Roger Falcone Chosen as Vice President of APS for 2016

By Emily Conover

APS members took to the polls in May and June to select new leadership, and the votes have been tallied. The majority of voters in the annual general election chose Roger Falcone to fill the office of vice president beginning January 1, 2016. Falcone, a professor of physics at the University of California, Berkeley, is the director of the Advanced Light Source, an x-ray synchrotron facility at Lawrence Berkeley National Laboratory.

Under the APS governance structure, the vice president joins the presidential line, eventually ascending to the presidency after one-year terms as vice president and then president-elect.

In January 2016, the current president, Samuel Aronson, will step down to become past president, and the current president-elect, Homer Neal, will assume the position of president. The current vice president, Laura Greene, will become president-elect, and Falcone will assume the vice presidency. Falcone will become president of the Society in 2018.

“I’m very pleased to be able to serve the Society and the physicists within APS,” Falcone said. “I will be spending a lot of time listening, to understand the work of the APS more close-up, and also hearing from people who are members of the Society.”

Falcone also cited the important role that physicists can play in influencing science policy in the nation. “APS can strengthen the collective impact of physicists, and improve the educational, industrial, private, and government institutions within which science is carried out,” Falcone said in his candidate statement.

The election is the first since the corporate reform that was instituted last year, which included amendments to the APS Constitution and Bylaws and Articles of Incorporation. Members voted to adopt the reform in November 2014. As a result of the restructuring, this year’s election marks the first time APS members have voted for a treasurer, a position on the APS Board of Directors. James Hollenhorst, senior director of technology for Agilent Technologies, will be the first elected treasurer of APS. Past president Malcolm Beasley is serving as interim treasurer.

“Without it, none of the exciting events for 2016 will survive the test of time.”

One important challenge is the changing face of scientific publishing. Hollenhorst added. “Open access is the rallying cry from the government, the universities, and the national laboratories.”

ELECTION continued on page 6

Getting Up to Speed on FASTR Legislation

By Emily Conover

A bill that would mandate public access to federally funded research is now one step closer to becoming law. On July 29, the Senate Committee on Homeland Security and Government Affairs unanimously approved the Fair Access to Science and Technology Research (FASTR) Act. This bill would require peer-reviewed scientific publications from federally funded research be made freely available to the public within a year of publication. The bill will next move to the full Senate for a vote. The bill has also been introduced in the House, but the committee responsible for the bill has yet to vote on it.

The bill is similar to a White House Office of Science and Technology Policy (OSTP) memo from February 2013; the memo requires agencies that fund more than $100 million worth of research to fashion plans to make peer-reviewed publications available to the public. Federal agencies and some publishers have since begun arrangements to release publications in accordance with the OSTP mandate. (See page 4 for a related article.) The new legislation would codify public-access policies into law, making requirements less likely to shift with each administration.

Open-access proponents have come out in support of the legislation. “The passage of the bill would be a step forward,” says Michael Eisen of the University of California, Berkeley, and a co-founder of the Public Library of Science (PLoS), a nonprofit open-access publisher. But, he says, “My hesitancy is that it doesn’t go far enough.” Eisen would rather see a bill requiring papers to be immediately available upon publication. The current legislation originally called for a 6-month time limit before publications must be made available.

FASTR continued on page 6

Inclusive Astronomy Conference Confronts Diversity Issues

By Emily Conover

Astrophysicist Jedidah Isler has not always felt welcomed by the scientific community. “Being part of a minority group can feel very daunting and very lonely,” says Isler, an African-American woman and a postdoc at Vanderbilt University. And although scientific communities — physics and astronomy included — have paid great attention to the status of women in recent years, other underrepresented groups have remained in the shadows. Among those are scientists who are members of racial or ethnic minorities, who are lesbian/gay/bisexual/transsexual/intersex/questioning (LGBTIQ), who are neuroatypical (e.g., have autism), and who belong to more than one underrepresented group — like African-American women such as Isler.

But change is on the horizon. Isler and others recently convened the inaugural Inclusive Astronomy Conference, held June 17-19 at Vanderbilt University, to explore how to make astronomy accessible to all. Following two influential Women in Astronomy meetings in recent years, the group “felt that the field was really ready to think about diversity and inclusion more broadly,” says Kevin Stassun, a professor of physics and astronomy at Vanderbilt and the chair of the local organizing committee for the meeting.

The goal is not just diversity, but also an atmosphere where everyone is welcome. “It’s not just having people at the table, it’s making sure that they feel like they … are encouraged to be who they are,” Isler says.

Making science more inclusive is crucial for its success, the meeting’s participants say. “Talent is not restricted to one group, so when you limit yourself to one group, you’re necessarily excluding a lot of talent, a lot of genius,” says Jesse Shanaan, a graduate student at Wesleyan University. “A lot of people in science like to claim that this is a true meritocracy, and that’s not true.”

Organizers designed the conference not only to help attendees understand the issues, but also to give them tools and strategies to Open-access proponents have come out in support of the legislation. “The passage of the bill would be a step forward,” says Michael Eisen of the University of California, Berkeley, and a co-founder of the Public Library of Science (PLoS), a nonprofit open-access publisher. But, he says, “My hesitancy is that it doesn’t go far enough.” Eisen would rather see a bill requiring papers to be immediately available upon publication. The current legislation originally called for a 6-month time limit before publications must be made available.

