**Physical Review X Out of the Gate**

By Michael Lucibella

Nobels Honor Discoveries of Accelerating Universe, Quasicrystals

Three astrophysicists, two of them US-based, were awarded the 2011 Nobel Prize for physics for “the discovery of the accelerating expansion of the Universe through observations of distant supernovae”, and, in an unusual twist, this year’s chemistry prize was awarded to research first published in Physical Review Letters.

The Nobel Prize Committee awarded half of the physics prize to Saul Perlmutter at Lawrence Berkeley National Laboratory, who, with several others, in 1997, announced the results of a redshift survey of distant supernovae. They showed that the expansion of the Universe was accelerating, an unexpected finding for the Universe’s evolution, which had been thought to be slowing down.

Perlmutter shared the other half of the physics prize with Brian Schmidt at the Australian National University and Adam Riess at Johns Hopkins University. The chemistry prize was awarded to David Schenck of the Technion–Israel Institute of Technology for his discovery of quasicrystals.

Schmidt and Riess respectively, examined the expanding universe using the distant supernovae as the primary observational tools.

**APS Helps Deconstruct the iPad on Capitol Hill**

By Mary Catherine Adams

Congressional staffers gathered at the Rayburn House Office Building in Washington on Sept. 21 to learn about how basic science research was integral to the development of the iPad—a tool many on Capitol Hill use daily.

In an effort to persuade Congress to invest in scientific research, the APS, participating with the Task Force on American Innovation (TFAI) and several other organizations, hosted an event called Deconstructing the iPad: How Federally Supported Research Leads to Gains-Changing Innovation, which specifically targeted conservative freshman members of the House.

“Our goal was to inform members of Congress on how technologies in the iPad are rooted in early-stage scientific research,” APS press secretary Tawanda Johnson said before the event. “We’re advocating for investment and for support for scientific research.”

There wouldn’t be an iPad for students, scientists in other fields.

“It is really targeted at those who are interested in what’s going on inside the journals but don’t have time to read the 20,000 pages per year,” said Physics editor Jessica Thomas.

Focus has traditionally had more of a journalistic feel to its articles. Since it was created in 1998, it has highlighted new and exciting research coming out of the journals, with an eye to appeal to a broader audience, including students, scientists in other fields.

**Fermilab Plans to Up the Intensity**

By Michael Lucibella

Luis von Ahn, of Carnegie Mellon University and founder of ReCAPTCHA, moderated the briefing. To his right are Martin Izzard, of Sussex Instruments, William Phillips, Nobel Laureate from NIST, and Benjamin Badenor, of the University of Maryland and Zurnolts, Inc.

Fermilab is now looking to explore the intensity frontier, in hopes of detecting very unusual interactions that hold clues to new physics. The transition from one focus to the other is a gradual one, as there is still much to take care of after the Tevatron shut down.

“The energy frontier is still going to have Fermilab participation. Many of our staff are engaged in the CMS experiment at the LHC, so we’re continuing in that sense on the energy frontier as collaborators,” said Bob Tschirhart, a research coordinator of the MiniBooNE experiment. “For the next few years we’re going to aggressively analyze our own data and collaborate with CERN.”

There are mountains of information left over from the final run of the Tevatron. It could be as many as two years before the last of its collisions have been analyzed. In addition, the lab will help analyze data coming out of the LHC and even has a remote operating room to keep the LHC beams running when it’s night in Geneva.

Over the next couple of years, neutrinos will take their place at the forefront of the lab’s research. They’ve been one focus already, but as time progresses their share of the experimental activity will increase.

“Neutrinos will be one of the flagship,” said Sam Zeller, coordinator of the MiniBooNE experiment. “The neutrino projects that Zeller and other researchers are working on are part of a long-term plan to build bigger and more sensitive detectors that can probe questions like the hierarchy of neutrino masses and neutrino mixing angles.”

**Redesigned Website Merges Physics and Focus**

The APS online publication Physics recently underwent a redesign and merged with another online APS publication, Physical Review Focus. With the newly upgraded website, readers can more easily navigate through the articles and find links to related content.

Physics was started about three years ago as a resource for physicists to keep up with the latest research developments across all fields covered by APS journals. The articles and commentary are written by current researchers to highlight important research coming out of their fields to other physicists working in other fields.

