# APS NEWS

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**Highlights**



## APS Awards 27 Minority Scholarships for 2006-2007

The APS Committee on Minorities has selected 27 students for the 2006-2007 Scholarship for Minority Undergraduate Physics Majors.

Each new scholarship is for of $2,000 and may be renewed once at a level of $3,000. This year the committee selected 13 new scholars and 14 renewals. The scholarship may be used for tuition, room and board, and educational materials. Each minority scholar is paired with a mentor at his or her university. Physics departments that host a minority scholar each receive $500.

New minority scholar Ana Berrizbeitia is intrigued by the possibility of a theory of everything. "The idea of trying to combine the laws of gravity with quantum physics, that they're trying to find an equation that describes the universe in a nutshell, I just thought it was fascinating," she said. Her love of physics was inspired in part by her high school physics teacher, and in part by popular science books, especially works by Stephen Hawking and Richard Feynman.

Berrizbeitia, originally from Venezuela, is now beginning her sophomore year at the University of Texas at Austin as a double major in physics and math. Her father, a math professor, encouraged her early interest in math. But after taking a physics course in high school, she found that physics had more real-life applications. "I thought physics was a wonderful example of what you need all this math for," she said.

Berrizbeitia is planning to participate in undergraduate research soon, and after completing her undergraduate education, she hopes to pursue a PhD and ultimately become a professor, since she likes teaching as well as research. She also enjoys painting, singing, theater, and playing soccer. She considered art as a career, and has thought about getting a minor in theater, but says she finds physics and math more intellectually stimulating, as well as offering better career options.

Minority scholar Amanda McCoy plans to use her knowledge of physics in a medical career. McCoy, who is from Pittsburgh and is starting her junior year at Harvard, also says her high school physics teacher really sparked her interest in the subject, though she had always enjoyed math and science. "My high school physics teacher was great. It just kind of clicked," she said.

McCoy's goal is to become a doctor, possibly with a specialty in radiology or radiation oncology, because those fields are closely related to physics. This summer, she is engaged in interdisciplinary research as part of the Bioengineering and Bioinformatics Summer Institute at the University of Pittsburgh, where she is developing computer simulations to explore

*APS Awards continued on page 7*

## Getting a Kick out of Physics


*Photo credit: Adrienne Klein*

*On June 17 and 18, the Science & the Arts program at the Graduate Center of the City University of New York sponsored an unusual outreach event: they brought science-related booths to a commercial street fair. Physics was demonstrated amidst vendors of sweaters, corndogs, kielbasa and crafts. Pictured here: Jake Levine learns the physics of fight under the guidance of APS's Jennifer Ouellette, as Jessica Clark, APS Head of Public Outreach, looks on.*

## Student Member Survey Fosters Two-way Communication

Student members of APS, both graduate and undergraduate, have made their opinions about APS heard through a recent survey. The survey also provided a way for the Membership Department to communicate with student members, who are often unfamiliar with all the benefits APS offers.

The survey asked how students first learned about APS, and why they chose to join. Many students (40%) first learned about APS through a professor or advisor recommendation. Others (17%) heard about APS through a friend or peer, and 14% discovered APS through attendance at an APS meeting. Among undergraduates, 29% heard about APS through the Society of Physics Students.

The most common reasons for joining were "wanted to present paper at APS meeting" (42%), "view APS as my professional organization" (38%), "professor recommended I join" (39%), and *Physics Today* (34%). (Respondents could choose more than one reason for joining.) Undergraduates were much less likely than graduate students to have joined in order to present a paper at an APS meeting.

Student members also rated the importance of various member benefits. *Physics Today* was rated essential or important by 80% of undergrads and 77% of graduate students. Other highly-rated benefits included: one free online journal for student members (rated essential or important by 66% of undergrads and 56% of graduate students); career website (rated essential or important by 65% of undergraduates and 62% of graduate students); reduced meeting registration fees at APS meetings (77% of graduate students and 41% of undergrads), and scientific and technology books discount (59% of undergraduates and 53% of graduate students).

The survey was emailed to student members in the fall of 2005. 4057 students responded, a response rate of 53%. This was the first APS membership survey that focused specifically on student members. Future surveys will seek the views of other aspects of APS membership. A survey of industial physicists is in progress.

*Member Survey continued on page 7*

## Outreach Project Seeks APS Member Volunteers

As it prepares PhysicsQuest 2006, an activity for use in middle school science classrooms this fall, the APS Public Outreach Department is asking APS members to get involved in helping to promote the project in their local areas.

"Not only do we want to increase the number of classrooms participating in PhysicsQuest, but we want to foster a locally active community of physicists–one that impacts the science education in their local areas," explains Jessica Clark, head of public outreach for APS.

APS first produced PhysicsQuest: The Search for Albert Einstein's Hidden Treasure as part of the World Year of Physics 2005. Nearly 10,000 classes received PhysicsQuest activity kits in 2005. Feedback indicated that this activity met a need within the middle school science community for fun and accessible physics material, so APS decided to continue this program with PhysicsQuest 2006: Benjamin Franklin's Secret Message.

PhysicsQuest is a story-based learning adventure that consists of a free kit that is sent to registered 6th to 9th grade physical science teachers. The kit includes teacher guides, student guides, and all of the materials that students need to complete four experiments.