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Members in the Media

He would pull one rabbit out of the hat and I would then suddenly the rabbits would arrange themselves in a pattern and start dancing in a way you’d never seen before.


“It would be incredibly naive of me to think that there aren’t people who rely on my blog for a bit of help.

John Eric Goff, Lynchburg College, Virginia, who has used physics to accurately predict the outcome of the Tour de France bicycle race, The Washington Post, July 30, 2015.

“The scientist in me rebels against that. We should start with the technical facts of the agreement, and then proceed to a very complicated diplomatic and psychological judgment call of what the world looks like if Congress does vote this agreement down.”

Peter DeFazio, Democratic congressman from Illinois, on partisanship surrounding the proposed U.S. nuclear agreement with Iran, realclearpolitics.com, July 27, 2015.

“We really had the prejudice that pentagulls were fakes and that nobody would believe it.”

Sheldon Stone, Syracuse University, New York, collaborator on the recent discovery of two kinds of five-quantum objects, insciencenews.org, August 10, 2015.

“The program] is losing patience with those of us who want to understand the fundamentals.”

Robert Austin, Princeton University, on the direction of a physical science oncology program of the U.S. National Cancer Institute that was not funded, The New York Times, July 25, 2015.

“Kepler would have been unable to speak, even have contributed to the rumors by virtue of an allegory he wrote called Pater Noster, which imagined the execution of the Duke of Württemberg, who ruled that there was insufficient evidence to pull one vein after another out of my body, I would have nothing to admit.” Then she recited a Pater Noster.

Portraits of Katharina Guldenmann, mother of Johannes Kepler, by an unknown painter in the 17th century.

Whether of regard Kepler was correct in this assessment, the rumors about his mother intensified. In 1615, a local woman named Ursula Reingold, who had also fallen out with her Christen, claimed that Katharina had poisoned her with a potion. After Einhorn — a cousin of Reingold’s as well as magistrate — attempted to force a confession at sword point while drunk, the fiery Katharina countered by suing her accuser for slander. This was a dangerous gambit. The witch-hunting hysteria was at its height in Europe during Kepler’s day, so even a malicious rumor could put Katharina in potentially mortal peril. Standard court procedure for examining an accused witch usually involved severe torture to elicit a confession; all were presumed guilty until proven innocent, and those found guilty were summarily executed. Still a defiant son, Kepler took the threat seriously enough to hire lawyers and take Katharina to Linz, commuting between the two cities.

He set aside much of his scientific research for a time, although he still managed to complete his “harmolody,” published in 1619 as Harmonics Mundi.

The suit dragged on for several years, and a number of less sympathetic judge took on Katharina’s case, Reingold took advantage of the switch to file a formal charge of witchcraft against her. By then Katharina had returned to Leoberg, determined to keep her face to face. It proved a serious mistake. In August 1620, she was taken from her daughter’s home by court order and found herself in prison, accused of 49 counts of practicing witchcraft. Along with hired lawyers, Kepler mounted a very effective defense, penning the bulk of the exhaustive argument to demolish the prosecution’s arguments. In the end, the judicial college at the University of Tübingen ruled that there was insufficient evidence on either side. Rather than order her subjected to torture to induce a confession, or release her outright, the college decided she should be shown the instruments of torture — hot irons, pincers, long needles, the rack, and a gallows used for drawing and quartering — with a graphic description of how each implement would be used. This was a practice known as torture verbals meant to frighten the accused into a confession. But Katharina was made of sterner stuff. She stubbornly refused to confess, declaring, “Do you think I am mad enough to be will be to pull one vein after another out of my body, I would have nothing to admit.” Then she recited a Pater Noster on her knees in a savvy display of piety.

Ultimately, Kepler’s defense was a success. Katharina was acquitted and released in October 1621 by order of the Duke of Württemberg, who ruled that her refusal to confess proved her innocence. An unremitting persecution of Katharina continued on page 7.

August 1620: Kepler’s Mother Imprisoned for Witchcraft

In 1615, Luthers Einhorn, a local magistrate of Leoberg, Germany, launched a series of witch trials, part of a witch-hunting hysteria then sweeping across Europe. The lives of thousands of suspected sorcerers. In all, 15 local women were accused of witchcraft on Einhorn’s watch; eight were executed. Among those caught up in the hysteria was the mother of one history’s greatest astronomers: Johannes Kepler.

Born Katharina Guldenmann in Stuttgart (part of the Duchy of Württemberg) in 1546, she was raised in Linz, and gained the patronage of the Duke of Württemberg. He largely kept his distance from her difficult mother. Katharina supported herself in Leoberg on a local “wise woman,” concocting potions and telling bad ailments “the remedy” to spells and charms. Combined with her bad temper and family history, it is small wonder that towns gossips soon labeled her a suspected witch.