“There is no doubt we do not know what dark energy might be, that would be making the universe expand faster and faster, we don’t even know whether really the answer will turn out to be a new energy in the universe,” Perlmutter said in an interview with Nobel Media following the announcement. “It’s possible that we’ve just discovered an extra wrinkle in Einstein’s Theory of Relativity, and that would be the real final result. But at this point, the job is really back in our court again as observers and we have to come up with more data that will help narrow in on what the answer is.”

**Philby Fellow-fest**

On September 15, APS hosted a reception in Philadelphia for APS Fellows from the area. In addition to conversation and refreshments, the Fellows who attended heard from APS past President Curtis Callan of Princeton, and from Executive Officer Kale Kirby, Treasurer/Publisher Joe Senese, and Editor in Chief Gene Sprouse. They were also brought up to date on political issues by APS Director of Public Affairs Michael Lubell. In the photo are (l to r) APS Fellow Mary Catherine Adams; Philadelphia-based Marsha Lastar of the University of Pennsylvania, Elizabeth McCormack of Bryn Mawr, and guest Jeff Bush.
“Physics is a true canary in the mine, so to speak, of judging America’s capabilities in terms of science and technology; let physics go, it’s symptomatic of the fact that something has eroded in the intellectual capacity of academic institutions.”

Carlos Rondônia, Texas Southern University, on proposed program cuts through the public universities. The New York Times, September 15, 2011.

“Until now, most faculty members thought their role was to do research and teach courses they were assigned… Now, researchers at institutions in Texas are going to have to take responsibility for students graduating successfully.”

Michael Marder, University of Texas at Austin, on proposed program cuts through the public universities of Texas. UPL September 26, 2011.

“It’s ridiculous what they’re putting out… Until this is verified by another group, it’s flying carpets.”


“If it’s correct, it’s phenomenon… We’d be looking at a whole new set of rules.”


“Probably not. But Maybe! Or in other words: science as usual.”

Sean Carroll, Caltech, quoted from his blog post talking about whether neutrinos really do travel faster than the speed of light, USAToday, October 9, 2011.

“I don’t think you’re going to find Einstein’s theory. You can try. It works.”


“There were all these wizards walking around, which was exciting for someone who didn’t get to get his hands on anything… There’s no way the LHC exists without the Tevatron.”

Christopher Quigg, Fermilab, reflecting on the technical wizardry that went into building the Tevatron, The Washington Post, September 29, 2011.

“High energy physics in the States has never fully recovered from the loss of the SSC.”


“The idea is to look for things that happen very, very rarely so the way to find them is to create lots of examples and see if you find something.”

Mareike Holmø, Fermilab, on the future of the laboratory at the intensity frontier, CBSNews.com, September 29, 2011.

“It was a very interesting machine to work on in the first place, because it was an invention that was never built and they were working with that had never been built before… It definitely has a personality, and that started right away.”

Roger Dixon, Fermilab, reminiscing about the Tevatron, NPR, September 30, 2011.

“Dark energy is incredibly strange, but actually it makes sense to me that it went unnoticed, because dark energy has no effect on daily life, or even inside our solar system… We know there is gravity because apples fall from trees. We can observe gravity in daily life. If we could throw an apple to the edge of the universe, we would observe it accelerating. Until the 1990s, there were few reliable observations about movement at the scale of the entire universe, which is the only scale dark energy affects. So dark energy could not be seen until we could measure things very, very far.”

Adam Riess, Johns Hopkins, The Atlantic, October 4, 2011.

“If which of the only reason to win a Nobel Prize, to be able to park on campus.”

Paul Perlmuter, Lawrence Berkeley Lab, on the perks of winning a Nobel Prize, The Associated Press, October 4, 2011.
Fiscal Year 2012 Appropriations
Congress stepped back from the brink of a government shutdown for the third time this year and, following last minute horse-trading, agreed to a temporary continuing resolution that would keep departments and agencies funded at Fiscal Year 2011 levels through November 18th. Senate and House appropriators passed separate bills that would fund science activities for Fiscal Year 2012 (FY12), but to date, no conferences have been held. It is widely expected that Congress will roll most appropriations for the new fiscal year into a series of “minibus” bills instead of passing twelve separate bills or rolling them all into one large omnibus. Congress will also use the ceiling of $1.043 trillion established in the Budget Control Act for discretionary spending instead of the $1.019 trillion cap provided in the House (Ryan) budget resolution. The higher ceiling should allow lawmakers to avoid making sharp reductions in support for science, as the latest versions of appropriations bills already suggest.