The story revolves around a central character and each experiment gives students a clue they need to solve an overarching mystery. PhysicsQuest 2006 celebrates Ben Franklin's 300th birthday year. Students will perform experiments inspired by Franklin's work with lenses, electrostatics, and heat transfer while trying to

*Outreach Project continued on page 5*

## "A New World View" Hits the Road

*Photo credit: Kendra Rand (left); Gail Rand (right).*

*In 2005, the APS commissioned a work of art, entitled "A New World View", to commemorate the World Year of Physics. The work is now making a tour of science museums around the country. Its first stop is at the Maryland Science Center in Baltimore's Inner Harbor, which is where 18-month old Chloe Rand got a chance to feel the glass panels (thanks to mom Gail) and take a tour on her own motorized vehicle. The complete artwork is described on the web at www.physicsmatters.org .*

## Blewett Scholarship Helps Mother of Two Return to Full-time Research

Elizabeth Freeland has been selected by the APS Committee on the Status of Women in Physics to receive the M. Hildred Blewett scholarship for 2006.

The purpose of the scholarship is to enable early-career women to return to physics research after having had to interrupt their careers for family reasons. The scholarship was endowed by a bequest from M. Hildred Blewett, a particle accelerator physicist who died in 2004.

Freeland is the second recipient of the scholarship. She is not only returning to physics research after a career break, but

*Blewett continued on page 3*

## Members in the Media

"The universe is a time machine –the farther away you look, the farther back you see in time."

*–Ed Stone, Caltech, Pasadena Star-News, June 12, 2006*

"Think about holding a rope taut. If you pluck it, you can see the vibration going down the rope."

*–Ellen Brown, explaining how sounds are produced at different frequencies, The Free-Lance Star (Fredricksburg, VA), June 16, 2006*

"The Chinese are so smart they knock your socks off. The impression you get when you go over there is that China is going to take over the world soon."

*–Andrew Strominger, Harvard University, on China's rapid improvement in science, The New York Times, June 20, 2006*

"Quantum mechanics is like poetry. The poem is right there, for everyone to see, but it has many different interpretations."

*–Daniel Sheehan, University of San Diego, San Diego Union-Tribune, June 22, 2006*

"It has really gotten quite outrageous. These new questions that were raised are just one more example of many, in which people are scrambling to find the slightest little reason to question important scientific results, and then blow it way out of proportion."

*–Neal Lane, Rice University, on recent disputes over climate science research, Houston Chronicle, June 23, 2006*

"If there is a supernova in our vicinity during the next couple of months, our chances of detecting and measuring the resulting gravitational waves are good. The first step towards gravitational wave astronomy has been taken."

*–Karsten Danzmann, University of Hanover, on GEO 600, a gravitational wave detector in Europe, BBC news online, June 26, 2006*

"We've spent 400 years since the invention of the telescope looking at a small portion of what exists."

*–Fred Raab, LIGO, Los Angeles Times, June 10, 2006*

"If anybody thinks we are going to be designing new warheads and not doing testing, I don't know what they are smoking. I don't know of a general, an admiral, a president or anybody in responsibility who would take an untested new weapon that is different from the ones in our stockpile and rely on it without resuming testing."

*–Sidney Drell, Stanford University, Los Angeles Times, June 13, 2006*

"The best monument in my opinion as a scientist would be to build a new facility that would allow groundbreaking new science. With respect to whatever new facility goes in here, the first thing you do on a tour is give homage to the history of the site. You talk about the Nobel Prizes, the discovery of the anti-proton, and so on, that happened on this site. I think that's a much more fitting monument than an old, decaying, hazardous structure."

*–Benedict Feinberg, Lawrence Berkeley National Lab, on whether to preserve the building that housed Berkeley lab's Bevatron, as a historic monument, or build a new scientific facility, San Francisco Chronicle, June 29, 2006*

"If those guys aren't more nervous than I am, they've become jaded and should resign their positions."

*–Douglas Osheroff, Stanford, on NASA managers' decision to launch the space shuttle on July 4, Associated Press, July 4, 2006*

"It was such a great question to ask that the sort of result you could get if you could do this was so huge. I thought, 'Why wasn't everybody doing this?'"

*–Saul Perlmutter, Lawrence Berkeley National Lab, on skepticism he initially faced when beginning his search for supernovas to measure the deceleration of the universe's expansion, Contra Costa Times, July 3, 2006*

"For a few hours [tonight], a lot of people will stop worrying about their troubles while watching the show, which is not a bad thing,"

*–Robert Adair, Yale University, on the Home Run Derby held in Pittsburgh, Pittsburgh Post-Gazette, July 10, 2006*

"I don't think anyone knows how long this will take. . . We have a vision, but not milestones."

*–Michael Freedman, Microsoft, on quantum computing, the Star-Ledger (Newark, NJ) July 12, 2006*

# This Month in Physics History

## August, 1913: Robert Millikan Reports His Oil Drop Results

Robert Millikan's famous oil drop experiment, reported in August 1913, elegantly measured the fundamental unit of electric charge. The experiment, a great improvement over previous attempts to measure the charge of an electron, has been called one of the most beautiful in physics history, but is also the source of allegations of scientific misconduct on Millikan's part.

