

2018 APS General Election Results

The results are in for this year's APS General Election, which began on July 2 and closed on August 10. Sylvester James Gates, Jr. (Brown University) will join the APS presidential line as Vice President in 2019, becoming President-Elect in 2020, and President in 2021. APS Treasurer James Hollenhorst (Agilent Technologies) was re-elected to a second three-year term. Robin Selinger (Kent State University) will serve as General Councilor and Enge Wang (Peking University) will become International Councilor. Nora Berrah (University of Connecticut) was selected to become the Chair-Elect of the APS Nominating Committee. All will begin their new terms on January 1, 2019.

Sylvester James Gates, Jr., (Vice President) a theoretical physicist, is currently the Ford Foundation Physics Professor and Affiliate Mathematics Professor at Brown University. He received his Ph.D. degree in 1977 from the Massachusetts Institute of Technology. This year marks the



Sylvester James Gates, Jr.

forty-sixth consecutive year of his university-level teaching in institutions as diverse as Caltech, Howard University, Gustavus Adolphus College, MIT, and the University of Maryland. Gates received the 2011 U.S. National Medal of Science, with a citation reading, "For his contribution to the mathematics of supersymmetry in particle, field, and string theories and his extraordinary efforts to engage the public on the beauty and wonder of fundamental physics." He is an APS

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2019 APS Medal for Exceptional Achievement in Research awarded to Bertrand I. Halperin

Harvard physicist Bertrand I. Halperin has been selected to receive the 2019 APS Medal for Exceptional Achievement in Research for his "seminal contributions to theoretical condensed matter physics."

Halperin, 76, is Hollis Professor of Mathematics and Natural Philosophy (Emeritus) at Harvard and an APS Fellow. He is winner of the 1982 APS Oliver E. Buckley Condensed Matter Physics Prize and the 2001 APS Lars Onsager Prize.

"Bertrand Halperin is a giant in the field of theoretical condensed matter physics," said APS President-Elect David Gross, chair of the medal selection committee. "His many contributions to the understanding of the dynamics of phase transitions, of low-dimensional quantum phenomena, of the quantum Hall effect, and his pioneering work on the role of topology in both classical and quantum systems have shaped condensed matter theory over the last 40 years, bringing it to bear on the understanding of many experiments."



Bertrand I. Halperin

The Medal for Exceptional Achievement in Research is the largest APS prize to recognize researchers from all fields of physics and is funded by a donation from entrepreneur Jay Jones. Previous recipients were Edward Witten (2016), Daniel Kleppner (2017), and Eugene Parker (2018).

"Bert is among our most distinguished APS Members," said APS Chief Executive Officer Kate Kirby. "It's hard to imagine someone more deserving

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PHYSICAL REVIEW A

covering atomic, molecular, and optical physics and quantum information

An Evolving and Leading-edge Journal with a Rich History

By Thomas Pattard and Gordon Drake

Throughout 2018, APS has been celebrating the 125th anniversary of *The Physical Review*. In comparison, *Physical Review A*—which was born under the heading "General Physics" when the original publication was split into four parts in 1970—is a young journal. Even so, we can already look back on an almost-50-year history. Since its founding, the journal has continuously grown in size and reach. While the first issue, in January 1970, had 33 articles, we now publish more than 200 articles each month. And although 28 of those first 33 articles had authors only from the US, we are now truly international: in 2017, 84% of the manuscripts submitted to us came from abroad.

Grounded in the tradition of *The Physical Review*, the mission of *Physical Review A* has always

been to publish excellent physics within the scope of the journal, and our approach was captured in a formal statement adopted by the APS Council in 1995: "It is the policy of the American Physical Society that the *Physical Review* accept for publication those manuscripts that significantly advance physics and have been found to be scientifically sound, important to the field, and in satisfactory form. The Society will implement this policy as fairly and efficiently as possible and without regard to national boundaries."

This is a promise to our authors that they will be treated as fairly as possible and that we do not discriminate on the basis of nationality, gender, religion, political views, or other aspects that are not part of the scientific assessment of their work. And it is a promise to our readers that, in addition to being free from



obvious errors, the papers they see published in *Physical Review A* have been judged by their peers to represent substantial advances. These guiding principles have not changed in decades and form the anchor for the journal.

Among the more than 77,000 papers *Physical Review A* has published, there are many jewels that would make any journal proud. The most highly cited, a paper on density-functional theory by

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PHYSICAL REVIEW E

covering statistical, nonlinear, biological, and soft matter physics

Interdisciplinary Excellence

By the Editors of PRE

This year, *Physical Review E* (PRE) is celebrating 25 years of publishing, along with the entire *Physical Review* family of journals, which is marking its 125th anniversary. The PRE story began in January 1993, when the burgeoning *Physical Review A* (*General Physics*) was split into two: *Physical Review A* (*Atomic, Molecular, and Optical Physics*) and *Physical Review E* (*Statistical Physics, Plasmas, Fluids, and Related Interdisciplinary Topics*).

Since then, PRE has continued the editorial philosophy of the founding editor, Irwin Oppenheim, by publishing research from emerging areas, nontraditional fields, and authors who are new to the *Physical Review* journals. To acknowledge his work, APS has announced a new honor, the first of its kind: the Irwin Oppenheim Award for best paper in PRE by young investigators. The award will recognize outstanding contributions to physics by early career researchers who publish in PRE. Appropriately this new initiative recognizes a visionary and inspiring editor who embraced the interdisciplinary nature of the journal.

The birth of PRE was preceded by rapid growth in statistical physics and nonlinear dynamics.

An entire generation of physicists studying topical areas such as renormalization group theory, critical phenomena, and chaos chose the journal to be their premier publication. PRE doubled in size in its first 10 years, with subsequent growth in soft matter and biological physics, and later complex systems and networks. Arguably, the emergence of entire fields of research including colloids, granular materials, and liquid crystals would not have been possible without PRE. Since its inception, PRE has published over 50,000 articles and these articles have garnered over 1 million citations.

PRE covers collective phenomena of many-body systems. The journal faithfully serves overlapping communities dealing with statistical and nonlinear physics, biological physics, and soft matter. And as these communities have evolved, so has the journal. For example, two years ago PRE added a new section in solid mechanics as this classical subject is experiencing a revival of interest among nonlinear, statistical, and soft matter physics researchers. Active matter, the study of self-propelled and self-organizing objects, is another recent addition to the table of contents. To better serve the com-



munity, the journal subtitle has changed twice, and to better organize its content, section titles have been updated about once per year. At the same time, sections of the journal that are aligned with units of the American Physical Society including computational physics, polymers, biological physics, plasma physics, and fluid dynamics have been stable over the years.

PRE is unique in that the theme that binds the journal together is not a single specific subject area, but rather an approach that often involves a statistical component. Typically, a PRE author may publish in multiple sections and on multiple topics, and there is a clear community corresponding to the journal. The journal's author and referee base is overwhelmingly international, and appropriately, about one half of the PRE editors are based outside the U.S., and the journal's editorial board spans 15 countries and five continents.

With its broad coverage, PRE relies primarily on editors who are active researchers, typically scien-

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Spectra takes on San Diego Comic Con

By Leah Poffenberger

San Diego, California—On July 18, the San Diego Convention Center threw open its doors to thousands of comic book fans hoping to take in the sights and sounds of San Diego Comic-Con International (SDCC). Over the five-day “con,” attendees milled about the 14-acre exhibit hall, hoping to catch sight of their favorite superheroes and grab some new comics. What most of them didn’t expect to find was a comic book about physics.

SDCC brings together comic book aficionados, artists, writers, and entertainment industry execs from around the world to share and show off their latest creations. Just steps from a massive display featuring DC Comics heroes like Superman and Wonder

Woman, many Comic Con visitors were greeted by a group of APS employees handing out free science comics. This team, led by Rebecca Thompson, APS Head of Outreach, made the trek to San Diego with one and a half tons of comics in tow featuring Spectra, the original laser superhero.

The *Spectra* comics, authored by Thompson, debuted in 2009 and follow the adventures of a middle school student with laser superpowers, while also providing sneaky physics lessons entwined with the story. Now with ten issues, the *Spectra* series continues to draw in new fans and delight devoted readers.

“The entire point of outreach is to meet non-scientists on their turf **COMIC CON continued on page 6**



The APS outreach team celebrates the launch of the latest issue of *Spectra* with friends and fans.

First Group of Fundamental Physics Innovation Awards Announced

The inaugural recipients have been chosen for the new Fundamental Physics Innovation Awards, funded by the Gordon and Betty Moore Foundation. The grants fall into three categories of funding: Lectureship Awards for seminar presentations, Visitor Awards for longer collaborative interactions, and Convening Awards to support small scientific meetings. APS selects the recipients based on recommendations from an external scientific advisory board.

