

NOBEL continued from page 1

Further investigation showed that this mysterious force, dubbed “dark energy,” makes up about three-quarters of the known universe. Dark matter makes up about 20 percent of the universe, leaving only 5 percent of the universe as normal matter.

“I think that the idea of the accelerating universe, indicating that there was some other big thing in the universe, other than things that have normal gravity, meant that a lot of the problems that existed in cosmology back 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 matter in the universe that needed to be flat.”

Many have compared dark energy to Einstein’s “cosmological constant,” which he introduced to explain the then-current belief that the universe was static. In 1999, Michael Turner of the University of Chicago, who is currently APS vice-President, coined the term “dark energy” in a paper published in *Physical Review D*.

In 1982 Dan Shechtman discovered that certain alloys of aluminum and manganese if cooled rapidly produced a diffraction pattern hitherto believed to be impossible. Up to that point it had been thought that crystals could only form in regular repeating patterns; however, the diffraction pattern that Shechtman saw was evidence that crystals were forming in a pattern that couldn’t be precisely repeated, reminiscent of the tiling patterns of mathematician Roger Penrose. Shechtman’s finding was highly controversial, and at one point he was asked to quit his research group. It took nearly two years of persistent effort to get his research published.

“The discovery of quasicrystals was so revolutionary,” said APS Editor in Chief Gene Sprouse in a press statement, “that Shechtman initially had trouble getting a peer-reviewed science journal to publish his research. However, by the time he submitted it to *Physical Review Letters*, some experts had become aware of its impor-



tance and it was quickly accepted and published, and is now one of the ten most cited articles in the history of the journal.” [Ed. Note: APS News published an interview with Shechtman in the January 2003 issue (available online) as part of its PRL “Top Ten” series.]

Soon after the publication in PRL, crystallographers the world over started seeing the pattern in other materials and Shechtman’s discovery forced scientists to fundamentally reassess long held assumptions about the molecular structure of matter.

APS was quick to congratulate the winners of the prestigious awards.

“The discovery of cosmic acceleration and dark energy provided the last piece in the current cosmological model and at the same time gave us the most profound mystery in all of science—what is dark energy, the source of the repulsive gravity that is causing the universe to speed up?” Turner said in an APS press statement.

“On behalf of the American Physical Society,” APS Executive Officer Kate Kirby said in a statement, “I offer our warmest congratulations to each of the 2011 Physics Nobel Prize winners. Their work has profoundly impacted our view of the universe and has challenged us with new questions.”

In a separate statement, she recognized the achievements of Shechtman as well, “I extend warmest congratulations to Professor Shechtman for his pioneering discovery of quasicrystals, which has given birth to a rich field of study at the intersection of physics, chemistry, and materials science.”



China, Sputnik, and American Science

Zuoyue Wang

As the US struggles to deal with a severe economic recession and other challenges, China and its scientific and technological progress have often been at the center of American national attention. In his state of the union address on January 25, 2011, President Barack Obama, for example, pointed to the rise of China and India as indication that “the world has changed,” especially in the global competition for jobs. As evidence, he cited China’s achievement in producing “the world’s largest private solar research facility” and “the world’s fastest computer.” Declaring that “this is our generation’s Sputnik moment,” he called for the US to increase its investment in science, technology, and education, vowing to “out-innovate, out-educate, and out-build the rest of the world.”

As a historian of science and technology who has studied the history of US-China scientific relations as well as the US responses to the Sputnik crisis, I see both advantages and disadvantages in deploying the Sputnik-China analogy. It is true that the US faces a serious challenge to its leadership in the world today as it did at the time of Sputnik, and President Obama has wisely followed President Dwight Eisenhower in characterizing it as one in science, technology, and education, not as a direct military threat. The analogy is also appealing because few events in American history have had the galvanizing effect of the Sputnik shock, which resulted in dramatic increases in federal support in the above fields, as well as reinforcement of a bipartisan consensus on broad national policy.

Yet, the present US-China relations, marked by close ties across many areas, are vastly different from the tense US-Soviet Cold War rivalry. Consequently, I want to share some historical perspectives on US-China scientific relations that I believe have shaped our current relationship and will influence future opportunities for cooperating on meeting our mutual challenges.