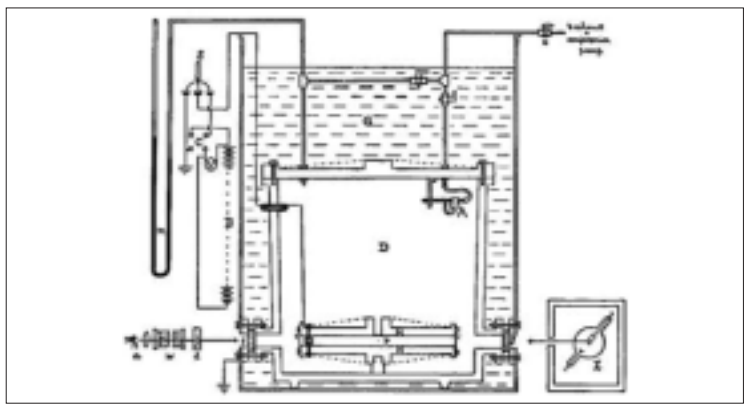

*Diagram of Millikan's apparatus, from his Physical Review paper*

Robert Millikan was born in 1868 and grew up in rural Iowa, the second son of a minister. Millikan attended Oberlin College, earned his PhD from Columbia University, and then spent a year in Germany before taking a position at the University of Chicago.

By about 1906, Millikan had become a successful educator and textbook writer, but he knew that he hadn't done any research of real scientific significance, and was eager to make his mark as a researcher.

J.J. Thomson had discovered the electron in 1897 and had measured its charge-to-mass ratio. The next step was to determine the electron's charge separately. Thomson and others tried to measure the fundamental electric charge using clouds of charged water droplets by observing how fast they fell under the influence of gravity and an electric field. The method did give a crude estimate of the electron's charge.

Millikan saw this opportunity to make a significant contribution by improving upon these measurements. He realized that trying to determine the charge on *individual* droplets might work better than measuring charge on whole clouds of water. In 1909 he began the experiments, but soon found that droplets of water evaporated too quickly for accurate measurement. He asked his graduate student, Harvey Fletcher, to figure out how to do the experiment using some substance that evaporated more slowly.

Fletcher quickly found that he could use droplets of oil, produced with a simple perfume atomizer. The oil droplets are injected into an air-filled chamber and pick up charge from the ionized air. The drops then fall or rise under the combined influence of gravity, viscosity of the air, and an electric field, which the experimenter can adjust. The experimenter could watch the drops through a specially designed telescope, and time how fast a drop falls or rises. After repeatedly timing the rise and fall of a drop, Millikan could calculate the charge on the drop.

In 1910 Millikan published the first results from these experiments, which clearly showed that charges on the drops were all integer multiples of a fundamental unit of charge. But after the publication of those results, Viennese physicist Felix Ehrenhaft claimed to have conducted a similar experiment, measuring a much smaller value for the elementary charge. Ehrenhaft claimed this supported the idea of the existence of "subelectrons."

Ehrenhaft's challenge prompted Millikan to improve on his experiment and collect more data to prove he was right. He published the new, more accurate results in August 1913 in the *Physical Review*. He stated that the new results had only a 0.2% uncertainty, a great improvement of over his previous results. Millikan's reported value for the elementary charge, $1.592 \times 10^{-19}$ coulombs, is slightly lower than the currently accepted value of $1.602 \times 10^{-19}$ C, probably because Millikan used an incorrect value for the viscosity of air.

It appeared that it was a beautiful experiment that had determined quite precisely the fundamental unit of electric charge, and clearly and convincingly established that "subelectrons" did not exist. Millikan won the 1923 Nobel Prize for the work, as well as for his determination of the value of Plank's constant in 1916.

But later inspection of Millikan's lab notebooks by historians and scientists has revealed that between February and April 1912, he took data on many more oil drops than he reported in the paper. This is troubling, since the August 1913 paper explicitly states at one point, "It is to be remarked, too, that this is not a selected group of drops, but represents all the drops experimented upon during 60 consecutive days." However, at another point in the paper he writes that the 58 drops reported are those "upon which a complete series of observations were made." Furthermore, the margins of his notebook contain notes such as, "beauty publish" or "something wrong."

Did Millikan deliberately disregard data that didn't fit the results he wanted? Perhaps because he was under pressure from a rival and eager to make his mark as a scientist, Millikan misrepresented his data. Some have called this a clear case of scientific fraud. However, other scientists and historians have looked closely at his notebooks, and concluded that Millikan was striving for accuracy by reporting only his most reliable data, not trying to deliberately mislead others. For instance, he rejected drops that were too big, and thus fell too quickly to be measured accurately with his equipment, or too small, which meant they would have been overly influenced by Brownian motion. Some drops don't have complete data sets, indicating they were aborted during the run.

It's difficult to know today whether Millikan intended to misrepresent his results, though some scientists have examined Millikan's data and calculated that even if he had included all the drops in his analysis, his measurement for the elementary charge would not have changed much at all.

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# High School Teachers Conduct Gravity-Defying Experiments

In May six teams of high school teachers conducted experiments in zero gravity aboard NASA's "Weightless Wonder" (or "Vomit Comet," although NASA doesn't really endorse that moniker).

The teachers had been selected as part of a World Year of Physics 2005 project, in which APS and AAPT invited high school physics teachers and their students to come up with experiments that they could do in zero gravity. Sixteen teams submitted applications, and six were chosen to fly. The winning teams were announced at the AAPT meeting in January of 2005.