Some historians have speculated that Kepler may even have contributed to the rumors by virtue of an allegory he wrote called Sonntum (The Drums), arguably the earliest work of science fiction, given its description of a trip to the moon and speculate on what astronomy would be like if practiced on another planet. The characters include a fictional world of six moons, where the smart prince brings together chains and communes with a demon in the moon — a strong resemblance to Katharina. The book wasn’t published officially until 1634, long after Katharina’s trial, but a footnote Kepler added to the main text suggests a copy of the manuscript-in-progress found its way to Tübingen around 1611, and he believed it had fueled suspicions of sorcery. “You would think a spark had fallen on dry wood,” he wrote. "My words have been taken up as thin, swarthy, gossiping and quarreling woman.

The recent discovery of two kinds of five-quantum objects, insciencenews.org, August 10, 2015.

We really had the prejudice that pentagulls were fakes and that nobody would believe it.”

Sheldon Stone, Syracuse University, New York, collaborator on the recent discovery of two kinds of five-quantum objects, insciencenews.org, August 10, 2015.

“The program] is losing patience with those of us who want to understand the fundamentals.”

Robert Austin, Princeton University, on the direction of a physical science oncology program of the U.S. National Cancer Institute that was not funded, Nature, August 5, 2015.
Training employees in a variety of new fields of physics is crucial to keep throngs of kids, parents, and other attendees at the convention.

The APS booth included the latest particle physics results, including a display of new materials for their classrooms. We also distributed copies of a recent comic book, Adventures of Batgirl: Heroine, which now joins the cover of Spectra every issue.

A squadron of Stormtroopers mars past; Wolverine flexes his muscles and bares his claws; and an eagle of Lucinda Hene, a girl who discovers she has laser powers. She embraces science.
**Letters**

Members may submit letters to letters@aps.org. APS reserves the right to select letters and edit for length and clarity.

**Guns on Campus**

The right of individuals to carry guns onto the campuses of Texas colleges and universities is now the law of the land. By this one act, the government of Texas has guaranteed that the recruitment of first-rate faculty for its universities will be essentially impossible. No experienced graduate potential faculty prospect would consider any offer from any state higher education institution. Bright people do not put themselves at risk on purpose. During my 36-year career as a university professor, if any student would have shown up carrying a gun into my classroom, I would have had him removed by campus security and permanently banned him from any class. If it presently a faculty member of any Texas university I would now be looking for a job elsewhere. There are many much higher-paying jobs available for physics PhDs outside of academia, and I would have no difficulty finding a job where guns are not allowed.

The stupidity of the politicians who have foisted upon us the law that allows other people than law enforcement personnel to carry guns onto the campus of any state university is beyond belief. The damage done is not reparable as long as we are ruled by stupidity instead of reason.

Tom Gray
Corpus Christi, Texas

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**Careers Report**

**Raising Student Awareness of Non-Academic Career Paths**

By Crystal Bailey

Whether at the bachelor’s, master’s, or Ph.D. level, most physics graduates will find permanent careers in the private sector rather than in academia (Careers Report, APS News, June 2015).

To enable students to map out their future careers, a mentor can help educate them about the full range of career options available to them — and these efforts should be particularly important for students who are nearing graduation. Even the most organized students need time for self-assessment, skill-building, and decision-making before they start focusing in earnest on the next steps of their careers.

For professionals, there are a number of ways that you as an academic mentor can do this, without adding unneeded work to your own schedule. One is to utilize the Phys- ics InSight slideshow, which you can display on screens in common areas around your department. Physics InSight is a free, downloadable PowerPoint slideshow that features physicists in various degree paths working in diverse sectors. It also includes up-to-date information on physics employment and salary statistics, opportunities for students — and also cool, cutting edge physics topics! A new version of the slideshow goes up about twice per semester; it’s a great diversion for students (majors and non-majors alike) who are waiting in hallways for their emails to begin. You can download the most recent edition at aps.org/careers/insight/. Students also benefit greatly from one-on-one contact with physicists working outside of academia. Consider holding special seminars in which a non-academic speaker visits the department to talk. CAREERS continued on page 6

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**PRIVATE SECTOR JOBS**

Physicists Find Fulfillment Outside of Academia

By Emily Conover

Physicists who contemplate private sector jobs often fear that at a loss; their academia-immersed advisors may know little about the opportunities available outside of the ivory tower, and data on phys- cists in private sector careers has been sorely lacking. But a new report from the American Institute of Physics (AIP) provides good news — most private-sector Ph.D.

Physics inSight can display on screens in common areas around your department. Physics InSight is a free, downloadable PowerPoint slideshow that features physicists in various degree paths working in diverse sectors. It also includes up-to-date information on physics employment and salary statistics, opportunities for students — and also cool, cutting edge physics topics! A new version of the slideshow goes up about twice per semester; it’s a great diversion for students (majors and non-majors alike) who are waiting in hallways for their emails to begin. You can download the most recent edition at aps.org/careers/insight/. Students also benefit greatly from one-on-one contact with physicists working outside of academia. Consider holding special seminars in which a non-academic speaker visits the department to talk. CAREERS continued on page 6

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**APS PROGRAMS**

**Physics inSight**

By Bushraa Khatib

According to APS program staff, the Physics Teacher Educator (PhysTEC) project has grown to over 300 member institutions. The Coalition is part of the PhysTEC project, a partnership between the APS and the American Association of Physics Teachers (AAPT) that works with college and university physics departments to increase the number of well prepared high school physics teachers.