“These awards are about bringing people together to think creatively about how we can take the next steps in fundamental physics beyond the Standard Model,” says Theodore Hodapp, Director



of Project Development at APS. “Large mega-projects offer one direction, but table-top physics may offer a window into the underlying physics in completely unexpected ways.”

Edmund Meyers, Research Professor of Physics at Florida State University, will receive a Lectureship Award to travel to the Max Planck Institute for Nuclear Physics in Heidelberg, Germany. He will give a seminar on using the spectroscopy of diatomic antihydrogen molecular ions to test CPT

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This Month in Physics History

August 15, 1934: World-Record Dive in the Bathysphere by Beebe and Barton

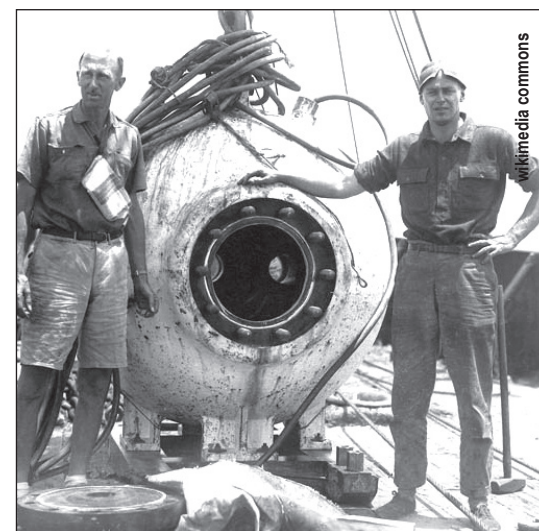
In 1986, a deep-ocean submersible vessel dubbed Alvin made international headlines when it carried explorer Robert Ballard and two others to the wreckage of the RMS Titanic, which sank in 1912. Its design was based on pioneering deep-sea dives in the 1930s by William Charles Beebe and Otis Barton in a spherical vessel known as the “bathysphere.”

Born in Brooklyn, New York to a newspaper executive, Beebe had a strong interest in collecting animal specimens, even teaching himself the art of taxidermy as a high school student. An avid amateur ornithologist, he published his first article in *Harper’s Young People* while still in high school, about a bird known as a “brown creeper.” He attended Columbia University, but left without earning a degree to work at the just-opened New York Zoological Park, where he cared for the birds and rose quickly to become a full curator. (Both Tufts and Colgate University later awarded him honorary doctorates.) Beebe also persuaded some of his professors to sponsor expeditions to Nova Scotia to photograph birds and other animals there and to collect specimens. There he picked up the practice of dredging, using nets to haul up organisms that thrived deep underwater.

In 1928, Beebe received permission from the British government to set up a research station in Bermuda to study the marine life in the region. He soon realized that for dredging and diving to observe deep sea animals in their native habitat, a special underwater helmet would not be sufficient. Helmets were safe to only a few hundred feet down, and though submarines had descended to 383 feet, they had no windows to permit observation. Beebe wanted to build a deep-sea vessel with observational windows, capable of descending to even greater depths. His early designs for a cylindrical vessel appeared in *The New York Times* and caught the attention of an engineer named Otis Barton, who also dreamed of going deep-sea diving.

Barton’s initial letters to Beebe went unanswered, largely because the latter received so much correspondence from obvious cranks. But eventually a mutual friend introduced them, and Barton presented his own design in person: a spherical shape, the better to withstand the immense pressures of the deep, with openings for three thick windows made of fused quartz. They agreed that Barton would cover the cost of constructing the vessel and related equipment, while Beebe would finance the chartering of a ship and other expenses.

The men conducted their first unmanned test of the bathysphere on May 27, 1930, descending to only about 45 feet. They sent it down deeper for the second test, and found that the crucial electrical and phone cables, encased in a rubber hose, were badly twisted around the suspension cable. Once that issue was resolved, Beebe and Barton



William Beebe (left) and Otis Barton with their bathysphere.

made their first dive, descending to 803 feet, and made several more successful dives that summer. They documented many deep-sea animals previously never observed in their native habitats, and Beebe noted how parts of the solar spectrum were filtered out during descent, until only the violet and blue hues remained. They also conducted shallower dives to map Bermuda’s underwater geography, despite the risk of the vessel colliding with the submerged cliffs.

A combination of bad weather and the Great Depression foiled diving plans the next summer, and Beebe pledged to dive down a full half-mile in an attempt to raise funding for more dives. The resulting funding enabled them to resume their dives in 1932. The project was nearly scuttled during an unmanned test of the bathysphere, when it reemerged nearly full of water. As they loosened the heavy metal hatch bolts, one of them “shot across the deck like the shell from a gun,” Beebe later wrote in his memoir, *Half Mile Down*. Had the two men been inside the vessel under those same circumstances, the water at such pressure “would have shot through flesh and bone like steel bullets,” before they even had time to drown.

But they fixed the leak, and a dive was scheduled for September 22, 1932. Barton planned to film the creatures through the bathysphere’s window, and NBC broadcast verbal observations as they were relayed up the phone line. It was a rough descent, and the bathysphere’s swinging from side to side caused Barton to vomit from seasickness. But they kept going, eventually reaching 2,200 feet—still 440 feet short of their half-mile goal. By then, Barton and Beebe were badly bruised from the rough ride, and asked to be brought back up.

Once again, Beebe found himself in need of sponsorship to conduct more dives in the bathy-

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APSNEWS

Series II, Vol. 27, No. 7
August/September 2018
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APS News (ISSN: 1058-8132) is published monthly, except for a combined August-September issue, 11 times per year, by the American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, (301) 209-3200. It contains news of the Society and of its Divisions, Topical Groups, Sections, and Forums; advance information on meetings of the Society; and reports to the Society by its committees and task forces, as well as opinions.

Letters to the editor are welcomed from the membership. Letters must be signed and should include an address and daytime telephone number. APS reserves the right to select and to edit for length and clarity. All correspondence regarding APS News should be directed to: Editor, APS News, One Physics Ellipse, College Park, MD 20740-3844, Email: letters@aps.org.

Subscriptions: APS News is an on-membership publication delivered by Periodical Mail Postage Paid at College Park, MD and at additional mailing offices.

For address changes, please send both the old and new addresses, and, if possible, include a mailing label from a recent issue. Changes can be emailed to membership@aps.org. Postmaster: Send address changes to APS News, Membership Department, American Physical Society, One Physics Ellipse, College Park, MD 20740-3844.

Coden: ANWSEN ISSN: 1058-8132

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* Voting Members of the APS Board of Directors

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Fellow and in 2013 he was elected to the U.S. National Academy of Sciences.

James Hollenhorst (Treasurer) is Senior Director of Technology for Agilent Technologies, an APS Fellow, and is currently serving as the first elected Treasurer of the American Physical Society. He received his Ph.D. in physics from Stanford University with a dissertation on gravitational radiation detectors. He spent eleven years at Bell Laboratories, where his team developed the photodiodes that became a mainstay of AT&T's network. His team also developed the pump lasers that enabled the world's first optically-amplified submarine cable.

Robin L. B. Selinger (General Councilor) is a Professor of Chemical Physics at Kent State University's Liquid Crystal Institute. She earned her Ph.D. at Harvard University in 1989. She is a computational theorist whose research focuses on fundamental pattern formation mechanisms that control microstructure and morphology in soft matter. An APS Fellow, Selinger served as Secretary/Treasurer of the APS Topical Group on Statistical and Nonlinear Physics (GSPN) from 2013 to 2016, as a member of the GSPN Fellowship committee in 2017, and as a member of the APS Soft Matter Physics Working Group in 2013. Selinger has been an innovator in developing outreach and mentoring programs to attract students to science majors

and promote diversity in the STEM workforce.

Enge Wang (International Councilor) is Professor of Physics and President Emeritus of Peking University. He received his Ph.D. from Peking University in 1990. Wang's area of research is surface physics. He has served the physics community in many ways: as Vice President of the International Union of Pure and Applied Physics and of the Chinese Physical Society, and on international scientific advisory boards for various organizations in Australia, Chile, India, Japan, Saudi Arabia, the U.K., and the U.S. Wang is a Fellow of the American Physical Society.

Nora Berrah (Chair-Elect of the Nominating Committee) is Professor and Head of the Physics Department at the University of Connecticut since 2014. She received her Ph.D. from the University of Virginia in 1987 and her research interests are in experimental atomic, molecular and optical physics. She received the David S. Shirley Award for "Outstanding Scientific Achievements" at the Advanced Light Source, a Humboldt Fellowship from the Alexander von Humboldt Foundation in Germany, and a Chair d'Excellence from SOLEIL National Synchrotron Laboratory in France. Berrah is an APS Fellow and the recipient of the 2014 APS Davison-Germer award.