About sixty years ago, on September 20, 1951, Xie Jialin (Chia Lin Hsieh), a Chinese physicist who had just received his PhD from Stanford, boarded the ship President Cleveland at San Francisco for China. Even though the US had tightened restrictions on Chinese students returning home after the establishment of the People’s Republic of China in 1949 and the outbreak of the Korea War in the summer of 1950, the door did not close completely, especially for those determined to go home for family reunification. Xie, who had left his wife and child behind when he came to the US in 1947, was excited at the prospect of returning home but his dream was shattered at Honolulu where

US authorities prevented him and several other Chinese students/scientists from continuing their journey, citing a new presidential order banning certain aliens from departing the US.

Thus came down the American “iron curtain” which, in an effort to deny technical talent to its Cold War rivals amidst rising McCarthyism, resulted in the *de facto* detention of many Chinese scien-



Wolfgang Panofsky and Xie Jialin in Beijing, 2002 (source: <http://news.sciencenet.cn/htmlnews/2009/3/217175.html>, accessed in September 2011)

tists in the US purely for political reasons. Even though Xie and several dozens of Chinese students/scientists were eventually allowed to return home following US-China negotiations in Geneva in 1954 and 1955, this episode embittered many in China and elsewhere who might have otherwise been disposed positively toward the US. As a group of Asia scholars in US universities pointed out in a letter to the *New York Times* in 1954, the detention of Chinese scientists was “incompatible with American principles of justice” and created more harm to the US in terms of “the ill-will created, here and abroad” than the technical knowledge they might bring back to China.

The next dramatic moment that brought American-educated Chinese scientists and US Cold War calculations together occurred in 1957, when the country was first alarmed by the Soviet launching of Sputnik, the world’s first satellite, on October 4, and then, just weeks later, delighted by the awarding of the Nobel prize in physics to Chinese American physicists Tsung Dao Lee of Columbia University and Chen Ning Yang of the Institute for Advanced Study at Princeton. Under the headline “These Chinese Choose,” *Newsweek* celebrated Lee’s and Yang’s allegiance to the US in the shadow of the Sputnik shock. If Xie represented the more than one thousand Chinese students (about 60% of them in science and technology) who returned to China from the US in the 1950s (the “returnees”) and who helped “Americanize” Chinese science, Lee and Yang symbolized the presence and prominence of about four thousand “stayees” in the American scientific community.

The paths of returnees and stayees would cross again when the US and China reopened relations in the early 1970s, and they played an especially active role in promoting US-China scientific exchanges and collaboration. In the 1980s, for example, Xie worked closely with Lee and Wolfgang “Pief” Panofsky of SLAC to design the SLAC-inspired Beijing Electron-Positron Collider, which would draw physicists from the US and elsewhere to conduct research. On his part, Panofsky, beloved in China for his work on BEPC and his devotion to international science, used his scientific connections to push effectively for Chinese participation in international nuclear arms control, including non-proliferation.

Perhaps most importantly, the returnees and stayees have helped to bring a new generation of Chinese students to the US who have themselves become an important part of the American scientific community. The latter in turn have promoted scientific collaboration across the Pacific on wide-ranging topics from global warming to public health.

Today, many of the challenges facing the world, such as climate change and a restructuring of the global economy, require joint actions by both the US and China. Indeed, President Obama has been careful to call the rise of China and India a positive development in the world and a constructive challenge to the US, and his administration has continued the post-Nixon bipartisan tradition of pursuing US-China scientific collaborations. Others, however, take a more negative view of such endeavors. Declaring that China had stolen technology from the US, that it behaved like Stalinist Russia, and that “we have nothing to gain from dealing with them,” a congressman, for example, succeeded in inserting a ban on all scientific and technological interactions with China involving NASA and the White House Office of Science and Technology Policy in the 2011 US federal budget passed in April 2011.

While it’s important to guard US national interests in international relations, there is a danger of defining them so narrowly that we lose sight of values and ideals, such as the free movement of scientists and international scientific collaboration, that have been long cherished by the American and international scientific community. American science and technology thrive on international exchange and collaboration and indeed have benefited enormously from the large-scale scientific migration from China and elsewhere during the last century. Furthermore, as Professor Xu Liangying, dissident Chinese physicist

CHINA continued on page 7

DISPATCH continued from page 3

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. Lubell, 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. 5th and 9th, respectively.

The fate of the James Webb Space Telescope was the subject of an Aug. 9th blog post on MSNBC.com. The post referenced the APS statement on the issue, which called for Congress to fund the telescope. APS Vice President, Michael S. Turner, discussed the issue on NPR’s *Science Friday* program on July 15th.

The *New York Times* published an Aug. 20th front-page story on the APS petition to the Nuclear Regulatory Commission regarding risk assessments for laser enrichment 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.