With support from the National Science Foundation, APS member donations, and partner society contributions, the PhysTEC project has grown dramatically since its inception in 2001. Coalition college and university members can apply to become a “supported site” with funding from PhysTEC in order to build and improve undergraduate pro- grams for future high school physics teachers. The project now has funded 46 sites to develop and carry out multi-year programs to strengthen physics teacher education.

**PHYSTEC continued on page 5**

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**JOURNAL PUBLISHING**

**APS Begins Release of Public Access CHORUS Papers**

By Emily Conover

As the clamor for open access to scientific research has intensified in recent years, a group of scientific publishers — of which APS is a member — responded in 2013 by creating the Clearinghouse for the Open Research of the United States (CHORUS), which connects users with publicly accessible research on publishers’ websites. Now, APS is releasing the first wave of articles, making papers funded by the U.S. Department of Energy (DOE) freely available through CHORUS effective August 1, several months ahead of the department’s official October 1 start date.

In February 2013, the White House Office of Science and Technology Policy (OSTP) issued a memo requiring federal agencies to spend more than $100 million on R&D to fashion plans that would make published research freely available to the public within a one-year embargo period after publication. The memo also called for public-private partnerships between federal agencies and publishers to avoid duplication of effort. CHOR- US takes on that role.

“Publishers are providing a ser- vice across the community to help agencies and researchers meet the OSTP mandate, but at the same time are making these papers publicly accessible in the context of the peer-reviewed journals in which they were published,” says APS Chief Information Officer Mark Doyle, co-chair of the technical working group for CHORUS.

One year ago, DOE unveiled its response to the OSTP memo, a website called the Basic Access Gateway for Energy and Science (PAGES). PAGES is a searchable database that links to DOE-funded research available on publishers’ websites, or if none is available, to a version in DOE’s repository. CHORUS provides an important platform that allows users to search for federally

**PHYSTEC continued on page 5**

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**APS PROGRAMS**

**APS Liquid Helium Purchasing Program Progress**

By Emily Conover

Scientists at West Texas A&M University used to worry about gaining access to liquid helium, but now they also have the necessary to operate their nuclear magnetic resonance spectrometers. “We were concerned because we had a new nuclear magnetic resonance spectrometer and a small customer,” recalled Catherine F. M. Clewett, assistant professor of physics at the university. “We had never ordered liquid helium and were finding it difficult to begin a relationship with the major helium companies.”

Those concerns have abated, thanks to the Liquid Helium Purchasing Program developed by the APS Office of Public Affairs (OPA). Last year, after learning of academic users’ concerns about liquid helium price fluctuations and reliability issues, the OPA partnered with the Defense Logistics Agency (DLA) to pilot-test a liquid helium “broker,” enabling academic users to obtain helium in a timely manner and at a reasonable cost. Recognizing that the issues were not exclusive to physicists, the OPA also partnered with the American Chemical Society (ACS). Enrollments began ordering their liquid helium on June 1, 2015.

DLC contracts with vendors who purchase liquid helium from the Federal Helium Reserve in Ama- rillo, Texas. The agency secures the liquid helium via the federal in-kind program on behalf of any federal grantee. The agency cur- rently purchases liquid helium and other chemicals for research groups at approximately 30 universities.

“The program has ensured that we can get helium when we need it at a stable cost,” added Clewett. “We also don’t have to worry about being the last customer to have our order fulfilled when helium is in short supply.”

The OPA and ACS pilot-tested the program with research groups at seven colleges and universities that had diverse liquid helium delivery and cost challenges: Stanford Uni- versity, Boise State University, West Texas A&M University, University of Memphis, University of New Hampshire, Amherst College, and Worcester Polytechnic Institute.

In general, academic researchers who are not participating in the program pay between $7 per liter and $30 per liter, depending on their location and usage. However, program enrollees are saving an average of 15 percent. One enrollee is saving as much as 27 percent.

The pilot program is slated for expansion in the fall, and new enrollees will be asked to commit to the program by December 2015. They would begin receiving their helium on June 1, 2016.

**HELIUM continued on page 7**
Washington Dispatch

POLICY UPDATE

Appropriations Stall

The House has now passed all twelve appropriations bills (legislation that sets aside money for various agencies and programs) out of committee, and six have seen final floor action. The Senate has only nine out of committee, and none have seen floor action. In both chambers, few Democrats have supported them. And the president, asserting that the spending bills are not based on sequestration caps that he believes should be eliminated, has threatened to veto every one.

The defense appropriations bill is the only one that breaks the caps, using the Department of Defense’s Overseas Contingency Operations fund as an off-budget vehicle to get around the legal restrictions. And it is the disparity between the Republican treatment of defense and non-defense spending that helped energize a Democratic rebellion on the Senate floor. The FY16 defense bill easily cleared the appropriations committee on a 27-3 vote, but it failed to receive enough votes (50-45) to bring it to the floor for consideration.

Looking ahead to the culmination of the FY16 budget negotiations, it is appearing more and more likely that yet another Continuing Resolution is in the offing.