For more on the election results visit go.aps.org/aps-vote-2018

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symmetry breaking.

Derek Jackson Kimball, Professor of Physics at California State University – East Bay, will receive a Visitor Award to travel to Ben-Gurion University of the Negev, Israel, to work with researchers there on table-top experimental investigations of exotic spin-dependent interactions related to dark matter.

Kim Siang Khaw, Postdoctoral Research Associate at the University of Washington, will receive a Visitor Award to travel to the University of Liverpool, UK, to organize a workshop on experimental methods for measuring a permanent electric dipole moment in muons.

W. Michael Snow, Professor of Physics at Indiana University, will receive a Visitor Award to host Valery Nesvizhevsky (European Center for Neutron Research, Grenoble, France) to give presentations at several institutions on experimental searches for neutron-

antineutron oscillations, which can provide insight into the baryon asymmetry of the universe.

Ricardo Alarcon, Cecilia Lunardini, Philip Maukopf, Tanmay Vachaspati, and Frank

Wilczek (all affiliated with Arizona State University) will receive a Convening Award to organize the First Arizona Workshop on Precision Searches for Fundamental Physics.

Mayda Velasco, Carl Eric Dahl, and André Luiz C. de Gouvêa (all affiliated with Northwestern University) will receive a Convening Award to organize a conference on Novel Instrumentation for Fundamental Physics at the Colegio de Física Fundamental e Interdisciplinaria de las Américas in Puerto Rico.

The application deadline for the next round of awards is October 15. For more information visit the website aps.org/programs/innovation/moore/.

News from the APS Office of Government Affairs

2018-19 APS Congressional Fellows Named

By Tawanda W. Johnson

Jennifer Dailey and Abigail Regitsky have been selected as the 2018-19 APS Congressional Fellows, and they are both thrilled to begin their new positions on Capitol Hill.

"I was extraordinarily excited to find out that I had been named a Fellow," said Dailey, who earned her Ph.D. in materials science and engineering from Johns Hopkins University.

She added, "Ever since I found out that this position existed a few years ago, I've been actively pursuing relevant training and outreach opportunities to gain as much experience as possible in the field. The news also made me a bit nostalgic; it was seven years ago that I first acknowledged, 'I'm a scientist, not just a science student,' while presenting research at my first scientific meeting: the 2011 APS March Meeting."

Regitsky, who received a Ph.D. in materials science and engineering from the Massachusetts Institute of Technology, recalled a feeling of elation after receiving news of her selection.

"I was very excited and almost speechless when I found out I was going to be an APS Congressional Fellow. After hearing about the [fel-



Jennifer Dailey



Abigail Regitsky

lowships] three years ago, I knew a fellowship would be the perfect opportunity to help introduce me to a career in science policy," she said.

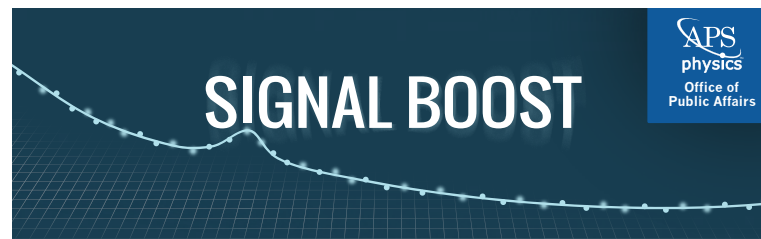
Sponsored by APS under the umbrella of the American Association for the Advancement of Science (AAAS) Science & Technology Fellowships, the aim of the Congressional Fellowships is to provide a public service by making available individuals with scientific knowledge and skills to members of Congress, few of whom have a technical background. In turn, the program enables scientists to broaden their experience through direct involvement with the policy-making process. Fellows gain a perspective which, ideally, will enhance not only their own careers

but also the physics community's ability to more effectively communicate with its representatives in Congress.

Fellowships are for one year, typically running September through August. Following a two-week orientation in Washington sponsored by the AAAS, incoming congressional fellows become acquainted with their new work environment. Following interviews on Capitol Hill, Fellows choose a congressional office—personal or committee staff—where they wish to serve.

Dailey and Regitsky both came highly recommended for the Congressional Fellow positions.

"I cannot think of a stronger
FELLOWS continued on page 7



Signal Boost is a monthly email video newsletter alerting APS members to policy issues and identifying opportunities to get involved. Past issues are available at go.aps.org/2nr298D. To receive Signal Boost and learn more about grassroots activities, contact Greg Mack at mack@aps.org.

Join Our Mailing List: visit the sign-up page at go.aps.org/2nqGtJP.

FYI: Science Policy News From AIP

U.S. Quantum R&D Strategy Taking Shape

By Mitch Ambrose

Efforts to prioritize quantum R&D have leapt forward this year in Washington, D.C., spurred by policymakers' growing conviction of the strategic importance of nascent technologies that leverage some of the deepest phenomena of quantum mechanics. Advances in quantum information science (QIS) in particular promise to enable powerful new sensing, communication, and computing technologies.

Although federal agencies have supported QIS research for decades, the field is now widely viewed to be at an inflection point. Countries and private companies are committing substantial resources to secure a stake in the market for quantum technologies and to master those that could prove especially disruptive.

Concerned the U.S. lacks a comprehensive strategy in the face of other governments' investments, particularly those of China and the European Union, some policymakers are seeking to launch a national initiative to better focus federal quantum R&D efforts in partner-

ship with academia and industry.

Drawing parallels to the space race of the 1960s, leaders of the House Science Committee have advanced bipartisan legislation to launch a 10-year National Quantum Initiative. The initiative would establish an interagency coordination infrastructure and direct \$255 million per year to QIS R&D across the Department of Energy (DOE), National Science Foundation (NSF), and National Institute of Standards and Technology (NIST) during its first five years.

DOE and NSF would commit \$125 million and \$50 million per year, respectively, to support up to five QIS research centers each. DOE's centers would focus on research and technology development, while NSF's would have more of an eye toward longer-term workforce development activities. NIST, a pioneer in QIS, would be charged with continuing to lay the groundwork for the emerging quantum industry by advancing relevant measurement science and standards.



A primary driver behind the bill is a coalition of scientific societies, universities, and industry groups known as the National Photonics Initiative. A newly launched Quantum Industry Coalition has also endorsed the initiative, although it hopes to broaden the bill's focus beyond basic research to explicitly encompass applied research.

The Senate Commerce Committee advanced similar legislation in August, although for jurisdictional reasons its version does not contain the DOE provisions.

Although supportive of the House bill's underlying research principles, APS has expressed concerns that the legislation could divert funding from other research programs if the agencies do not

R&D continued on page 7

International Research Travel Award Program

Provides funding to foster international scientific collaborations between APS members and physicists in developing countries.

Deadline:
November 1, 2018

go.aps.org/irtap-2018

APS
physics



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A.D. Becke, has received more than 22,000 citations, making it the 5th-most-cited paper in the 125-year history of the *Physical Review* family. Other highlights include seminal papers by Loss and DiVincenzo on quantum computation with quantum dots, by Bennett et al. on quantum error correction, and by Allen et al. on orbital angular momentum of light, to name just a few that have amassed over 2,000 citations each. And over the last twenty-five years, eleven Nobel prizes have been awarded in areas directly related to work published in *Physical Review A*, and all of the recipients have published some of their work in our journal.

While we are proud of this rich history, it does not mean that we should rest on our laurels; on the contrary, the editors are motivated to continue to work hard so that *Physical Review A* will remain the journal of choice in the areas of physics that we cover. In order to achieve this, the journal has always evolved, and continues to do so, to adapt to the changing needs of the community.

For example, a significant change, rooted in the ever-increasing size of the journal, was to begin highlighting a small number of papers that the editors feel deserve special attention due to their particular interest, significance, or clarity. Of course, we feel that all the papers published in *Physical Review A* deserve attention, but the sheer amount of available

information has made it increasingly difficult for readers to follow developments that are somewhat outside their own main areas of specialization. In order to help our readers navigate this information, we introduced Editors' Suggestions in August 2013. Now, five years later, we are about to publish our 500th Suggestion.

Even more important are the changes to the content itself—the scope of the journal. When the journal became too large and seemed to lack focus, *Physical Review E* was split off from *Physical Review A* in January 1993, and *Physical Review A* concentrated on atomic, molecular, and optical physics. Being one of the first journals to fully embrace quantum information as a new research field, we created a separate section entitled Quantum Information as early as January 1998.