ANNOUNCEMENTS

APS Congressional Science Fellowship 2012-2013

THE AMERICAN PHYSICAL SOCIETY is currently accepting applications for the Congressional Science Fellowship Program. Fellows serve one year on the staff of a senator, representative or congressional committee. They are afforded an opportunity to learn the legislative process and explore science policy issues from the lawmakers' perspective. In turn, Fellows have the opportunity to lend scientific and technical expertise to public policy issues.

QUALIFICATIONS include a PhD or equivalent in physics or a closely related field, a strong interest in science and technology policy and, ideally, some experience in applying scientific knowledge toward the solution of societal problems. Fellows are required to be members of the APS

TERM OF APPOINTMENT is one year, beginning in September of 2012 with participation in a two-week orientation sponsored by AAAS. Fellows have considerable choice in congressional assignments.

A STIPEND is offered in addition to allowances for relocation, in-service travel, and health insurance premiums.

APPLICATION should consist of a letter of intent of no more than two pages, a two-page resume: with one additional page for publications, and three letters of reference.

All application materials must be submitted online by January 13, 2012.

<http://www.aps.org/policy/fellowships/congressional.cfm>

Ig Nobels May be not so Crazy After All

By Michael Lucibella

In keeping with its 21-year tradition, this year's Ig Nobel prizes honored research into some of the most pressing questions in science. Research ranging from yawning turtles to the ideal concentration of wasabi spray was honored at this year's award ceremony on September 29.

The winners of the Physics prize got to the bottom of an issue that's been plaguing the sports world for millennia. In the Olympics, discus throwers are often beset by dizziness after launching their projectiles while hammer throwers are exempt from this affliction, and now for the first time scientists know why. Winners Philippe Perrin, Cyril Perrot, Dominique Devitterne and Bruno Ragaru from France and Herman Kingma of the Netherlands interviewed athletes and analyzed slow-motion video of the athlete's different throws. They found that while the two throws appear similar, hammer throwers keep their eyes focused on their seemingly stationary hammer while discus throwers don't have the same visual anchor point to focus on.

"We are very happy to accept the Ig Nobel prize. As we understand it is something that deals with research that at first glance seems funny. We accepted it to show that our research is not funny at all. We are very serious researchers who are trying to figure out how the balance system works," Perrin said in a video statement at the ceremony (they were unable to attend in person).

Perrin's somewhat tongue in cheek speech alludes to the motto of the

Ig Nobel Prizes, which "honor[s] achievements that first make people laugh, and then make them think." The idea is to highlight scientific research that on the surface might sound wacky or trivial, but on further investigation gets at something more serious.

Such is the case with the wasabi spray that won the chemistry prize, which was shared by seven researchers from Japan. After much experimentation, they perfected the ideal concentration of five to 20 parts per million of pungent horse-

radish spray that is needed to wake up a sleeping person.

"We examined 50 subjects including deaf people," Imai said, "We sprayed an odorless compound at first, and we confirmed that they maintain sleep. Second we sprayed out the real stimulant and observed their arousal level and movement. They wake up within three to four minutes."

The reason; they wanted to develop a new smoke alarm that can wake up people with hearing disabilities. Current techniques use bright flashing lights or vibrating beds, which work sometimes, but not always.

Safety also had been on the mind of John Senders of the University of Toronto on whom was bestowed the Public Safety award. In the 1960s he developed a technique to determine how long one can safely drive without actually seeing the road. He did this by painting over the clear visor of a motorcycle helmet so the driver can't see through it. The visor is connected to a servo that flicks it up and down over the driver's eyes, and that times how long someone keeps the visor down.

For decades Senders' research was largely forgotten. However,



Image courtesy of Improbable.com

Master of ceremonies and co-founder of the Ig Nobels Marc Abrahams shows off this year's prize, a miniature periodic table.

after the invention of cell phones, GPSs and other electronic devices that often distract drivers, his method to time how long someone can drive while distracted took on new importance. The International Standards Organization now uses a variation of his technique, termed the occlusion method, to set a standard for how long an in-car device can distract a driver.

Anna Wilkinson, Natalie Sebanz, Isabella Mandl and Ludwig Huber shared the Physiology Ig

Nobel for proving that red-footed tortoises aren't subject to contagious yawning. Many biologists thought that contagious yawning is a sign of intelligence, because it is a subtle way of learning. The team showed that while tortoises are very intelligent creatures that can solve mazes and puzzles, yawning was not a good measure of their intelligence because they are completely asocial creatures and cannot teach things to each other.