The American Research Investment Fund

As federal investment in fundamental science wanes, APS has been educating lawmakers about funding avenues for basic research (“Thinking Big and Outside the Box,” APS News, July 2015). One possibility is the creation of the American Research Investment Fund (ARIF). In order to create ARIF, Congress would have to first pass comprehensive corporate tax reform legislation that contains a provision requiring a portion of money held overseas by large corporations. Currently money held overseas, largely by high-tech companies like Google and Microsoft, totals more than $2 trillion. If a deal is struck to repatriate the money at a relatively low tax rate, 5 percent to 15 percent for example, it would create a one-time net recovery of $100 billion to $300 billion for the federal government. Congress could then authorize the use of $100 billion to endow ARIF. ARIF would invest the money and use the interest to sustain itself and to fund research.

ARIF would be a public-private partnership and would be able to nimblly fund scientific research in a number of ways, from encouraging Congress to boost science budgets by providing matching funds, to supporting midcareer activities that currently fall through the federal budget cracks.

America COMPETES

The House version of the American COMPETES Act, which APS opposeed, passed the House. There is no full COMPETES bill in the Senate; rather, there is a separate Energy title, and Senate Science Committee has put out a request for stakeholders to weigh in on the crafting the science portion of COMPETES. APS supports the Senate Energy title of COMPETES and has sent a letter urging lawmakers to use the Energy title as a blueprint for crafting the science portion of COMPETES.

The Elementary and Secondary Education Act

As this issue of APS News is being prepared, the Elementary and Secondary Education Act is being debated on the Senate floor, with a large role in this year’s debate being played by both Republicans and Democrats. If the Senate bill passes, it will then be conferred with the House bill, which passed the House the first week of July.

Of interest to physicists, a major difference between the two bills is that the House bill contains very little mention of science, technology, engineer- ing, and mathematics education, whereas the Senate bill would maintain funding for the Math-Science Partnerships programs.

WASHINGTON OFFICE ACTIVITIES

Media Update

The Huntsville Times published an op-ed on June 30 by Chris Jeffrey, a recent graduate of the University of North Texas. Jeffrey made the case for supporting the Energy Title of the American COMPETES Reauthorization Act of 2015 — legislation that would bolster energy research, reduce the nation’s reliance on fossil fuels, and enable the development of energy-efficient technologies. Read the op-ed: bit.ly/1INAG3u.

The defense appropriations bill is being debated on the Senate floor, with a large statement of APS in response to those comments and will present the final statement to the Panel on Public Affairs (POPA) members read through the overwhelmingly letter produced by the APS Office of Public Affairs. Read the op-ed: aps.org/publications/capitolhillquarterly/201505/backpage.cfm.

Panel on Public Affairs

Panel on Public Affairs (POPA) members read through the overwhelmingly supportive comments of the APS membership on the proposed APS Science Budget (Charging Change) POPA out of committee in response to those comments and will present the final statement to the APS Council for a vote this fall. If approved, it would become an official statement of APS.

The POPA Physics & the Public Subcommittee will be working with the American Institute of Physics on a survey this summer focused on over...

INCLUSIVE continued from page 1

improve the inclusiveness of their communities. It was also a chance to introduce people to one another, allowing attendees to meet and learn from people of different underrep- resented groups and connect with APS.

One issue the conference partici- pants tackled was how to promote access for underrepresented groups. “One of the most important and very concrete barriers that we talked about is the use of standardized tests — for example, the GRE — as part of admission to graduate programs,” says Stassan. Research has shown that the GRE is a poor predictor of performance, Stassan says, and also that it is biased: “If you rank-order applicants to your program even just in part based on their GRE scores, you will systematically exclude women and minorities.”

Participants also discussed the concept of intersectionality — the idea that people who fall under more than one underrepresented group can’t be treated as if they fall solely into one category. “The lived experiences of people with intersectional identities don’t fall along one path at all,” says Stassan. “They live all of them,” says Isler. “It’s unfair to ask me to identify, either as a woman or a black person, when the fullness of my identity is seated in both.” And while the percentage of female astronomers has grown over the years, female African-American astronomers are still few and far between.

Although scientific organiza- tions like APS have paid significant attention to addressing the under- representation of racial and ethnic minorities, says APS Diversity Programs Administrator Science Modesto Knowles, “I think those efforts have still been limited in scope, and the commitment to racial and ethnic diversity in the physics community does not seem to be as widely held as the commitment to women.” Furthermore, she says, “Although APS has not focused on intersectional issues, I think this is an area of great opportunity for us.”

In traditional academic spaces, Shanahan says, “When there is an issue, people don’t feel like they can speak up.” But the Inclusive Astronomy meeting was different. “The organizers worked incredibly hard to create a space where people would be respected, listened to, and a space that would accommodate as many people as possible,” says Shanahan.

Shanahan participated in a panel on establishing inclusiveness in astronomy, in which she focused on disability issues. Shanahan, who is disabled and often walks with a cane or wears braces, says, “I feel like I’m excluded kind of on a daily basis because a lot of people don’t think about including people with disabilities.”

Transgender scientists as well still face many hurdles, says astronomer Jessica Mink of the Astronomical Society of the Pacific, a transgender woman and one of the organizers of the meeting. “There’s still a prejudice that people have that don’t come to the surface very easily,” she says. And there can be negative career repercussions for transgender scientists, “to be early in your career you’re dependent on what a lot of people think about you,” which can make coming out as transgender a scary prospect.