The six teams were: Beaumont High School, University Heights, Ohio; Circle High School,Towonda, Kansas; Columbus High School, Columbus, Georgia; Glenbrook North High School, Northbrook, Illinois; Greendale High School, Greendale, Wisconsin; Roosevelt High School, Seattle, Washington.

Planning and preparing for the flight was a long process, according to Vinaya Sathyasheelappa, APS World Year of Physics Project Coordinator. Each team was assigned a NASA mentor from Johnson Space Center to help them with the mountains of paperwork and to make sure that all aspects of their experiment were flight ready.

The flights were originally scheduled for May 2005, but were postponed because the new plane NASA had been planning to use for the flight wasn't ready. The flights were rescheduled for September, but were then postponed again, this time because of a fuel leak and a cargo door that wouldn't seal properly.

Finally, after several months of uncertainty, the flights took place in May 2006. The teams spent ten days at the Johnson Space Center in Houston, first undergoing several days of flight training and safety briefings before flying with their experiments.

The team from Circle High School in Towonda, Kansas studied the motion of objects in microgravity. The simple experiment took data that students will use to understand some of the basic laws of physics, said Dan Mattern, Circle High physics teacher. Mattern's students helped develop the idea of accelerating a ball out of a tube, using a video camera to record how far and how fast the ball moved. They also performed the same experiment on the ground for comparison. Mattern said he had found it eye-opening to actually witness how fast things happen in microgravity. "I was surprised in zero-g how quickly everything went. It was amazing how quickly the ball accelerated out of there," he said.

The team from Beaumont High School, a girls' school in Ohio, made glycerol bridges–drops of glycerol suspended between two posts–of various lengths and widths, and measured their stability under microgravity. The girls and their teachers, along with mentor Greg DiLisi of John Carroll University, came up with the experiment after conducting a literature search to find interesting topics to research in zero gravity. They assembled their apparatus with computer and video equipment to record what happened to the bridges during the flights. "As the vomit comet pulls out of the dive, some bridges collapse and some don't. We're trying to figure out the size where the bridges remain stable and where they break apart," said DiLisi. It was helpful that most of the experiment was automated, because it is difficult to do many tasks while floating, and even slight head movements can make one feel sick, said DiLisi. After the experiment, the students set about analyzing the data, and they plan to report the results in a journal article.

The other experiments were: a free-floating robot that used a light sensor grid and student-generated software to control the robot's orientation; three separate experiments on magnetism in zero-g; a study of granular materials in an electric field; an investigation of how paints interact with themselves, each other, and different surfaces while producing unique artwork in zero-g; and an experiment to measure the tumble rate of a two pound picosatellite.

The flights were successful, and all groups got some good data to take back for their students to analyze. The teachers and participating students then returned to their schools to share what they've learned by giving presentations about their experiments and developing activities for use in their schools and communities.

## Chairs Around the Table

Photo credit: Bernard Khoury

*A group of physics department chairs enjoys a moment on the patio outside the American Center for Physics in College Park, MD.They were attending the biannual conference for department chairs, which took place June 9-11 and was sponsored by APS and the American Association of Physics Teachers. The conference featured a keynote address by Norman L. Augustine, retired Chairman and CEO of Lockheed Martin, who chaired the committee that produced the report "Rising Above the Gathering Storm", and included sessions on graduate education, ethics education, and diversity issues.*

### All Aboard the "Vomit Comet"

*Vinaya Sathyasheelappa, APS World Year of Physics Project Coordinator, joined the teachers aboard NASA's Weightless Wonder. Here's his description of being in Zero-G:*

The day began early. Our daily morning briefing consisted of some housekeeping items, flight conditions, scheduling, etc. Following that, we had our medical briefing. A NASA flight surgeon, who accompanies each flight, issued all the team members a dose of anti-nausea medication. (Most people, including the crew members, take the meds. It just makes it easier.) Flyers briefed, meds were taken, and then finally, we were airborne.

Even though they had warned me that the experience was very unlike the sensation of riding a roller coaster, I fully expected it to be very much like that. Boy, was I wrong...in a good way. The transitions from 2-g to zero-g were very, very smooth. One minute, you're plastered to the floor of the plane and the next minute you're floating around in the cabin. Luckily, I didn't get sick. (NASA says that only 20% of flyers experience mild discomfort.)

Weightlessness is sort of like swimming. Except there is no friction from the water, although you do feel buoyant. You aren't able to propel yourself by flapping your arms or legs. You need to push off something; otherwise, you'll just float there. Somersaults were a little bit difficult, but only because you have to push off from the floor (or ceiling) of the plane.

We conducted 42 parabolas in all. The last two parabolas simulate Lunar and Martian gravity, which are a lot different than zero-g. Lunar gravity looks and feels like you're hopping on the ground and floating at the same time–just like you remember from footage you've seen of the lunar walks. Martian gravity feels like you're very strong. People were doing push-ups with four people standing on their backs.

I can truly say that this was one of the most amazing–and exciting–experiences of my life. Was I scared? Yes, a little bit. but more of being sick on the flight. Would I do it again? In a heartbeat. Hopefully, I won't have to wait until 2105!

*More about Vinaya's experience and pictures can be found online in the Vomit Comet Blog: www.physicscentral.com/freefall*

## Anybody Seen my Comb?

Photo credit: Vinaya Sathyasheelappa

*Teacher Lori DiLisi of Beaumont High School in University Heights, Ohio flies through the air with the greatest of ease in the weightless environment aboard NASA's reduced gravity C-9 airplane.*

BLEWETT CONTINUED FROM PAGE 1

has switched fields, from condensed matter theory to particle physics.