Energy and Water Appropriations: The FY12 bill passed by the Senate Appropriations Committee would fund the Department of Energy’s Office of Science (SC) at the FY11 level of $4.84B, significantly less than the $5.42B presidential request. The bill would also provide $1.80B for Energy Efficiency and Renewable Energy (EERE), the same level as FY11 and $1.40B below the request, and $250M for ARPA-E, $70M above FY11 but $300M below the request. The House-passed bill would fund SC at $4.80B, EERE at $1.30B and ARPA-E at $180M.

The SC subprograms would receive the funding at the following levels:

- Advanced Scientific Computing Research (Ascr) [$422M in FY11]–$442M (Senate) and $427M (House);
- Basic Energy Sciences (BES) [$1.68B in FY11]–$1.69B (Senate and House);
- Biological and Environmental Research (Ber) [$612M in FY11]–$622M (Senate), $527M (House);
- Fusion Energy Sciences (Fes) [$376M in FY11]–$335M (Senate), $405M (House);
- High Energy Physics (HeP) [$796M in FY11]–$780M (Senate), $797M (House);
- Basic Energy Sciences (BES) [$507m in FY11]–$500M (Senate), $511M (House);
- Major Research Equipment and Facilities Construction (Mrefc) [$117m in FY11]–$117M (Senate), $100M (House).

The Senate would provide no funding for Fermilab’s Long Baseline Neutrino Experiment (LBNE), while the House appropriations report cautions DOE not to provide any construction funds for the Deep Underground Neutrino Experiment (DUSEL). With Fermilab’s future at stake, Rep. Randy Hultgren (R-Il 14) science and engineering laboratory (DUSEL). The Senate bill also eliminates funds for the $300m Argonne’s Advanced Photon source upgrade, pending restrictions on DUSEL and LBNE and pledged their support for Fermilab.

The Senate bill also eliminates funds for the $300m Argonne’s Advanced Photon source upgrade, pending DOE’s decision on proceeding with expansion of the Linac Coherent Light Source facility at the SLAC National Accelerator Laboratory.

Funding for the James webb space telescope, zeroed out in the House bill, and would bump Jwst funding for the national Accelerator laboratory.

National Science Foundation (NSF), the National Institute of Standards & Technology (NIST) and NASDA, would provide the following levels of support for FY12:

- NSF (total) [$6.8B in FY11]–$6.8B (Senate), $6.9B (House).
  - Research and Related Activities (RRA) [$5.65B] (Senate), $5.16B (House).
  - Major Research Equipment and Facilities Construction (MREFC) [$117M in FY11]–$117M (Senate), $100M (House).
  - Education and Human Resources (EHR) [$861M in FY11]–$829M (Senate), $835M (House).
- NIST Core [$578M in FY11]–$560M (Senate), $571M (House).
  - Scientific and Technical Research and Services (STSR) [$507M in FY11]–$500M (Senate), $511M (House).
  - Construction of Research Facilities (CRF) [$70M in FY11]–$60M (Senate), $55M (House).
- NASA Science [$4.94B in FY11]–$5.10B (Senate), $4.50B (House).
  - Research and Related Activities (RRA) [$5.65B] (Senate), $5.16B (House).
  - Construction of Research Facilities (CRF) [$70M in FY11]–$60M (Senate), $55M (House).
  - Technology Innovation Program (TIP) [$45M in FY11]–$40M (Senate and House).

NASA Science would restore funding for the Falcon-9 rocket, zeroed out in the House bill, and would bump Jwst support $150M above the presidential request in order to achieve a 2018 launch. It would also cap the project cost at $8.00B.

The Senate reductions for both NSF and NIST were unexpected, given past support for these agencies by CJS Appropriations Chair Barbara Mikulski (D-MD).

Defense Appropriations: The House and Senate appropriations bills would both increase support for basic (6.1) and applied (6.2) research. For the 6.1 programs, funded at $1.95B in FY11, the Senate would provide $2.10B and the House, $2.08B. For the 6.2 programs, funded at $4.45B in FY11, the Senate would provide $4.73B and the House, $4.66B.

Labor, Health and Human Services Appropriations: The Senate appropriations bill would fund NIH at $30.50B for FY12, compared to $30.69B in FY11. The House appropriations subcommittee has yet to “mark up” its bill.

Be sure to check the APS Washington Office’s Blog, Physics Frontline (http://physicsfrontline.aps.org/), for the latest news on the FY12 Budgets.