In the ensuing two decades, this section has grown to be the second-largest section of the journal, and now contains about twenty percent of all the papers published in *Physical Review A*. In recognition of this, we have recently added “Quantum Information” to our formal statement of coverage, to both recognize that quantum information has evolved into its own subfield of physics, and to make it clear that *Physical Review A* views itself as the home for high-quality papers in this area.

Along similar lines, we have very recently responded to the

needs of another community by renaming one of the sections of the journal. While APS has had a Topical Group on Precision Measurement and Fundamental Constants since 1987, the field has recently seen a surge, and more and more papers in this area are being published, many of them in *Physical Review A*. Thus in July 2018 we changed the title of the “Atomic and molecular structure and dynamics” section to “Atomic and molecular structure and dynamics; high-precision measurements,” to signal that this community clearly has a home in our journal.

For almost fifty years, *Physical Review A* has been an indispensable part of the AMO community and (for a somewhat shorter time) the quantum information community. The journal has grown with its community, and has, in turn, facilitated and enabled the growth of the community itself. While we feel that we have much to be proud of, we will not be complacent. We will continue to listen to our readers, authors, and referees, and adapt, within the framework of our mission, to their needs.

Thomas Pattard is Managing Editor of Physical Review A and has been with the journal since 2006. Gordon Drake has been Lead Editor of Physical Review A since 2006. He is a former Head of the Department of Physics at the University of Windsor, a Fellow of the Royal Society of Canada, and an APS Fellow.

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tists who are internationally recognized in their respective fields of research. Many sections in PRE are managed by a single editor who is an expert in that area. PRE has benefited from having experienced editors: two of them, plasma physics editor Brant Johnson and nonlinear dynamics editor Antonio Politi, have served for over twenty years. Remarkably, the average and the median tenure of PRE editors exceeds ten years. The journal also benefits from the dedication of a small team of full-time editorial staff, who are located at the APS

editorial office in Ridge, New York.

To call attention to papers of outstanding quality or to especially interesting results, the journal has highlighting mechanisms such as Editors' Suggestions, trending articles, and spotlights on emerging research areas. Exceptional articles are covered by the APS publication *Physics*. Influential papers from the past 25 years are currently being featured in a collection of anniversary milestones. These milestone papers include classics on such topics as the lattice Boltzmann method, fluctuation theorems, flocking, jam-

ming, and random graphs (available at go.aps.org/2w6QSjU).

With all the changes over the years, one thing has remained constant at PRE: as with the rest of the journals in the *Physical Review* family: our acceptance criterion that manuscripts must report *significant advances in physics*. While maintaining these editorial standards, we will keep striving to improve the journal, to keep the journal agile and responsive to the needs of the community. We welcome feedback from all of our authors, readers, and referees at pre@aps.org.

Missile-Defense Systems May Risk Space Warfare

By Sophia Chen

2018 APS April Meeting, Columbus, Ohio—This May, U.S. President Donald Trump's administration was slated to publish its Missile Defense Review, proposing future strategies to protect the country from potential missile threats. As of press time, the document has not yet appeared. But likely it will argue for expanding current systems and developing new, potentially space-based technologies for missile defense, said physicist Laura Grego, of the Union of Concerned Scientists, at a press conference at the APS April Meeting.

The intent is to keep the country safe. But a beefed-up defense system can also easily become an offensive weapon, with unintended consequences that policy makers gloss over, she says. Grego emphasizes one danger in particular: these missile defense systems have the capability to destroy satellites. “If you make a good missile defense system, you are also making a good antisatellite weapon,” says Grego. “You can't help it. They just do the same kind of thing.”

Current missile defense systems—some based on land, some on ships—launch projectiles into the air to hit incoming offensive missiles. But some of these projectiles can reach altitudes higher than 2,000 kilometers—beyond low Earth orbit (LEO), where some 1,000 satellites reside.

Eighty percent of those LEO satellites belong to the U.S. So by developing a robust missile defense system, the U.S. is also creating a technology that disproportionately threatens its own satellites, Grego noted. It's actually easier to knock a satellite down than a missile loaded with nukes: satellites travel in known orbits, so attacks can be planned in advance.

The U.S. government has already used missile defense technology to blow up a satellite, one of its own. In 2008, the Pentagon converted a defensive missile to shoot down a non-functioning military satellite in a mission known as Operation Burnt Frost. “It only took a few days of reprogramming to make that missile capable

of hitting the satellite,” says Todd Harrison, an aerospace security expert at the Center for Strategic and International Studies, a bipartisan think tank.

However, Harrison says that other countries shouldn't worry that the U.S. will turn its missile defense systems on their satellites. For one thing, these collision-based methods create lots of debris that damage other spacecraft. According to Grego, destruction of a single 10-ton satellite could double the amount of large debris in LEO. “We have more to lose in space than anyone else,” says Harrison. “Why would we want to be polluting it with all kinds of debris?”

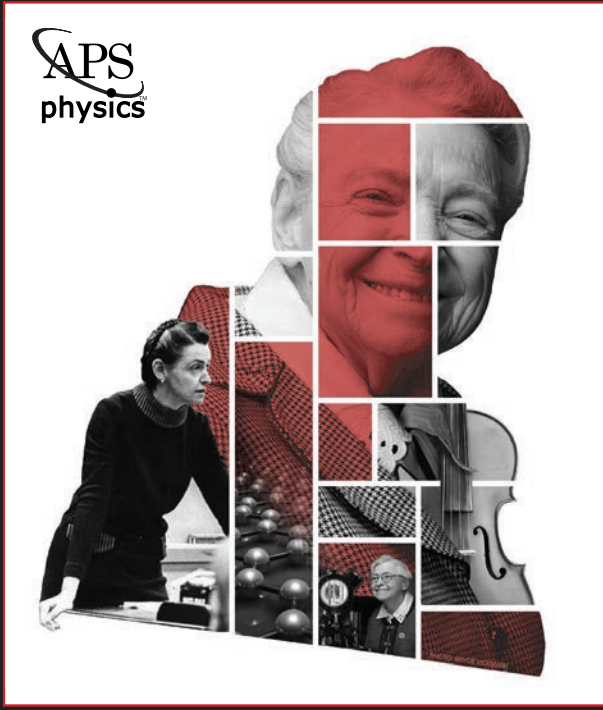
But conversely, Harrison says, the U.S. does need to keep an eye on other countries with antisatellite capability, such as Russia and China. Russia's missile defense system can also shoot down LEO satellites. In 2007, China shot down one of its weather satellites as a demonstration. Debris from that test collided with a Russian spacecraft in 2013, altering its orbit.

Grego says that antisatellite weaponry threatens more than just the satellites themselves: it also erodes political norms about space as a peaceful domain. Although countries have always used space for military advantage—launching satellites for military surveillance or “jamming” an adversarial country's communications—so far, countries have avoided aggressive conflict in space. More than 100 countries, including the U.S., have signed the Outer Space Treaty of 1967, which prohibits weapons of mass destruction in space, while declaring that space should be used for peaceful purposes.

However, in recent years, the U.S. government has shown a “shift in thinking,” says Grego, as space real estate becomes more crowded. In a March speech, President Trump referred to space as “a war-fighting domain just like the land, air, and sea,” and proposed a new branch of the military, a Space Force.

The development of antisatellite weaponry furthers the possibility

MISSILE continued on page 7



APS
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Ballistic missile defense systems are deployed on land and sea. A move to space could lead to geopolitical tension. In this photo, the guided-missile destroyer USS Fitzgerald launches a missile as part of a joint ballistic missile defense exercise in the Pacific Ocean on Oct. 25, 2012.

Education and Diversity Update

APS Conferences for Undergraduate Women in Physics (CUWiP): Student Applications Open September 3

APS CUWiPs are three-day regional conferences at multiple sites across the U.S. and Canada, and are designed to increase the recruitment and retention of undergraduate women in physics. The 2019 APS CUWiPs will be held at twelve universities during January 18–20. The conferences will provide great opportunities for women in physics to network, as well as learn from scientific presentations, panel discussions, graduate school fairs, and career expos! Applications are open September 3 – October 12 at aps.org/cuwip.

Interested in hosting an APS CUWiP at your university in 2020?

If you are interested in applying to be a host site for our 2020 conferences, please visit go.aps.org/cuwiphost and submit an application form by November 1. Email women@aps.org for more information.

Professional Skills Development Workshop for Women Physicists

With support from the National Science Foundation and the APS Division of Fluid Dynamics (DFD), APS will offer a Professional Skills Development Workshop in conjunction with the 2018 Annual DFD Meeting in Atlanta, GA. The workshop is open to women postdocs and early career women physicists and is designed to provide professional training in effective negotiation and communication skills, as well as a special opportunity for networking. For more information and to register, please visit apsdf2018.org/events-1/.