The scholarship consists of a one-year award of up to $45,000, which can be used for dependent care, salary, travel, equipment, and tuition and fees.

Freeland received her PhD in condensed matter physics in 1996 from Johns Hopkins University. Her husband, also a physicist, received his PhD around the same time. The couple then moved to Brookhaven, where he had a postdoc position. Geographically limited in her job search, Freeland was unable to find a suitable job. She also wanted to take time off for family. Her first child was born in 1999.

The family then moved to the Chicago area, where Freeland's husband had a job at Argonne National Lab. She took a part-time position teaching physics at the School of the Art Institute of Chicago.

After having her second child in 2002, Freeland wanted to get involved with research. She sent letters to a number of researchers at Fermilab, looking for a project she could work on, and Andreas Kronfeld invited her to work with his lattice quantum chromodynamics (QCD) research group. Though her previous work had been in condensed matter, Freeland was willing to switch fields in order to continue working in physics. "Since there's not a lot of information about what to do, I went with the opportunities at hand," she said.

But in order to do research, she needed a grant, and she found that almost all grants required a full-time affiliation–a problem Freeland says she had not anticipated when she took a career break. It didn't matter what science she wanted to do, or whom she wanted to work with; without a full-time affiliation, she could not get a grant.

One of the few programs she was eligible for was an American Association of University Women Fellowship, which Freeland received in 2005. The AAUW fellowship enabled her to do research while still teaching part time. This year, the Blewett scholarship will allow her to devote herself full time to research.

Though it has required her to learn a new field, Freeland is excited about her research in lattice QCD, which attempts to simplify strong force calculations by restricting quarks to a grid, or lattice, instead of a continuous space. In the past few years there has been considerable progress in using lattice QCD to predict particle properties, and Freeland says she's excited to be part of that. Her current research involves calculating quantities related to B meson decays.

After this year, Freeland's youngest child will be in school, and she plans to look for a full-time position. But she says that even if she doesn't find an ideal job right away, she will be able to continue her research, which she believes will be on a solid footing, thanks to the Blewett scholarship.

Having gone through a career break, Freeland has given considerable thought to the issues involved. There are not a lot of resources for people in career break situations, she says, though the situation is better in some other countries. For instance, in the UK, there are more programs specifically targeted towards people in career breaks, and the Institute of Physics has published a pamphlet that discusses how to plan and manage a career break. Here in the US, Freeland couldn't even find a pamphlet for people in her situation. More publicity about the problems could help, she says.

Freeland has written an article about career breaks for the *Gazette*, the newsletter of the APS Committee on the Status of Women in Physics. She advises others taking a career break to stay in touch with the field as much as possible. Also if possible, before taking a career break, Freeland suggests women consider doing a postdoc if they haven't already. "Basically, the more established you can be before you take a break, the better off you can be," she advises.

Freeland was happy to find out in 2004 that Hildred Blewett had endowed this scholarship. "I'm really glad she did it," said Freeland. "To me it was significant that a person, so dedicated as a physics researcher, would leave her money specifically to this issue."

# Letters

### Thinking Outside the Bomb-Box

The interview with Admiral Richard Mies was highly illuminating. The Admiral exposed us to government-think on nuclear politics. The thesis is based on the premise that the world is populated with persons who behave rationally, have similar motivations and respond to crises according to agreed upon rules. If one accepts the premise, then the thesis is quite reasonable.

A series of global events in our lifetime demonstrates the fallacy of the premise. To name a few: The Nazi genocide, Darfur, Hiroshima, Nagasaki, 9-11, Beirut, USS Cole, etc, etc, etc. Today, it is no longer reasonable to expect that we can reason with the irrational.

Consideration of the multiple approaches to resolving the many global threats to civilization seems beyond our capacity, so we continue to fall back on the military solution. In the past, this has worked in the short run.

But today's world requires rethinking the entire sequence of events. When our nation was deciding on whether the Japanese government was so irrational that nothing short of nuclear attack would persuade them to stop the killing and end the war, the political/military thinking trumped pleas to attempt humanitarian approaches. President Truman's addresses to us were very persuasive. The world was not made safer for democracy by either WW I or WW II. Similarly using the bomb on large cities did save us, momentarily, but unfortunately brought about the feasibility of the predicted Apocalypse, the unthinkable.

We need our leaders to begin thinking out of the bomb-box . It takes but a single thinking leader to come forward, and recognize that the only solution to nuclear self destruction is the conversion of ALL nuclear weapons into nuclear reactors or some other non-destructive application of nuclear energy for peaceful purposes. We could go a long way to helping with the climate, the environment, scarce petroleum resources, and the myriad of other planet issues while disposing of the threat posed by the overhanging sword.

The rational world thinks along with Admiral Mies, while in some back room in Pakistan or Afghanistan or Providence there is a group of irrationals plotting to get hold of a bomb to trigger our self destruction.

**Jerome Eckerman**
*Potomac, MD*

### Advanced LIGO Will Be Swimming in Gravity Wave Signals

In the "Members in the Media" section of the June *APS News*, my quote from a *New York Times* article was put in the wrong context. My concern is that a reader could be given a misleading and negative impression with potentially serious consequences for the credibility of the Advanced LIGO project that we expect to begin constructing in 2008.