The meeting had its snags. A banquet was held on the other side of campus, an unmanageable journey for some attendees with disabilities. And other types of exclusion cropped up along the way, like Mink, who does not have a Ph.D., pointed out that much of the discussion centered on the academic pipeline. It is also important, Mink says, to appreciate the contributions of scientists who have not followed the traditional path.

CHORUS continued from page 4

funded open-access research across the participating publishers and sci- entific societies, most notably the American Association for the Advancement of Science, AIP Publishing (the journal publishing arm of the American Institute of Physics), the American Astronomical Society, Elsevier, IOP Publishing (part of the Institute of Physics), and others. CHORUS also provides a set of tools that show publishers progressing in making research publicly accessible.

DOE will work with CHOR- RUS to fulfill the OSTP mandate, according to an agreement made last spring. As part of CHORUS, DOE has been asking funding in- formations and other metadata to CrossRef, a nonprofit that catalogs information about academic publications, provides Digital Object Identifier (DOI) registration, and allows reliable linking in citations across journals. PAGES can then use CrossRef to link to content on publishers’ websites and access articles funded by DOE.

On August 1, APS began releas- ing DOE-funded papers that were published one year ago, and from now on about 150 to 200 articles will be released each month as their embargo periods expire. (This is around 10% of the average number of articles APS publishes monthly.) In January 2016, APS-published articles funded by other federal agencies will begin to become available. However, the available version of the article may not be its “version of record,” (the version that will appear in the journal). Instead, the articles may be provided in the “accepted manuscript” state — before copyediting and formatting have taken place.

Despite the hiccups, the meet- ing “was incredibly supportive,” says Shanahan. “People were really willing to learn.”

Talking about racism, sexism, ableism, and other exclusionary practices was a challenge, par- ticipants say. “One of the ground rules they put up was ‘it’s okay to be uncomfortable,’” says meeting attendee Meredith Rawls, a gradu- ate student in astronomy at New Mexico State University. “As the conference went on, people would actually call each other out in a very friendly way,” they were excluding some, Rawls says.

One aim of the Inclusive Astronom- y meeting was to produce a concrete set of recommendations for improving diversity and inclusion in the field, following in the footsteps of previous Women in Astronomy meetings. Conference organizers are collecting and synthesizing feedback from the meeting’s 160 attendees for a report that they will share with the community and the APS, says Shanahan. “The involvement of the Astronomical Society (AAS) leadership in 2016.

AAS President Meg Ury, who also attended the meeting, noted that the AAS leadership is looking forward to seeing the recommenda- tions. “The AAS supported this meeting very strongly, in terms of equity and inclusion, and in mak- ing sure that qualities that aren’t relevant to the practice of astron- omy not be used in determining one’s suitability for it,” Ury wrote in an email.

The meeting left a big impression on attendees in how they viewed diversity and inclusion. “The more you are aware of this stuff, you start seeing it everywhere,” says Rawls. “When I first learned calculus it changed the whole way I saw the world,” she says. “Learning about all this — how inclusivity is necessary to do good science … that realization was equally big in my mind.”
CAREERS continued from page 4

about his or her work. An event like this not only provides students with information and insight about non-academic work, but also gives the organization opportunities to network with potential employers. Where colleges or universities are near industry, it is a common practice for companies to look to their local universities as a source of new talent. Your institution’s ability to reach and identify good potential candidates—or you can use the APS Industrial Speakeas y’s List, which is available at aps. org/speakeasies/speakeasys_list (be sure to open “more options” and check “industrial careers” before you do the search). You could also enlist the help of physicists who have won the APS Distinguished Lectureship on the Applications of Physics (DLAP). This award recognizes physicists in industrial or nonacademic careers for their work in new or expanded areas. The award is co-sponsored by the APS Forum on Industrial and Applied Physics and the Committee on Lecturers and Professional Development. Each lecturer/winner gives an address at the annual APS national meeting, as well as at section meetings, annual meetings, and individual department colloquia during his or her term; all travel costs associated with talks are covered by APS. It’s an easy way to get someone with a rich and interesting perspective on non-academic careers to visit your department. For more information please visit the DLAP homepage (aps.org/careers/lectureship)."

Another way you can bring stu dents, faculty, and physicists in industry or national labs together is to work with Local Links in your area. APS Local Links are small, grassroots gatherings of local phys icians in a concentrated geographic area (such as a city), who meet on a regular basis to network, build relationships, and discover new sources of employment and collaboration.

Local Links benefit employers and students as recruitment opportu nities, and they also encourage new collaborations among national labs, industries, and academic research facilities. APS provides each Local Link with some admin istrative and logistical support, and helps boost the visibility of Local Links meetings by sending announcements about upcoming events to local membership. If you’re interested in learning more about the APS Local Links program, please visit aps.org/mem bership/locallinks/.

Building students’ awareness of non-academic work is challenging but with a modest amount of energy you can build a strong base. We encourage you to talk about your personal experience and help make your faculty colleagues aware of career paths and research opportunities outside of the academic sphere. Such efforts can improve students’ confidence about — and prepared ness for — their own future career path.