The Peace Prize was awarded to Arturas Zuokas, mayor of Vilnius, Lithuania for "demonstrating that the problem of illegally parked luxury cars can be solved by running them over with an armored tank." Two Australian researchers, Darryl Gwynne and David Rentz won the Biology Prize for their research into why a particular species of beetle mistakenly tries to copulate with empty beer bottles. The Psychology Prize was awarded to Karl Halvor Teigen of the University of Oslo for his investigations into why people sigh. John Perry of Stanford received the literature prize for his book "How to Procrastinate and Still Get Things Done," but he was unable to attend the ceremony because he had too much work piled up.

The Medicine prize was split between two teams for research that showed in certain circumstances, having to go to the bathroom makes people make better decisions, but in other circumstances it makes them make worse decisions. The Mathematics Prize was likewise shared amongst Dorothy Martin, Pat Robertson, Elizabeth Clare Prophet, Lee Jang Rim, Credonia Mwerinde and Harold Camping, all of whom predicted the world was going to end, for "teaching the world to be careful when making mathematical assumptions and calculations." No one came to collect that prize.

The theme for this year's award ceremony was "Chemistry" and featured a mini-opera about chemists in a coffee shop and several renditions of Tom Lehrer's "Elements Song." The award given to the Ig Nobel winners was a miniature Periodic Table table.

Reviews of Modern Physics

Bayesian inference in physics

Udo von Toussaint

Experiments in physics are generally affected by a never perfect measuring apparatus and by a limited time in which a measurement is performed. On the other hand, the existence of additional information about the experiment and underlying physics remains frequently neglected. This review discusses Bayesian inference, a probability theoretical approach for data analysis, to extract the best from both data and meta information. Starting from an introduction into the Bayesian concept of probability the article summarizes case studies for Bayesian analysis and illustrates them with physical examples from cosmology, mass spectroscopy, plasma physics, and surface science

<http://rmp.aps.org>

Professional Skills Development Workshops

for Women Physicists



When:

February 26, 2012 - Boston, MA
March 30, 2012 - Atlanta, GA

Deadlines to apply:

November 18, 2011 (for Boston)
December 16, 2011 (for Atlanta)

Who may apply: Women postdoctoral associates and women faculty and scientists (early-career should apply for the April Meeting workshop; senior-level should apply for the March Meeting workshop).

First consideration will be given to applications received by the deadlines. Workshops will be limited in size for optimal benefits. Women of color are strongly encouraged to apply.

Participants may be eligible to receive a stipend to help cover the cost of travel and up to two nights lodging.

▶ See <http://www.aps.org/programs/women/workshops/skills/>

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CHINA continued from page 5

and influential translator of Albert Einstein's work into Chinese, stated (through his son) when he received the APS Sakharov Prize in 2008, it's important for the international community, especially the scientists, to keep engaged with China in order to improve human rights there.

Whether we live in another Sputnik moment or not, the Cold War world is gone and internationally-minded scientists like the Xies and Panofskys of today should be encouraged, and not blocked, to collaborate across national boundaries to advance science and work on global problems facing all of us.

Zuoyue Wang, who studied

physics and the history of physics (under Xu Liangying) in China, is a professor of history at the California State Polytechnic University, Pomona. Author of *In Sputnik's Shadow: The President's Science Advisory Committee and Cold War America (2008)*, he is currently conducting research on "Chinese/American Scientists: Transnational Science during the Cold War and Beyond," with partial support from the National Science Foundation under Grant No. SES-1026879. Any opinions expressed in this material are those of the author and do not necessarily reflect the views of either NSF or APS.

WEBSITE continued from page 1

and engineers. That being the case, the two publications have a significant amount of reader crossover.

"We think current readers of *Focus* and current readers of *Physics* would be interested in reading the other publication," said *Focus* editor David Ehrenstein. "It will allow *Focus* to be visible to a whole new readership."

In October of last year, the editors of *Physics* took a survey of its readers looking for ways to improve the new website. The editors say that the new layout

is easier to navigate between the Features, Trends and Synopsis sections of the website, and has a space to highlight important articles. The developers have updated the homepage and links to old *Focus* articles to redirect users to the article's new home on *Physics*.

"I think this will expand the readership of *Physics*," Thomas said. "Overall the idea is that for those who like to read the whole spectrum of content that the APS is offering, they can find it now on one website."