there were still some surprises left. It turns out that the universe is a little bit older (13.72 billion) and made up of more dark matter than astronomers had previously thought. In October, the agency announced that after its successful mission, the observatory would shut down for six months. In August of 2012, but after several previous false positives, scientists needed more data to be sure.

**Dark Matter**

Apparently conflicting results dominated the ongoing search for dark matter this year. First in April, the Cryogenic Dark Matter Search reported that after analyzing data from their five-year run, they identified three signals that looked like dark-matter candidates. However, in October, scientists at the Large Underground Xenon experiment in South Dakota released the null results of their first run. It should have been able to spot the signals seen by CDMS, but the fact that it didn’t has left physicists scratching their heads.

**Kavli Prize continued from page 1**

When he sold the company in 2000 for $340 million, he established The Kavli Foundation to advance science for the benefit of humanity and promote increased public understanding of scientists and their work.

Since that time, the Foundation has donated more than $280 million and established the Kavli Prizes in fundamental physics, neuroscience, and nanoscience and nanotechnology. It has also sponsored projects and programs that bolster scientific endeavors, and a special Kavli prize was awarded at the APS March Meeting and April Meeting, to the NIH Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, to science journalism prizes and travel fellowships.

And then there are the Kavli Prizes, designed to parallel the Nobels, the Prizes are awarded every other year in Oslo in a partnership with The Norwegian Academy of Science and Letters, The Kavli Foundation, and The Norwegian Ministry of Education and Research. They recognize scientists for their seminal advances in astrophysics, nanoscience and neuroscience, and consist of $1 million for each of the three scientific fields, according to the Kavli Prize website. “Fred was proud to say (in jest) that the Kavli medal was 1 mm larger than the Nobel medal,” says Michael S. Turner, APS Past President.

For the people who knew Kavli, his actions spoke louder than words, and advocate on behalf of basic research is not being whitewashed. “He believed that philanthropy is crucially important to moving science forward,” says Conn, “and through science, the world becomes a better place.”

Fred was proud of the fact that he was a physicist,” says Kate Kirby, APS Executive Officer. “He really, truly believed that physics was so concerned that physics should receive the kind of support it needed. Through the established institution, he helped bring important researchers together to work on fundamental problems. It’s wonderful to see a Foundation focused on basic science.”

The Foundation’s gifts to the Kavli institutes are almost always unrestricted, says Conn. The endowments which support the institutes, including the Kavli Institute for Theoretical Physics at UC San Barbara (the first established), provide about $400,000 annually in income, designed to seed research that otherwise might not be funded.

**KAVLI continued from page 1**

Case in point: the South Pole Telescope (SPT), an early endeavor of the Kavli Institute for Cosmological Physics at the University of Chicago, which Turner heads. The SPT examines cosmic microwave background (CMB) radiation and galactic evolution and structure. Since taking first light in 2007, the SPT has produced data with unique insight into the early universe, including new knowledge concerning stellar and galactic formation, a region which has led to a better understanding of dark energy and stronger tests of inflation. But the project never received the kind of support Turner had been hoped for the money from the Kavli Foundation.

“We leveraged the gift from the Foundation,” says Turner, “as a $40 million grant from the National Science Foundation,” which resulted in the telescope being built, and used as a stepping stone with other range of research on CMB and discoveries of clusters of galaxies.”

Kavli is described as “extraordinarily smart, disciplined and determined,” says Conn, which served him well in his various pursuits. In 2005, when the Maryland board of regents, and the Foundation’s assets decreased in value, “Fred came in everyday like a day trader to try to get the funds back up,” says Turner. He was known for his frugality. The “Foundation, a lean and mean machine,” he adds, has a staff of only six and its headquarters are a nondescript office plaza in Oxonand, CA, by design. Kirby recalls hearing that Kavli never flew first class: “He said it’s such a ‘frugal luxury, which could be used to support science.’” But he did find pleasure in certain material outlets. “He loved driving his Bentley,” says Turner with a laugh.

As for the future of the Foundation, Conn says that Kavli left a legacy, “I think people have to leave money to the Kavli Foundation, but we didn’t know how much,” he says with a chuckle. “It would be wonderful if each of his estate to the Foundation. We expect in the next three to five years to be spending two to three times what we’re spending now. The Kavli Foundation is here to stay and will continue to support science, now, at an even larger scale.”