Save the Date: 2019 PhysTEC Conference

Join the nation's largest meeting dedicated to the education of future physics teachers. The 2019 PhysTEC Conference will be held at the Westin Boston Waterfront Hotel in Boston, MA, March 2nd and 3rd. It will feature a special workshop entitled 'Get the Facts Out,' a toolkit for recruiting physics teachers, and much more! Find out more at phystec.org.

BATHYSPHERE continued from page 2

sphere. This time their benefactor was Gilbert Hovey Grosvenor, editor of *National Geographic*, who pledged \$10,000 if Beebe and Barton succeeded in reaching a depth of half a mile and Beebe subsequently wrote an article for the magazine. By this time the bathysphere was in need of some repairs, but once the renovations were complete, they succeeded in reaching 2,510 feet on August 11, 1934, just 140 feet shy of their goal. A few days later, on August 15, Beebe and Barton successfully took the bathysphere down to the promised 3,028, setting a new world record in the process. That record would stand until Barton broke it in 1949, on a dive in a new vessel he dubbed the Benthoscope.

Beebe lost interest in the bathysphere, deeming it too expensive

for what little knowledge remained to be gained from such dives, but he continued to be an avid researcher. Active well into old age, even at 80 he could still scramble up tree trunks to examine bird nests. As his strength flagged, he still managed to do work in the laboratory, such as examining the structure of birds' nests. He died of pneumonia in 1962. As for the bathysphere, it was exhibited at the 1939 New York World's Fair and was used to observe underwater explosions during World War II, before finding a permanent home at the Coney Island aquarium in 1957.

Further Reading:

Beebe, W. *Half Mile Down*. New York: Harcourt Brace and Company, 1934.

Matsen, B. *The Incredible Record-Setting Deep-Sea Dive of the Bathysphere*. Berkeley Heights, N.J.: Enslow Publishers, 2003.

American Institute of Physics CEO Michael H. Moloney

By Leah Poffenberger

The American Institute of Physics (AIP) started 2018 with big news: In January, AIP announced the hiring of their ninth CEO. In March, physicist Michael H. Moloney assumed his role at the helm of the organization.

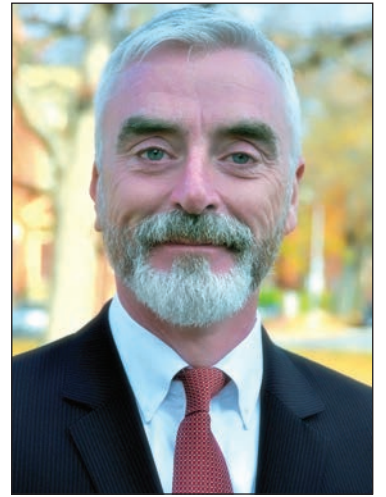
AIP is a federation of scientific societies, including APS, dedicated to advancing and promoting the physical sciences. All told, the member societies serve over 120,000 scientists, engineers, and students. "AIP has been through a lot of change in the last decade," says Moloney. "My job, 87 years after AIP was established, is to help prepare AIP to be a robust, sustainable organization into its second century of existence."

AIP offers support and programs to its member societies to assist in communication, education, and promotion of the physical sciences, and publishes *Physics Today* magazine. "The most obvious benefit AIP offers to members is *Physics Today*—Every member of our member societies receives it," says Moloney. "I remember getting

it when I joined APS in 2001—it's certainly a powerful brand."

AIP is a key resource in other ways: its subsidiary AIP Publishing offers a range of journals; AIP's newsletter FYI provides policy news and analysis; the Inside Science news service produces a range of wide-spectrum science reporting; the Institute hosts the Niels Bohr Library and the Center for the History of Physics; and the Statistical Research Center produces original research on physics education and workforce issues.

Moloney is no stranger to science organizations: He's been a member of both the American Astronomical Society and APS for most of the last 16 years, during which time he was on the staff at the U.S. National Academies of Science. He's also an experimental physicist in his own right, holding a doctorate from the University of Dublin, Trinity College. "I worked somewhere between [atomic, molecular, and optical] physics and condensed matter physics," says Moloney. "It wasn't until I arrived in the U.S. that I knew I had to be a



Michael H. Moloney

type of physicist—back then I was just a physicist."

Moloney's physics background, coupled with a seven-year career in diplomacy as a member of the Irish Foreign Service, uniquely qualified him for a position at the U.S. National Academies of Science. At the National Academies, Moloney oversaw the Aeronautics and Space Engineering Board and the Space Studies Board, both of which are

MOLONEY continued on page 6

Top Undergrads Vie for Apker Award

By Leah Poffenberger

Six young physicists arrived in Washington DC on August 13 in hopes of taking home an APS LeRoy Apker Award for outstanding achievement in physics by undergraduate students. The Apker Award finalists each presented their undergraduate research to a tough selection committee that must make an even tougher decision: Which talented young researchers most deserve the award.

Each year, two LeRoy Apker Award winners are selected—one from a Ph.D. granting institution and one from a non-Ph.D. granting institution. The award consists of \$5,000 to the recipient and \$5,000 to the winner's physics department, a certificate, and funds to travel to an APS meeting to give an invited talk. This year's finalists vying for the award are: Connor Occhialini (University of Connecticut), Elise LePage (Hamilton College), Eric Cooper (Pomona College), Madelyn Leembruggen (University of Cincinnati), Nicholas Sherman

(University of California, Davis), and Zhongying Yan (Bryn Mawr College). All of the finalists will be continuing their physics careers in graduate school this fall.

"All of these finalists would be excellent award winners," said Laura Greene, APS Past President and Chair of the Apker Selection Committee. "They've all presented the highest quality research with originality and scope—just making it here is an accomplishment."

The finalist presentations represented a wide range of physics research, from the dark matter that affects galaxy rotation to the mechanisms in plants that send seeds spinning. In a series of forty-five minute talks, the finalists explained the research and results that defined their undergraduate careers and fielded questions from the selection committee of ten physicists from varied fields.

The selection committee had the challenging task of assessing which outstanding undergraduate students would receive the Apker Award. Committee mem-

bers consider the finalists' original applications—including letters of recommendation and manuscripts of their published work—and their presentation performance. The presentations offered the young physicists a chance to practice sharing their research with a tough crowd of physics critics—a valuable skill for future careers.

Potential for future scientific accomplishment is a major criterion of the Apker Award, which was named in honor of LeRoy W. Apker (1915-1970), an experimental physicist at the General Electric Research Laboratory who studied photoemission of electrons in semiconductors. The award was established in 1978 through an endowment from Jean Dickey Apker.

The winners of the Apker awards will be announced at the end of September, and both award recipients will present their research at either the 2019 March meeting or 2019 April meeting.

For more on the Apker Award see go.aps.org/2I3vIYR

POP Report
Neutrons for the Nation
Discovery and Applications while Minimizing the Risk of Nuclear Proliferation
Read at go.aps.org/apsneutrons

U.S. Physics Team Returns from Lisbon

By Leah Poffenberger

For the eleventh year in a row, every member of the United States Physics Team has medaled at the International Physics Olympiad (IPhO). This year, five high school students representing the United States traveled to Lisbon, Portugal, from July 21 to 29 and brought home three gold and two silver medals, finishing seventh out of 60 countries.

This year's traveling team included Daniel Zhu (Montgomery Blair High School), Michelle Song (Mission San Jose High School), Gopal Goel (Krishna Homeschool), YuQing Xie (Charter School of Wilmington), and Anthony Ou

(Carmel High School). Zhu, Goel, and Xie scored gold medals, and Song and Ou both brought home silvers.

Every year, 20 of the nation's best and brightest high school physics students make the trip to the University of Maryland for a grueling—and rewarding—physics boot camp. These exceptional students make up the U.S. Physics Team, and five of them were selected, based on performance on exams at the end of the training camp and their compatibility as a cohesive group to compete in the 49th IPhO.

On May 27, this year's twenty students arrived at the University of Maryland, which became their

headquarters for physics instruction, discussion, and experimentation for the next ten days. Despite coming from different states and schools, and ranging from freshmen to seniors, the team quickly bonded around their love of physics.

Michelle Song shared her experience from last year's camp in her biography this year. "I had always thought I'd be too tired after a day of lectures and exams to continue talking about physics over the dinner table, but Physics Camp last year proved me wrong," wrote Song. "I never knew a bunch of nerds could be this down-to-earth and cohesive." Song competed at

IPHO continued on page 6

MOLONEY continued from page 5

crucial to U.S. policy and directing the research priorities of federal agencies such as NASA and NSF.