The quote appearing in the May 2, 2006, *NY Times* article was "25 percent, if nature's kind." The article made clear that I was commenting on LIGO's chances of seeing gravitational waves during the current data run. This run, which began in November 2005, utilizes LIGO in its present configuration.

Advanced LIGO will have 10 times greater sensitivity than in the current data run and will therefore be able to see about 1,000 times as many sources of gravity waves as the current LIGO. So if the current LIGO configuration has a 25% chance of seeing gravity waves, we will be swimming in gravity wave signals once Advanced LIGO reaches its full sensitivity.

By the way, my affiliation is the California Institute of Technology, not Lawrence Berkeley National Laboratory as the "Members in the Media" item stated.

**Jay Marx**
*Pasadena, CA*

*Ed. Note: Jay Marx is the Executive Director of the LIGO project.*

### Headline Misrepresents the Data

The June 2006 issue of *APS News* contains the headline "JLab Experiment Discovers Some Strangeness In the Proportion of Strange Quarks." That statement is not consistent with the result of the HAPPEx collaboration described in the article. Both the magnetic moment and charge distibutions of the proton are consistent with zero.

Zero strangeness is not "some" strangeness.

**Robert E. Chrien**
*Upton NY*

*Ed. Note: The word "strangeness" was being used in its everyday sense: it's strange that so little strangeness was found. And we could not resist the temptation to quote Francis Bacon: "There is no excellent beauty that hath not some strangeness in the proportion." (Do you think he knew about the mixing of s and b quarks?) Sorry for the confusion.*

### Admiral's Chart Not Definitive

The chart that Admiral Mies (Back Page, June 2006 *APS News*) introduces to support his contention that a nuclear threat can reduce war deaths is ambiguous. The "...percentage of human deaths as a result of warfare" may vary over recent times in part from better statistics, but it may also belie a trend more chaotic than linear. What does the future actually portend from these fluctuations in modern wartime deaths–an overall reduction of per capita fatalities, or a tendency toward nonlinear instability?

**Loren Booda**
*Arlington, VA*

# Viewpoint...

## Wen Ho Lee's Settlement: What Happened and Why

**Edward Gerjuoy**

On June 2 of this year the news media reported that Wen Ho Lee, the former Los Alamos National Laboratory (LANL) researcher who was the subject of my Back Page article in the April 2000 *APS News*, had settled his lawsuit against the US government for $1.65 million, to which sum five news organizations had contributed a total of $750,000 although they were not named defendants in the case. The present article describes the basis for the lawsuit, elucidates the settlement terms and explains how the news organizations came to be involved.

In April 2000 Wen Ho Lee was being held in solitary confinement (bail having been refused), under a 59-count indictment issued December 10, 1999 accusing Lee of unlawfully mishandling classified documents "with the intent to injure the United States, and with the intent to secure an advantage to a foreign nation." The investigation which led to his indictment had begun in 1995, shortly after the DOE had received information causing it to suspect that the mainland People's Republic of China (PRC) government had obtained US nuclear weapons secrets.

Although the investigation had focused on Lee almost from its outset, by the time of his indictment any supposed evidence that he had revealed nuclear weapons secrets to the PRC already had begun to collapse. Indeed the above-quoted indictment language accusing Lee of mishandling classified documents carefully avoids the much more serious charge, punishable by death, that Lee actually had given any classified information to a foreign power. By September 13, 2000 the evidence had completely collapsed. On that date the government agreed to a settlement whereby, in return for Lee pleading guilty to a single count of the original 59, he immediately was freed on a sentence of "time served" and all the other counts were dismissed. Presiding Federal District Court Judge James A. Parker told Lee in open court, "I sincerely apologize to you, Dr. Lee, for the unfair manner [in which] you were held in custody by the executive branch."

Despite the dubious evidence, the fact that a case was being built against Lee had been leaked to the news media long before he actually was indicted. For example, on March 6 and 9, 1999 *The New York Times* published two front page stories that disclosed many details of the government's ongoing investigation; the March 9 story explicitly named Lee as the investigation's "prime suspect."

A March 10, 1999 *Albuquerque Journal* story said the reason for firing Lee was based on "very strong suspicions of his participation" in espionage for the PRC. Accordingly, starting on March 10, 1999, Lee's lawyer Brian Sun wrote the Department of Justice (DOJ) and the FBI a series of letters pointing out that the continuing leaks were highly prejudicial to Lee, were a misleading characterization of whatever evidence the DOJ had against him, and directly violated established DOJ policies. These letters also pointed out that the sources of the leaks were subject to lawsuit for the damages to Lee that those leaks had caused. None of these letters were answered.

The threatened lawsuit was filed ten days after Lee was indicted. It was based on provisions of the so-called federal Privacy Act, Title 5

*Wen Ho Lee continued on page 7*

### US Nuclear Deterrence Strategy is a Disingenuous and Dangerous Fallacy

In its June Back Page, *APS News* featured an interview with Admiral Richard Mies arguing that the US nuclear threat can enhance stability. Mies's arguments contain faulty logic and contradictory statements aiming to endorse the very dangerous nuclear path that the US is pursing, which will lead to catastrophic consequences if not altered.

Mies starts by stating "the primary value of nuclear weapons is not their use; it's in the threat or potential of their use." The primary value of *any* weapon is not to kill; it is to allow its owner to force its will on others. Hitler would have liked nothing more than to be able to conquer Europe by merely threatening to use Germany's firepower, as he did with Czechoslovakia. Only because other countries were not deterred from resisting had the German army to engage in actual use of their weapons.