“Fred took sheer joy in supporting basic research,” says Turner. “He realized what a gem he had in these institutes and that this would be his greatest legacy. He always spoke about the Kavli Institutes as his children.”

**All Sorted Out**

Physicists gather in mid-January to carry out the crucial task of sorting abstracts for the 2014 April Meeting. Back Row: Laura Blecha (University of Maryland), Toria Vereo (NASA Goddard), Brock Russell (University of Maryland), Liz Hays (NASA Goddard), Julie McEnery (NASA Goddard). Foreground: Sam Leitner (University of Maryland), Peter Polko, (University of Maryland).
**ANNOUNCEMENTS**

### We Want your Nominations for Historic Sites

Owing to technical difficulties, the website for APS Historic Sites suggestions did not retain any past nominations. Please submit nominations, both new and previously submitted, via http://www.aps.org/programs/outreach/history/historicites/nomination.cfm

Nominations received before the end of February will be eligible to be considered in the 2014 cycle.

### Reviews of Modern Physics

**Quantum-Bayesian coherence**

*Christopher A. Fuchs and Rüdiger Schack*

This review explores some of the consequences and features of the quantum-Bayesian approach to quantum theory. This approach contends that the difficulties in the foundations of quantum theory arise from the difficulties in understanding the nature of probabilities. "Dutch-book" wager games are explored to illustrate the Bayesian view on probabilities, and to give a different underpinning for the Born rule for measurement probabilities. A new view on the state-space structure of quantum mechanics arises from these considerations.


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**FELLOWSHIP continued from page 1**

the STEM Master Teacher Corps. Mundy received her bachelor’s degree in physics and chemistry and her master's in chemistry from Harvard University in 2006. After that, she spent two years teaching science through Teach for America, first in Baton Rouge with students who had been evacuated from New Orleans because of Hurricane Katrina, then in New Haven, Connecticut. She then attended Cornell for her doctorate in applied physics.

Mundy received her bachelor's degree in chemistry from New Orleans because of Hur-ricane Katrina, then in New Haven, Connecticut. She then attended Cornell for her doctorate in applied physics. Starting in 2006, After receiving her doctorate, she spent two years teaching science through Teach for America, first in Baton Rouge with students who had been evacuated from New Orleans because of Hurricane Katrina, then in New Haven, Connecticut. She then attended Cornell for her doctorate in applied physics.

**MEMBERS continued from page 1**


"We were watching these things [avalanches] go by...and we were running out of food. We began to get very depressed about it all."


"That's getting me back to a real love of my life...It gets me back to something I also feel passionate about."


"As a high school science teacher, you're immersed in science education policy," Mundy said. "I was really interested after college in working as a teacher to provide high-level educational opportuni-ties to all students."

The APS has been trying to es-tablish such a fellowship at the Department of Education for years. The Society was one of the found-ing partners of the AAAS Congress-sional Fellowships in 1973, but placing individuals at the Depart-ment of Education has proven more difficult. In September when the other AAAS policy fellowships start up, the STEM Education Policy Fellow will join the rest of the cohort.

"Fifty years ago APS was one of the founding member societies of the AAAS Fellowships, and once again APS is leading the way," Glenbo said. "There has never been a fellow [of this kind] at the Department of Education."

http://www.aps.org/programs/research/bridgeprogram/link/apply.cfm

Questions?
Contact bridgeprogram@aps.org

www.apsbridgeprogram.org/link/apply.cfm

http://www.aps.org/programs/outreach/history/historicites/nomination.cfm

Nominations received before the end of February will be eligible to be considered in the 2014 cycle.

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**BOUCHET continued from page 1**

The more she worked with the crystals, the more her background in experimental physics and chem-istry came in handy. "I think that the field of liquid crystals requires [this combination] more than many other field," Martinez-Miranda said.

After receiving her doctorate, she left for the West Coast to do a postdoc work at the University of California, Berkeley. "At MIT I was working on just the basics of liquid crystals," Martinez-Miranda said.