In addition to leading the Aeronautics and Space Engineering and Space Studies boards, Moloney also oversaw the production of nearly 100 scientific reports for use by federal agencies, Congress, and policy communities. These reports—which include several decadal surveys that set research priorities—range in topics from astronomy and astrophysics to atomic, molecular and optical physics and condensed matter physics, which harkens back to Moloney’s roots in the lab.

“I think over my 16 years at the

academies that I’ve pretty much touched all the science areas that are represented by the 10 member societies of AIP,” says Moloney. “These communities are very familiar to me and this position at AIP is an opportunity to continue to work with them in a different environment.”

“The mission of AIP has expanded from advancing physics to advancing and promoting the physical sciences,” says Moloney. “Members of the American Vacuum Society or the Acoustical Society of America might not self-identify as physicists, but physics is at the core of what they do.”

Moloney has taken the helm of

AIP at a time of change: “The physical sciences are in a rapid state of evolution at the moment, becoming very multidisciplinary—people are interacting across research boundaries in ways that weren’t happening ten years ago,” he says. AIP remains committed to adapting to changes within the physical sciences and continuing to serve its community of member societies, he added.

“I want to do the best job I can for AIP and the federation. I’ve always had a public service kind of ethos, and this is just an extension of that,” says Moloney. “I have been a member of APS for a long time, and I look forward to working with our colleagues at APS.”

PhysTEC Announces the 2018 National Teacher of the Year

By Leah Poffenberger

Each year, the Physics Teacher Education Coalition (PhysTEC) selects a group of outstanding recent graduates from physics teaching preparedness programs around the U.S. PhysTEC recognizes up to one local Teacher of the Year per PhysTEC institution and a single national Teacher of the Year. This year’s national winner is Tiffany Taylor from Rogers Heritage High School in Rogers, Arkansas.

The Teacher of the Year award recognizes the contributions of physics educators to their school and the physics community at large. Award recipients receive a certificate of recognition from PhysTEC, funding to attend two professional physics conferences focused on teaching and teaching preparedness, and a grant of \$1000 for classroom materials.

Taylor was especially noted for her recruitment efforts and the increase in enrollment of students in AP Physics 1 and 2, from only 26 students in her first year of teaching, to over 80 students in recent years. More than 40% of her students are typically from underrepresented groups in physics (including women and Hispanic populations).

“She pays close attention to ensuring that all students feel welcome in her class,” says the announcement on the PhysTEC website. “As part of her award, she receives funds to attend the 2018 American Association of Physics Teachers (AAPT) Summer Meeting in Washington, DC, and the 2019 PhysTEC Conference in Boston, MA, where she will receive public recognition for her achievements.”

PhysTEC is jointly led by APS



Tiffany Taylor

and AAPT and aims to improve the education and preparedness of future physics teachers by transforming physics departments, creating successful models for physics teacher education programs, and disseminating best practices. For more details, visit www.physTEC.org.

IPHO continued from page 5

the IPHO last year and is a now a two-time silver medalist.

Since 1986 the American Association of Physics Teachers (AAPT) has been responsible for recruiting, selecting, and training the team of high school students to compete against 60 other countries at IPHO.

To create talented teams, AAPT scours the nation for high school

physics students with the potential to compete at an international level. In mid-January the search for team members begins with two exams administered to high school students at schools all over the country. Top performers qualify for a spot on the U.S. Physics Team, and get their tickets punched to physics training camp. “These kids come here rough around the edges, but

we help polish them up,” said Paul Stanley, who has served as the team’s academic director for the past 16 years.

The U.S. Physics team is made possible by the support of AAPT, sponsorship from APS, the American Institute of Physics, and other physics organizations, and the dedication of bright physics students and enthusiastic coaches.



The U.S. Physics Team that went to Portugal for the 2018 International Physics Olympiad. L-R: YuQing Xie, Gopal Goel, Michelle Song, Daniel Zhu, and Anthony Ou.

COMIC CON continued from page 2

to stress the importance of physics in their lives,” says James Roche, APS Outreach Programs Manager, who has been part of the delegation to comic con for the past nine years. “I think we’ve made a really solid comic book that comic book fans enjoy. It just so happens to teach them about physics in the process.”

During the convention, visitors had their chance to snag free copies of several *Spectra* issues, chat with Thompson, and get quick physics lessons on light emitting diodes and magnetism. Stopping by the *Spectra* booth is a yearly SDCC must for some attendees eager to pick up the newest offerings from APS, among them *Color Charge*, a coloring book for older artists full of real physics images from the APS research journals.

“A number of people come to find us every year because they like the educational aspect, or they just like the comics,” says Thompson. “A lot of people continue to stop by just because they think what we do is cool—and some people have been stopping by for nine years.”

For other Comic Con attendees, stumbling upon a free comic book all about science was a surprise, but nearly everyone who stopped to find out more about *Spectra* had someone in mind to share the comics with—kids at home, nieces and



nephews, or their friends who teach science. Many who were teachers themselves were absolutely delighted to find out something like this existed that could help their students engage with science in a non-intimidating way.

Spectra comics are currently used to generate interest in physics in 20,000 classrooms around the country, says Thompson. *Spectra*, along with *Nikola Tesla and the Electric Fair*, another comic available at SDCC, are part of PhysicsQuest, an APS program that sends activity kits corresponding with the comics to middle school classrooms to promote positive experiences with physics.

Taking *Spectra* to Comic Con gives many would-be science enthusiasts the chance to engage with physics: This year, the APS outreach team passed out more than 28,000 comics.

“Comic Con is full of people smiling ear to ear, super happy in their element,” says Roche. “Probably my favorite part is seeing when that enthusiasm is attached to the latest issue of *Spectra*.”

All issues of *Spectra* are available on the APS Physics Central website (physicscentral.com), including issue ten, *Spectra’s Energetic Escape*, which debuted online during SDCC.

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APS MEDAL continued from page 1

of the APS flagship honor, the 2019 APS Medal for Exceptional Achievement in Research.”

Halperin received his A.B. degree from Harvard in 1961, and his Ph.D. from the University of California, Berkeley, in 1965. Following a postdoctoral year in Paris, he spent ten years at Bell Laboratories and then joined the Harvard physics faculty in 1976.

While Halperin’s early work centered on the behavior of classical critical systems and properties of systems with frozen disorder, his recent work has focused more on quantum properties of electrons in confined geometries, especially two-dimensional electron systems in a strong magnetic field. Topological aspects of his work include the roles of dislocations and disclinations in two-dimensional melting, of vortices in the superfluid transition, and of edge states, fractional statistics, and emergent gauge fields in quantum Hall systems.

Among his many honors, Halperin is a member of the National Academy of Sciences and the American Philosophical Society, and a fellow of the American Academy of Arts and Sciences. In addition to his APS awards, he received the Dannie Heineman Prize of the Göttingen Akademie der Wissenschaften, the Lars Onsager Lecture and Medal of the Norwegian University of Science and Technology, an honorary doctorate from the Weizmann Institute of Science, the Lise Meitner Lecture and Medal, and the Wolf Prize in Physics.

The formal award will be made at a ceremony in Washington, DC, on January 31, 2019. In addition, Halperin is invited to give a presentation on his work at the 2019 APS March Meeting in Boston (March 4-8). The Medal is accompanied by a prize of \$50,000.

For more on the award visit aps.org/programs/honors/prizes/apsmedal.cfm

FELLOWS continued from page 3

candidate for the fellowship from our department. I believe that Jen [Dailey] epitomizes the traits that your Society holds important – she is a committed educator, an excellent scientist, and an excellent citizen of the world,” said Jonah Erlebacher, professor and chair of the Johns Hopkins Department of Materials Science and Engineering.

Erlebacher added that Dailey has been a superb student. “I have had the pleasure of Jen in my classes and participated as a panel member in her thesis proposal defense, which she easily passed. Her presentation at this program milestone was notable—not only did she present an effective argument for why her work developing sensors ultimately for detecting pathogens such as MRSA [methicillin-resistant staphylococcus aureus] was feasible and innovative, but her presentation style was exceptionally good.”

Regitsky is the type of person who takes initiative, according to Niels Holten-Andersen, John Chipman Assistant Professor of Materials Science and Engineering at MIT.

“Abigail is an extremely talented materials scientist with a deep dedication to applying herself in efforts that ultimately will support a more sustainable life on this planet. Already during my first meeting with Abigail as part of our departmental recruitment, I was immediately impressed with her strong desire to pursue her own research ideas on bio-inspired engineering of materials for sustainable consumer product packaging.”