Crystal Bailey is APS Careers Program Manager.

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from the readers and authors of our journal articles; but someone has to pay for the added value that APS brings.

Voters elected Deborah Jin of the National Institute of Standards and Technology and the University of Colorado, Boulder to the position of chair-elect of the APS Nominating Committee for a term lasting 10 years. She is excited to participate in this work in APS governance, to help out, and also just to learn more about what it means to be a member of the committee.

Another private sector bonus? Better pay. Many of the surveyed physicists raked in higher earnings than those that went the academic route, and more than three-quarters pocketed six-figure salaries in 2011. Nonacademic career data have been in short supply, as physicists who have left acade mia usually aren’t included in the career studies career studies. Private-sector physicists also tend to be more difficult to track down than their academic peers.

Unsurprisingly, those employed in physics-related industry jobs found their degrees most relevant, but physicists working in finance also had a higher degree of satisfaction than their level of education, due to the importance of mathematical model ing and development of algorithms in their field. In fact, many physi cists working in finance noted that they regularly worked with other physicists.

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HELium continued on page 4

Mark Elsegger, APS senior policy analyst, who oversees the program, notes about its success that he “was apprehensive at the start because we were trying something different; but for all enrollees to see immediate savings and have reliable delivery is a huge win for the community,” said Elsegger. “I’m excited about working with DLA on the program expansion this fall.”

Added Laura Greene, a condensed matter physicist and vice president of APS: “It is remarkable what the OPA has done on behalf of the scientific community.”

Notwithstanding the success of the program, the scientific community remains concerned about the future availability of liquid helium.

William Halperin, a low-temperature physicist at Northwestern University and chair-elect of the APS Division of Condensed Matter Physics, testified about those challenges during a Capitol Hill hearing on July 8, 2015, before the House Energy and Mineral Resources Subcommittee. “For some scientists, purchasing liquid helium has become an existential issue — as the price has gone up, they have been forced to choose between abandoning a research project or laying off employees and students,” he said.

In addition to informing lawmakers about the purchasing problem, Halperin told them APS is partnering with the ACS and the Materials Research Society to determine the best path for “transferring as many academic researchers as possible to systems that recycle helium.”

Although the Helium Stewardship Act of 2013 extends the lifetime of the Federal Helium Reserve to 2021, the long-term supply of liquid helium is still a concern. Therefore, Halperin added that another step should be taken: “This subgroup should carefully consider possible legislative fixes to shutting down the reserve.”

For more information about the OPA Liquid Helium Purchasing Program, contact Mark Elsegger at elsegger@aps.org.

The author is Press Secretary, APS Office of Public Affairs.

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CERC/SPcP.

In early 2015 the FCC study was recognized by the European Commission through the funding of the FCC technical design study (EuroCirCol) via the program of HORIZON2020 (the largest European Union research and innovation funder). The nuclear study institute KEK in Japan and sixteen beneficiaries from the European Research Area committed to perform the core of the FCC-eh collider ring design and the 16 T magnet R&D. The four key themes addressed are the arc design, led by CEA Saclay (CEA is the French Atomic Energy Commission), the interaction-region design (John Adams Institute in the United Kingdom), the cryo-b皇家-vacuum system (CELSI consortium), and the high-field magnet design (CERN). Four major U.S. laboratories, Brookhaven National Laboratory (BNL), National High Magnetic Field Laboratory (NHMFL), Fermi National Accelerator Laboratory (Fermilab), and Lawrence Berkeley National Laboratory (LBNL), are associated with the EuroCirCol international collaboration. It covered all aspects of the study, e.g., designs of 100 km hadron and lepton colliders, infrastructures, technology R&D, experiments, and physics.

R&D efforts at the four leading U.S. magnet laboratories (BNL, FNAL, LBNL, and the NHMFL at Florida State University) with the goals of the FCC study. An implementation plan for joint magnet R&D is being developed. First demonstrator magnets could be ready by 2017 or 2018, both in Europe and in the U.S.

The FCC Week 2015 also included a special plenary session of the FCC Gender Equality Working Group, where personal experiences of women physicists were reported from all around the world. At this meeting, Director of APS Education and Diversity Theodore Hodapp, representing both the APS committees on the status of women in physics and on minorities in physics, gave an intriguing presentation on how to support women physicists, which triggered lively discussions. R&D progress will be reviewed at the next FCC Week, to be held in Rome from April 11 - 15, 2016. Further information about the global FCC study is available at cern.ch/fcc (general FCC), eurocircol.org (EuroCirCol) and cern.ch/fcwc2015 (FCC Week 2015).
I imagine an international sport where eager high school students who share a passion for problem-solving compete with peers from around the world...

By the time of the third Olympiad in 1969, a set of statutes had been drafted, and in 1972 the first western country, France, participated. There were rough patches: Efforts to politicize various academic Olympiads in 1977 into socialist events resulted in several years without any physics Olympiads. True international participation began when the Federal Republic of Germany hosted the IPO, and the program has been hosted by various nations around the world every year since 1981.

In 1984 a permanent leadership program was established, and the Polish physicist Waldemar Gorzowski became the first president of the IPO. With the support of active members of the international board, he solved the problems of hosting the IPO. Gorzowski served as president of the IPO until he passed away during the 38th IPO in Iran, doing what he enjoyed most: supporting a friendly competition amongst the world's best high school physics students.