Mies advocates nuclear weapons with "lower yield, higher accuracy, ... improved earth penetrating ability" because with these weapons, US forces have a "credible deterrent and thereby never have to use them." Sure, we would like to achieve our goals without having to use them, but the clear implication is, we will use them if deterrence fails. And the decision is not yours nor mine nor even Congress's, it is the President's, with a small group of hand-picked like-minded advisors.

According to Mies and stated US policy, US nuclear weapons are intended to deter such things as terrorist attacks, an adversary's use of underground facilities to store WMD, and even an adversary's intention to use WMD. Mies's statement that nuclear weapons "will always be weapons of last resort" merely means that they will be used when every other resort to deter such behaviors has failed.

As of today, the deterrence value of US nuclear weapons for such behaviors is minimal. Nuclear weapons have never been used in response to such behaviors, and the memories of nuclear weapons' actual use (Hiroshima and Nagasaki) are fast fading into the past. This is why the Bush administration is preparing the conditions that will "justify" the use of a low-yield nuclear device against an Iranian underground facility under the stated new US nuclear weapons policies.

Deterrence is not a monopoly of the US. Once the nuclear threshold is crossed again, many more nations will rush to acquire nuclear weapons as a deterrent to a US attack. Even the mere statement of such policies together with the development of more "credible" nuclear weapons provides a strong incentive for non-nuclear nations to become nuclear. With no longer a nuclear taboo and many more nuclear countries, the chances of a global nuclear conflict will be exponentially enhanced.

Mies is right in stating that nuclear weapons probably helped prevent a conventional conflict between nuclear powers, thus saving lives. However the same argument is not valid when nuclear weapons are used to target non-nuclear countries, as the US is doing now.

The way to reduce the global nuclear danger is not utopian global disarmament nor enhanced counter-proliferation efforts, nor even non-first-use pledges. It is an ironclad unconditional pledge by the nuclear nations to renounce the option of nuclear weapons use against non-nuclear nations. Nuclear nations are already deterred from using nuclear weapons against each other by fear of retaliation, and such a pledge would provide a real deterrent for non-nuclear nations to become nuclear, as well as a real incentive for nuclear nations with small arsenals to disarm.

Would such a pledge be detrimental to US national interests? Arguably yes to the extent that it would reduce our ability to coerce other nations, or in more

*US Nuclear continued on page 7*

### We Must Seperate Science from Dogma

After reading several of the letters responding to Lawrence Krauss' repudiation of Intelligent Design as a scientific theory, I feel the need to rise to his defense. Krauss did not write a diatribe against religion. Instead, he warned against those with a particular religious belief, Intelligent Design, trying to gain a foothold in the science classroom. This is not the first attempt at replacing scientific theory with dogma, as evidenced by Lysenkoism in the old Soviet Union. It is the obligation of scientists to protect science from dogmatic pressures of any kind and to disseminate to the public our best understanding of natural, not supernatural, phenomena.

**William Lehr**
*Bothell, WA*

# Letters from the Middle East

*Ed. Note: In late July, we contacted two APS members in Lebanon, Bassem Sabra of Notre Dame University-Louaize and Ghanem Oweis of the American University of Beirut, as well as Eitan Ehrenfreund of the Technion in Haifa, Israel. We asked for news of the impact of the crisis on them personally and on their physics communities. Their responses, written on July 27 and 28 and slightly edited, follow. APS News plans a lengthier feature on this subject in our October issue.*

**Bassem Sabra:** "Your email is very heartening after a long, troubled night of air raids. The humanitarian situation is grim indeed…Needless to say this is taking its toll on the physics community. Many graduating physics students who were getting ready to go abroad for graduate studies are now stuck here. Mail services are down so they are not able to get their papers ready in time and getting out of Lebanon is not that easy given that the roads with Syria are bombed regularly. Summer sessions at universities are on hold.

"I had this whole summer planned out for research and public outreach. The astronomy club at my university, together with the Lebanese Astronomy Group and the Arab Astronomical Union were organizing the first Arab amateur astronomy meeting in late August. We had a full program of lectures and hands-on workshops on practical astronomy. Five speakers from the US, e.g. Alan Hale (co-discoverer of comet Hale-Bopp) and Europe were expected. Participants from all the Arab world were planning to attend (over 100 persons). The convent where we were going to house the participants has been badly damaged. We cancelled the whole event and are planning to host it next summer (the phoenix will rise again).

"I have two students working with me on studying the correlations between host galaxy properties, dark matter halo, and the central supermassive blackhole. This project has screeched to a halt since one of the students is stuck in the South, the other is in the sea city of Byblos, and I am stuck in the Bekaa. The roads are dangerous. My university in Mount Lebanon is closed. My home in Beirut is dangerous to live in. There is no place for us to meet to discuss the project. We are cut off from the resources that we need. I cannot go to my office to continue with the other projects. I am trying to work on yet another project on my laptop computer but, due to the situation, my efficiency is at a record low….One of my colleagues whom I was collaborating with on a proposal to the Lebanese CNRS spent two days looking for milk for his children. Many were planning to travel abroad to carry out experiments at the labs outside Lebanon or were getting ready to have international colleagues come to there labs. Due to the heavy teaching load during the fall and spring, we all look forward for the summer to get some work done. All these research efforts have been torpedoed."