APS Vice President Phil Bucksbaum, who participated in the selection of the Congressional Fellows, said the finalists had outstanding qualifications.

“Not only did they have a solid achievement record in their gradu-

ate and early postgraduate careers, but they also had excellent backgrounds to prepare them for the world of government science policy,” he explained.

He added, “The final interview was rigorous. Our interview team consisted of APS leaders, experienced members of the APS Office of Government Affairs, and most importantly, some former Congressional Science Fellows. It was kind of like a moot court; The candidates presented policy papers to the committee members, who played the roles of staffers in a congressional office.”

Bucksbaum concluded, “The committee believes that each of the candidates who rose to the top in this process will be able to use their backgrounds as scientists to make a solid contribution to the work of the Congress.”

The author is the APS Press Secretary.

MISSILE continued from page 4

of space-based conflict. “If we’re not careful, we may lose options for keeping space secure for the benefit of all people,” said Grego at the press conference.

In addition to its threat to outer space, the current U.S. missile defense system isn’t entirely effective at stopping missiles, either. It has passed tests only half of the time, under idealized conditions, says Grego.

Some lawmakers, such as Senator Ted Cruz (R-TX), have expressed support for building a missile defense system in space, a recurring idea since the Reagan administration proposed “Star Wars”—the Strategic Defense Initiative—in the 1980s.

In theory, these systems could target missiles as they are launching, as opposed to when they are cruising. Missiles in boost phase would be easier to hit, as they would be moving more slowly. They are also less likely to have deployed decoy targets to fool interceptors. However, for a space-based missile defense system to be

effective, the system would need to cover vast swaths of the planet at once, which would be too expensive, says Harrison. For example, to defend against North Korean missiles, the system would need the ability to launch an interceptor at the country within minutes at all times of day.

“The biggest misconception is that space-based interceptors are a viable option for protection,” says Harrison. “They’re just not. The physics doesn’t work, and it doesn’t scale.” Yet last year, Congress authorized the Pentagon to develop a space-based missile defense system.

Ultimately, the only foolproof method of blocking a missile attack is to avoid conflict in the first place, says Grego. To her, the policy makers’ overall strategy for missile defense—building new technology—points to a bias against diplomatic solutions. “There’s a real impulse to solve things unilaterally with technology,” she says.

The author is a freelance writer in Tucson, Arizona.

R&D continued from page 3

receive corresponding budget increases. APS supports the Senate version, which does not have stringent funding directives.

Separate quantum-focused legislative measures have already made it into law this year. The annual defense policy bill Congress passed in August directs the Department of Defense to create a program to coordinate QIS R&D across the department and interface with civilian agencies where appropriate.

At the other end of Pennsylvania Avenue, the White House Office of Science and Technology Policy has tapped NIST physicist Jake Taylor to be the office’s first-ever point

person for QIS and co-lead a new interagency coordinating committee dedicated to the subject (see *APS News*, February 2018). Across the Potomac, the Pentagon has created a new position dedicated to overseeing quantum research as part of a broader restructuring of its R&D apparatus.

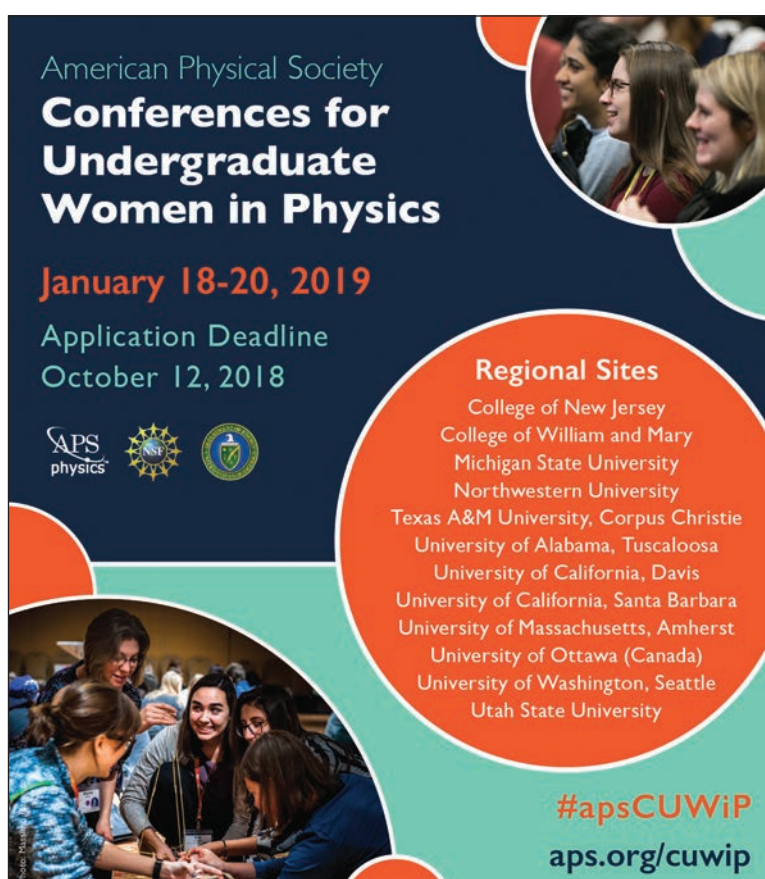
Although the current spate of congressional action is driven by interest in the potential technological applications of QIS, Taylor stresses there is much fundamental science still to be done.

“If you just think of this as a technological field that’s ripe for that type of development, I think

that at the present time we see that as a bit early,” Taylor says. “There is technology to be done, for sure, but it’s a little bit like trying to predict the emergence of the Global Positioning System right after you invented the atomic clock.”

The author is a science policy analyst with FYI at the American Institute of Physics.

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Distinguished Lecturer in Plasma Physics (DLPP) Program

The Division of Plasma Physics (DPP) of APS invites academic institutions to host a DLPP speaker in academic year 2018-2019 for one or two days. Lecturers will give a departmental colloquium open to the entire academic community and will meet with student and faculty. They may also give a guest lecture in a class related to plasma physics. The dual purpose of the program is to strengthen plasma physics in the established lexicon of basic and applied physics by increasing awareness of plasma physics to students and faculty in college departments that do not have a significant plasma research component and to steer new graduate students towards a Ph.D. in plasma physics.

DPP covers travel expenses of the lecturer whereas the host institution is responsible only for arranging and advertising the lecture schedule. Requests should be sent directly to the DLPP speaker or to Mark Koepke (mkoepke@wvu.edu). There is no deadline. For these instructions, details, and others, see apsdpp.org/outreach/lecturers.php.

Lecturers for 2018-2019:

Extreme environments at the world’s most powerful pulsed x-ray sources
Christine A. Coverdale, *Sandia National Laboratories*

Fast Magnetic-Reconnection in Laboratory and Space Plasmas
Amitava Bhattacharjee, *Princeton Plasma Physics Laboratory, Princeton University*

Lasers, plasmas, and the big things we could do if we had small accelerators
Wim Leemans, *Director, Accelerator Technology and Applied Physics Division and Berkeley Lab Laser Accelerator Center*

From sandpiles to burning plasmas: How turbulence self-organizes to facilitate fusion energy
George R. Tynan, *University of California - San Diego*

Stormy (space) weather: An EMFISIS on the Radiation Belt Storm Probes,
Craig Kletzing, *The University of Iowa*

Solar wind interactions with magnetized lighter plasma cavities and unmagnetized heavier plasma clouds in the heliosphere
Peter Delamere, *Geophysical Institute, University of Alaska*

The Back Page

APS in the #MeToo Era

By Warren Rogers, Roxanne Springer, and Sherry Yennello

With the release of the U.S. National Academies (NA) report *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine* [1] and the increasing visibility of the #MeToo movement [2], this is a good time to consider the experience of women in our APS community. There is growing awareness of the damage that is done to individual careers as well as to our physics community when women are not treated with equity and respect. Here we want to discuss steps that have been taken as well as the work our community still needs to do. Gender norms, for better or worse, are part of human culture; managing the negative impact they can have is something that will take perpetual and continuing effort. We ask that APS members embrace this concept and make a commitment to help create an APS culture where personal integrity and physics excellence are celebrated, where those who unintentionally harass are mentored, and those who continue to harass are marginalized.

The NA report emphasizes that typically when the phrase “sexual harassment” is used, we think of explicit and unambiguous assault or coercion. But included in the range of behaviors the NA identifies as sexual harassment is “gender harassment”—actions and comments that demean or belittle women and/or call attention to them as sexual objects. The NA report states that the trauma of frequent gender harassment on women, as reflected in their physical and mental health and their likelihood of leaving the field, equals that of physical assault. This is the landscape we in APS, and as members of our physics community at our universities and laboratories, need to address.