The international competition

The current IPO comprises two five-hour exams: a theory exam that accounts for 60% of the total score, and an experimental exam that accounts for the remaining 40%. The allowed topics are drawn from a syllabus that is similar to algebra-based AP Physics. The use of calculus to solve problems is permitted, but is expected to be minimal. Each nation is allowed to bring five high school competitors and two leaders; the leaders help moderate the exams.

There are three theoretical questions, but the level of difficulty of the exam has grown over the past four decades to the point that each question is usually composed of many parts. These questions are set by the host country, but then debated and approved by the international board, which is composed of two leaders from each of the represented countries. These board discussions take place after the opening ceremony and after the leaders are removed from contact with the competitors.

Host countries are expected to draw from the entire syllabus, and often select problems of relevance to the host nation. In Vietnam, a problem was devoted to the physics of a rice pounder; in Denmark, one was devoted to Greenland. Sometimes the problems are farfetched, such as the problem from Singapore: What would be seen by a pinhole camera back at least a dozen years; often more of the exam is devoted to problem-solving techniques, and often require the competitors to construct analytical, numerical, or graphical solutions. Ordinarily the top 20 eligible competitors are invited to the ten-day training camp.

"Exam questions are designed to test fundamental physics as well as problem-solving techniques..."

As with most nations, the U.S. Team struggles with success at the International Physics Olympiad. The U.S. Physics Olympiad publicized the names of all the competitors (rather than just those selected for the team). This public recognition increased interest in the exam, but also resulted in the challenging of exam scores by the competitors, their teachers, and their parents.

The demographics are interesting. First-generation Asians have a strong presence in the U.S. Team, a pattern that goes back at least a dozen years; often more of the team is composed of such students. The racial diversity of those current and former U.S. Team members who were not first-generation Asians is much closer to that of the U.S. population as a whole, but the U.S. team has a number of African-American and Hispanic students, while not zero, is lower than the corresponding percentages of the population.

Approximately 20% of the almost five thousand initial test-takers are women, as are 16% of those on the U.S. Team. Since 2003 seven women have represented the United States at the IPO.

A decade ago many of the U.S. Team members came from private high schools or special science schools. This has changed. Several public high schools throughout the nation have active preparation programs and now regularly send a student or two to the training camp.

The training program involves lectures, experiments, exams, and problem-solving practice. Exam questions are kept secret, as good questions take weeks to develop despite the fact that it sometimes takes the students only minutes to figure out a correct path to the solution. Recently a coach commented that the internal training program had reached such a level that we were scouring the graduate level texts of Jackson and Goldstein to find problems that were hard enough to challenge these high school students.

Olympiad outcomes and differences in preparation

A decade-long ranking of the top teams is independent of the choice of measure. China, Taiwan, and South Korea are ranked first through third. The U.S. is ranked fourth. Thailand and Russia are fifth and sixth. The most commonly used measure of the performance is the number of medals earned, how many gold and silver medals each country wins. Less common is the aggregate point score of a team, and even less common is the aggregate ranking of the members of a team. Though the status of the IPO are careful to point out that this is a competition among individuals, the team leaders, as well as the national organizations that back the training of the teams, do watch overall team performance and how it relates to other nations, in a friendly and supportive way.

All five of the U.S. Team travelers have won medals every year since 1991. Though the U.S. Team has secured gold, silver, and a silver on five different occasions, it has yet to acquire the coveted five-golded status, a privilege held only by China, Korea, Singapore, Taiwan, and Thailand. Still, U.S. Team travelers have won special recognition in top spots in top exam, top overall, top female participants, and best solution.

One complaint about the program is that it does not train students to do real-world physics as a physicist would do. This is true, but that is not the point of the program. Part of the training camp does develop problem-solving and laboratory skills outside the realm of the IPO, but the focus is on competitive techniques. Even so, the playful conceptual problems that students enjoy are often similar to the problems posed by Newton, Einstein, or Feynman.

All members of the U.S. Team have fun doing physics: One of their favorite activities is competing against the coaches to solve “Fermi problems” — order-of-magnitude back-of-the-envelope physics calculations. It is, in fact, this playground that first enables the U.S. Team to out-perform when compared to countries with considerably more extensive training programs.

The U.S. Team has 10 structured days of training followed by several weeks of independent study. The top-performing nations have training programs that consist of a mix of supervised and independent work that takes place over the course of many months, and some for longer than a year. The IP63 enables current high school students who love problem-solving to do just that: solve problems. The students relish rising to the challenge and engaging in intellectual competition, and the degree of difficulty of the problems has increased over the years to reflect that. Though the Olympiad is not a program for creating future PhD physicists, U.S. Team members go on to careers in the STEM fields and also in economics. Former team members have become professors in a multitude of disciplines, Wall Street analysts, medical doctors, engineers in Silicon Valley, and yes, even physicists.

For more information, visit www.ipho.org and www.aapt.org/physicsteam and their parent, APS News welcomes and encourages letters and submissions from APS members responding to these and other issues. Responses may be sent to: letters@aps.org.