"At Berkeley they were looking at it from the point of view of how liquid crystals interact with a surface...I went from being very ba-sic to applications."

She then spent a year as a visit-ing professor at Kent State Univer-sity at their liquid crystal center. While there, her research interests started to evolve. She started work-ing on thin films as well and when she took a position at the Univer-sity of Maryland, she expanded further into work on nanoparticles.

"If you look at them in a microscope, they’re visually very attractive.”

The more she worked with the crystals, the more her background in experimental physics and chemistry came in handy. "I think that the field of liquid crystals requires [this combination] more than many other fields," Martinez-Miranda said.

After receiving her doctorate, she left for the West Coast to do a postdoc work at the University of California, Berkeley. "At MIT I was working on just the basics of liquid crystals," Martinez-Miranda said.

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When I heard that the APS was proposing a new journal, Physical Review Applied, it seemed to me self-evident that the one thing we don’t need is more journals. New journals appear monthly, providing increasing amounts of clutter (a form of low-quality papers) that dilute important signals (high-quality science) made by serious researchers. Moreover, there are obviously already strong applied physics journals, and I didn’t feel that science would benefit from a fast-food philosophy: The presence of a McDonald’s is justification to put up a Burger King next door. The natural question then is, what possessed me to become editor of Physical Review Applied?

The simple answer is that despite the excess of noise provided by what I call value-subtracting journals, there is a very real and significant gap at the intersection of physics and engineering that I believe needs to be filled, and as a consequence, many APS members doing important, valuable, and frankly very beautiful research have no publishing home for their work.

Speaking for myself, I am trained as a mathematical physicist, but I work in biomedical engineering. I have published in both engineering and physics journals, and I have found that whichever category of journal I choose, colleagues from the other category seldom learn of that work. I am certainly not alone in this: I know many physicists whose research involves eminently applicable topics, and they couldn’t spit out physics words fast enough to convey the ideas to the people who need to hear them, so the result is the “back door” that I and other physicists use to bring ideas into the world.

On the other side, when I speak of “autonomous” systems, my bioengineering colleagues look at me with puzzlement—because they are thinking of autonomous robots and would call my system “endogenous.” Similarly, to physicists “translation” results from linear motion, but to engineers this means bringing a technology to market—and a physicist could be forgiven for asking how engineers manage to do this day in and day out. Descriptions of systems of cells, organs or organisms interact, whereas in bioengineering it refers to (usually informatic) studies of how genes and proteins regulate cell functions.

More fundamentally, the artificial divide separating physics from engineering, which is so pressing to me, is the real world. I have had several collaborations with bioengineers that took off only after several hours of recalibrating our understanding. One example: I have been trained to reason by forward chaining—making a hypothesis and deriving results—while my bioengineering colleagues tend to work by backward chaining—observing a phenomenon and dissecting it. And don’t even get me started discussing “balance,” which engineers use to describe anything from mass conservation to Newton’s second law.

Despite this culture gap, physics-engineering collaborations that do take hold are enormously rewarding and productive. There is no shortage of examples. GPS is entirely based on physics, but has been introduced into our phones and cars by electrical engineers. Robotic surgery has revolutionized delicate operations, and could not exist without major contributions by physicists alongside mechanical, electrical, and biological engineers. The same is true of high-resolution tomography, confocal and convolution microscopy, and essentially every single part of a laptop computer, from memory to processors to displays to mouse to touch-screen. All of these technologies have resulted from collaborations between physics and engineering, and the pace of similar developments is accelerating.

This is the raison d’être of Physical Review Applied: to promote the publication of the highest quality papers at the intersection of physics and engineering, and to provide a forum for researchers at that intersection. There will indeed be a need to fill the physics-engineering gap. It took more than three decades for Isidor Rabi’s work on nuclear magnetic resonance in the 1930s to be developed into the first magnetic resonance images in the 1970s. The same is true of Gorilla® Glass: universally used in cellphone and computer displays today, it was developed using long-established methods of physical chemistry in the 1960s, but wasn’t engineered into a device until the 1990s. We can’t predict what innovations will emerge from this intersection, but we can all agree that while a 30-year wait may have been needed in times past for truly elegant and useful ideas to catch up with science, 30 years is too long to wait today.

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