To take a recent example, the theme of the 2018 APS April meeting was Richard Feynman's birth 100 years ago. A tremendous amount has been written about Feynman, his famous physics achievements, and his famous personality, including many essays on the long-running tension between our awe of his discoveries and our acknowledgment of the gender harassment he perpetrated [3]. This tension was heightened when Lawrence Krauss, who wrote a biography of Feynman and was an invited speaker at a session dedicated to Feynman at the meeting, was uninvited due to his alleged sexual misconduct toward women.

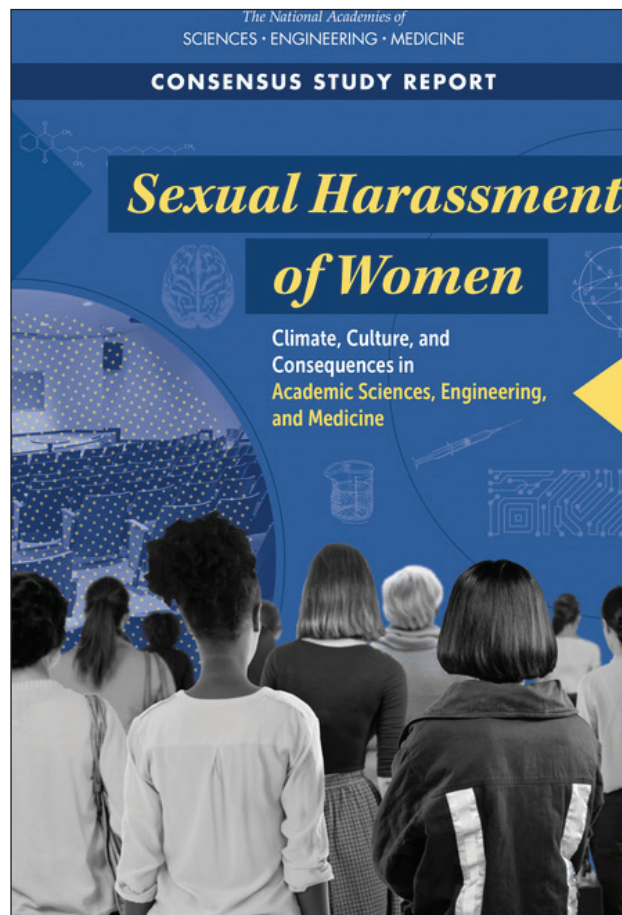
“Unfortunately, even today some people in our community think that if Feynman did it, it must be okay. It is not.”

Unfortunately, even today some people in our community think that if Feynman did it, it must be okay. It is not, and we hope in what follows to present some ways that the APS community can move forward.

Within our own subfields of physics, there is still much that needs to be done. When we asked Division of Nuclear Physics (DNP) members to tell us about experiences at APS meetings that made them uncomfortable, we received two types of responses. The first type related interactions that made the responder feel diminished, demeaned, or unwelcome. The second type indicated that the responder had never witnessed any inappropriate behavior at APS meetings.

We think both viewpoints are sincere, and that this mismatch between experiences is one reason it is so difficult to create a welcoming environment for all women at APS meetings. When a large portion of a community has never felt unwelcome it is hard for people in that portion to believe that there is a problem. The NA report cites that “58 percent of women experience sexually harassing behaviors at work” [4]. This varies by field from 43 to 69 percent. A more recent survey found that 81 percent of women and 43 percent of men are sexually harassed during their lifetime, with 38 percent of women experiencing harassment in the workplace [5].

This happens in academia and it happens in Silicon Valley; to assume that it is not a problem at APS meetings would be naive and unreasonable. Since all APS divisions except for one have fewer than 20 percent women [6], such a small population means that the number of people being harassed is small, but the NA report finds that the climate



in which women are a small percentage of a community actually increases the likelihood of any one woman being harassed [1]. These numbers may explain why we have APS members who never witness inappropriate behavior as well as members whose careers are completely derailed by harassment. It is also possible that some of our members do not recognize harassment when they see it. Even fewer in our community are minorities in race or sexual orientation, and yet harassment in these communities is higher than in the parallel “majority” category [7]. This situation is in complete conflict with our desire to make our APS community more inclusive.

Fortunately, the NA report identifies several remedies and explicitly advises that “Professional societies should accelerate their efforts to be viewed as organizations that are helping to create culture changes that reduce or prevent the occurrence of sexual harassment.” Steps that the APS community has already taken to address this problem include establishing a Code of Conduct (CoC) [8]. That CoC is currently operational for the March and April meetings. Critically, before anyone can register for these meetings they must agree to abide by the CoC. The annual DNP meeting has also implemented the CoC and registration agreement.

The DNP established an Allies program at its Fall 2017 meeting in Pittsburg [9] after receiving reports of harassment of participants in the Conference Experience for Undergraduates. The Allies program visibly raises awareness of harassment at meetings and provides trained bystanders who serve as a resource to targets of harassment. In addition to this, the DNP Ad-Hoc Education Committee has sponsored workshops at the fall meetings on issues related to diversity and sexual harassment, addressing stereotype threat, implicit bias, and diversity in the workplace. At the Fall 2018 DNP meeting in Hawaii we will continue our Allies program. In addition, we are planning a workshop there on how senior DNP members can

help improve the climate at our meetings.

The NA report emphasized the influence professional meetings and organizations have and that “... they have a responsibility to join academic institutions in addressing sexual harassment ... Sexual harassment in academic science ... cannot be addressed in higher education if the standards of behavior are not also upheld in these off-campus environments.”

Of the NA suggestions the APS has yet to implement we advocate:

1. Broadening the Allies program to encompass all APS meetings.

2. Offering bystander training at APS meetings.
3. Considering “harassment-related professional misconduct” [1] when choosing award and fellowship recipients [10].
4. Partnering with Callisto [11] to aid in collecting data.
5. Requiring a pledge to abide by the APS CoC not only at every APS conference registration, but for membership renewal.
6. Including sexual harassment as a form of research misconduct [10] in the APS Guidelines for Professional Conduct [12].
7. Administering regular surveys to APS members to measure our progress.

The NA report states, “Research also shows that, by far, the greatest predictor of the occurrence of sexual harassment is the organizational climate ...” The influential role APS leaders play in shaping this climate cannot be overstated, but every APS member also has a responsibility. Few of us have the experience to respond appropriately in the moment, and

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some of us don’t recognize harassment even as it is happening. If your home institution offers training, please sign up for it. Bystander training is an effective way to respond to incidents of harassment [1]. This training will allow more of us to be equipped to positively influence potentially harmful situations as we witness them. The next time you see or hear something that looks like harassment, please do something. If you are at an APS meeting you can say something yourself or you can contact an APS representative at your meeting. Please be part of creating the inclusive and respectful culture we all want in our community.

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References

1. The NA report is available at go.aps.org/2BxeinG.
2. Ohlheiser, A., “The woman behind ‘Me Too’ knew the power of the phrase when she created it—10 years ago,” *The Washington Post*, October 19, 2017: go.aps.org/2Bzxxk8.
3. See, for example, go.aps.org/2NbkazE. For a nicely balanced way to think about our flawed scientific role models, see “Rethinking our Physics Heroes,” *Nat. Phys.* 14, 769 (2018): nature.com/articles/s41567-018-0263-0.
4. Ilies, R. et al. “Reported incidence rates of work-related sexual harassment in the United States: Using meta-analysis to explain reported rate disparities.” *Personnel Psychology* 56, 607 (2003): [dx.doi.org/10.1111/j.1744-6570.2003.tb00752.x](https://doi.org/10.1111/j.1744-6570.2003.tb00752.x).
5. See the NPR story at go.aps.org/2o1wf4w (Note: these numbers are for sexual harassment so those for total harassment will be higher).
6. Statistics are available at go.aps.org/2MKNI4j.
7. rainn.org/statistics/victims-sexual-violence.
8. Code of conduct for APS meetings: aps.org/meetings/policies/code-conduct.cfm.
9. The Astronomy Allies program created by the American Astronomical Society was highlighted in the NA report. See also *DNP News*, December 2015: go.aps.org/2nXcdrM. The DNP Allies program was created by the DNP ad-hoc Committee on Harassment Prevention, chaired by Prof. Filomena Nunes of Michigan State University.”
10. The American Geophysical Union does this. For more, see the website at go.aps.org/2Nduo7G.
11. Callisto is a non-profit organization that develops technology to combat sexual assault and harassment. See their website at projectcallisto.org.
12. APS Guidelines for Professional Conduct are available at go.aps.org/2MqpZif.