ISSUE: POPA
Several POPA Subcommittees proposed ideas for studies and related activities at the October 2011 meeting. The Subcommittee on National Security is in the early stages of planning a joint workshop/study meeting with the Senate Select Committee on Intelligence (CSIS) on the downsizing of non-strategic nuclear weapons. The Subcommittee on Energy & Environment presented a revised proposal for an educational component associated with the Direct Air Capture Technology Assessment, which will now be sent to the APS Executive Board for approval. They are also researching the future of nuclear energy as a possible study topic. The Subcommittee on National & International Research Policy is considering a report on the issue of science-backed standards.

Since early May 2011 there has been considerable legislative activity associated with the Energy Critical Elements report; there are bills, both in the house and in the senate, that support recommendations made in the report.

If you have suggestions for a POPA study, please send your ideas electronically to http://www.aps.org/policy/reports/popa-reports/suggestions/index.cfm.
PRX continued from page 1

and review processes in several ways,” says Jorge Pullín, Edi-
tors who are invited to be selective and prompt throughout, starting with the stage of initial editorial review. Manuscripts that report solid research are judged based on whether there is incremental originality and/or marginal in significance, are “re-turneds,” and thus returned to the author, so that pass the initial editorial review are sent out to expert refer-

ees and authors and discuss with the external review. “This effort on our part not only allows authors to pursue other publication options quickly, but also permits the edi-
tors to pay more attention to each manuscript that receives external review. Throughout a review pro-
cess, researchers and authors discuss with one another so that each other can see the potential concerns can be as well informed and balanced as possible. Key to a high editorial and publication standard,” continues Miao, “and we can continue this effort.”

One of PRX’s unique features is the popular summary that ac-
companies each paper, along with the traditional abstract. A collabora-
tive effort between the authors and editors, the summaries help make PRX more accessible to the public and readers benefit from these,” Pullín remarked.

The editors have seen very positive feedback on this new journal. Even before the authors of a paper knew its fate, after the first round of reviewing, they told the editors, “...we would like to continue submitting our best works to PRX. Your profes-
sional assistance and the referees’ detailed and fair reviews certainly give us more confidence in PRX.”

The editors’ advantage is an open access and unrestricted length in com-
bination with the high standards attract authors, too. “...we truly appreciate the unique avenue to publish high quality research with-
out length restriction that PRX as-
pires to provide...as much as we’d like to contribute to this endeavor through our present work, we wish you the best of success regard-
less of your final decision!”

We would highly appreciate that you are trying to maintain very high stan-
dards for the new journal; this is precisely why we chose the PRX,” wrote the authors of a paper to the editors to which one of the editors had initially questioned, and who had asked the paper to extend to the references to the paper’s specific concerns to address the editors’ spec-
cific concerns. “The authors made a very persuasive case in response to the reviewer’s questions, and as it has turned out, they were right! Both they and PRX benefited from such a productive interaction based on mutual understanding and a high level of respect between Miao and satisfaction.

PRX’s second issue will close at the end of the year and will in-
clude about 25 pages. A number of papers in this issue have already been published, and one of them, reporting a combined experimen-
tal and theoretical study of the exotic quantum spin liquids, has been highlighted with a Viewpoint in Physics. “We are seeing from the more recent submissions an increase in quality. We expect the breadth and the caliber of PRX to grow as more and more research-
cers come to recognize PRX as a high-quality journal, both in its publications and in its editorial services, and that once established, published papers will acquire a good degree of visibility across phys-
ics,” Pullín remarked.
China, Sputnik, and American Science
Zuoyue Wang

As the US struggles with severe financial crisis, discord and other challenges, China and its scientific and technological progress have often been at the center of much media attention. In his state of the union address on January 25, 2011, President Obama warned of the “rise of China War” and “rise of China” and pointed to the rise of China as “a reality that has changed, especially in the global competition for jobs.”

As a historian of science and technology, I have studied the history of China’s scientific and technological progress and have come to the conclusion that China has become a major player in the global scientific community. China has made significant contributions to the scientific and technological progress of the world, and its achievements have been recognized by the international community.

In the early 20th century, China was a poor and weak nation, and its scientific and technological progress was negligible. However, in the last few decades, China has made significant progress in science and technology. In particular, the progress in physics and mathematics has been remarkable. China has become a major player in the global scientific community, and its achievements have been recognized by the international community.

In conclusion, China has made significant progress in science and technology, and its achievements have been recognized by the international community. China has become a major player in the global scientific community, and its progress in science and technology will continue to be significant in the future.


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ISSUE: Media Update

The issue of how science funding would fare under the newly passed Budget Control Act was the topic of an Aug. 12th story in Science in which Michael S. Lambert, APS Director of Public Affairs, was quoted about possible across-the-board cuts in 2013. He was also quoted on the matter in Bloomberg and Nature on Aug. 9th and 9th, respectively.

The fate of the James Webb Space Telescope was the subject of an Aug. 16th story in Science. The telescope, which was expected to cost $10 billion, was canceled by the Obama administration. The story was published in the Washington Post and The New York Times.

The New York Times published an Aug. 20th front-page story on the APS’s Science Policy Committee regarding risk assessments for nuclear energy technology. The story was picked up in numerous publications throughout the U.S. and abroad.

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

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lished in “dark energy” in a paper published in Physical Review D. In 1982 Dan Shechtman discovered quasicrystals, which he introduced to explain the then-current belief that normal matter.

In 1998 were suddenly solved if this stuff existed,” Schmidt said in an interview with Nobel Media. “So there were a lot of people, especially theorists, who wanted the universe to be geometrically flat, which means it had to have a lot of stuff in it that we just didn’t know was there. And this stuff solved that problem. It gave the extra stuff in it that we just didn’t know existed,” Schmidt said in an interview with Nobel Media.

Further investigation showed that “dark energy,” makes up about 70% of the universe.

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In conclusion, China has made significant progress in science and technology, and its achievements have been recognized by the international community. China has become a major player in the global scientific community, and its progress in science and technology will continue to be significant in the future.

Before free long-distance and the Internet, would physicists in the Pacific Northwest establish a way to keep in touch despite the geographical separation and the political separation of an international border. In the 1960s, physicists from the University of British Columbia, Idaho State, and the University of Washington in Seattle organized an annual meeting which brought together the universities as a way to keep up with what their peers were doing.

“Some to the north, the Northwest section is a revival of that spirit,” but with more modern communication, said former section Chair Erich Vogt. A founder of Canada’s TRIUMF national laboratory for particle and nuclear physics, Vogt was the section’s first chair-elect, which he served from 1988 and is back for an annual round, now serving a second term. “The Northwest section is unique for being the only cross-border section. In fact, the first meeting was held at UBC, said the University of Washington’s Ernest Henley. A former executive committee officer and former APS president, who, along with Vogt, was instrumental in creating the section, Henley called the cross-border relationship “appropriate” because about a fifth of APS members are foreigners.

“They claim we should call this the Northwest section,” said Brendan Casey, currently part of the UBC staffers that because industry has been good for students from the New York Section

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Ig Nobels May be not so Crazy After All

By Michael Lucibella

In keeping with its 21-year tra-dition, this year’s Ig Nobel prizes honored research into some of the most puzzling questions in science. Research ranging from yamming turtles to the ideal concentration of wasabi spray was honored at this year’s award ceremony on Sep-tember 29.

The winners of the Physics prize gave a prize that is often seen as that that’s been plaguing the sports world for millennia. In the Olympics, discus throwers are often beset by dizzi-ness, a problem that could hand over the major prizes to their competitors. The Professional Science Master of ceremonies and co-founder of the Ig Nobels Marc Abrahams shows off this years prize, a miniature periodic table.

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A Framework for K-12 Science Education

By Helen Quinn

The eight practices described in the framework are intended to better define what scientific inquiry and engineering design look like, and to ensure that students are asked to engage in all parts of the process. These are:

- Asking questions (science) and defining a problem (engineering);
- Developing and using models;
- Planning and carrying out investigations;
- Analyzing and interpreting data;
- Using mathematics and computational thinking;
- Constructing explanations (science) and designing solutions (engineering);
- Engaging in argument from evidence;
- Obtaining, evaluating, and communicating information.

The view of scientific and engineering practice here goes beyond doing a lab or a hands-on activity. It also moves away from a single definition of "scientific method". It includes multiple interpretive and discourse practices that tie the investigation of phenomena to the process of developing new understanding about them. Notably, six of the eight practices are common for engineering and science. The two practices where science and engineering differ relate to the primary goals of each discipline (Constructing explanations and designing solutions) and the beginning stage of approaching such a goal (asking questions and defining a problem). Scientists can play an important role in helping teachers and teacher educators understand these practices and find ways to implement them at the appropriate level in science classrooms.

Asking students to develop explanations does not mean asking them to replicate the explanations given by scientists. Rather we expect them to incorporate what they are learning about these theories into their models for and explanations of phenomena or systems.

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