**Ghanem Oweis:** "I was in Beirut, Lebanon during the first three days of the crisis, and managed to evacuate through the embassy of Jordan, of which I am a citizen, to the safety of the capital Amman, where I am well and spending time with my family… I moved to the American University of Beirut in February of this year as an assistant professor where I've been teaching and working on establishing a laboratory for experimental fluid mechanics. Things have been going well with my new life, up until the crisis erupted. It was very sudden and without any warnings, and within 12 hours the situation changed from well to hell. My concerns and thoughts shifted from getting my lab up and running and finishing up manuscripts, to trying to stay alive…I was working on my PhD at Michigan on September 11th 2001; the nerve wracking confusion and uncertainty was déjà-vu this time but it is something you'd hope never to go through again."

**Eitan Ehrenfreund:** "Technion was closed for a week (16-22/7/06); it is now formally 'back to routine'. Many employees do not show up, but prefer to stay at home with their children, who of course do not have any summer camps or other activities. There are no exams (July was the exam period); all exams are postponed, as of now, to September. There will be no summer semester. Administratively, Technion is functioning…

"So far, it has not been hit by a missile or rocket, but one of the missiles fell some 400 m from Technion fence. Of course, we are all worried and pray for the safety of our soldiers in Lebanon and the safety of Israeli citizens under the missile threat."

# US Team Garners 4 Gold, 1 Silver at Physics Olympiad in Singapore

The United States Physics Team brought home four gold medals and one silver medal from the 37th International Physics Olympiad, held in Singapore July 8-17. This year's event was the largest Olympiad ever, with 383 competitors from 86 nations participating.

Winning gold medals were: **Menyoung Lee**, a senior at Thomas Jefferson High School for Science and Technology, Alexandria, VA. Lee won a gold medal for the second year in a row; **William Throwe**, a senior at Shoreham-Wading River High School, Shoreham, NY. Last year Throwe, the son of PRL Assistant Editor Jane Throwe, served as an alternate to the team; **Henry Tung** , a junior at Torrey Pines High School in San Diego; and **Otis Chodosh**, a senior at the Oklahoma School of Science and Mathematics in Oklahoma City. Taking home a silver medal was **Sherry Gong**, a junior at Phillips Exeter Academy in Exeter, NH.

In an unofficial ranking of countries based on total team score, the US team placed second, outscored only by the Chinese team.

From 1986 to 2006 the United States teams have brought home 30 gold medals, 21 silver medals, 26 bronze medals, and 11 honorable mentions.

The Olympiad is an international competition among pre-university students from more than 80 nations. The goals of the Olympiad are to encourage excellence in physics education and to reward outstanding physics students. Competitors solve challenging theoretical and experimental physics problems.

The 24 members of the US Physics Team are selected through two competitive examinations. As reported in the July *APS News*, these students attended an intensive week-long training camp held at the University of Maryland in May, after which the five traveling team members were selected. The US Physics Team is co-organized by the American Association of Physics Teachers and the American Institute of Physics. APS is one of the sponsors.

## Professional Skills Development for Women Physicists

Do you want to improve your negotiation skills? Do you have great ideas that you want to communicate to your colleagues?

If so, the Committee on the Status of Women in Physics invites you to attend one of the workshops entitled "Professional Skills Development for Women in Physics." These workshops will:

- Coach women in key skills that are needed to enhance their careers.
- Provide training in persuasive communication, negotiation, and leadership presented by experienced professionals.
- Provide a special opportunity for networking among participants.

Workshops at the 2007 March and April APS Meetings will be aimed at women in industry and government labs, and will take place on Sunday, March 4, 2007 (Denver) and Friday, April 13, 2007 (Jacksonville). Application deadlines are Dec. 4 for the March workshop and Jan. 12 for the April workshop.

Each workshop will be limited in size for optimal benefits. Workshop participants are eligible to receive a stipend to help cover the cost of travel and up to two nights lodging.

These workshops are funded by the National Science Foundation.

Details will be available in September at http://www.aps.org/educ/cswp/index.cfm .

# INTERNATIONAL News

*...from the APS Office of International Affairs*

# An Open Invitation to APS Members to Form Iranian-American Physicists Network Group

**Hamid Javadi**

Formation of a network group for US physicists with Iranian heritage appears to be timely. Already, three distinct groups form a nucleus for US physicists with Chinese, Korean, and Indian cultural heritage–the Oversees Chinese Physics Association (OCPA), American Chapter of the Indian Physics Association (ACIPA), and Association of Korean Physicists in America (AKPA). Each of these groups has established bylaws which govern their activities.

In the same way that those organizations have enhanced linkages throughout their community, this article intends to be an open invitation to all APS members that respect diversity and value dialog, to form an Iranian-American Physicists (IrAP) network group.

First, some personal thoughts as an Iranian-American physicist, regarding the motivation for creating such a network:

It is important to nurture diversity in its true sense. Some cultures may not be equipped to deal with challenges of the future. The key to success in the field of science is also open-mindedness and high receptivity. While our political world today does not always portray tolerance, I believe that the human spirit heralds a bright and friendly future for all of us.

Diversity resonates with teachings of Sufism (the inner or esoteric dimension of Islam [1]) that tolerates aspect of human endeavors as manifestation of ubiquitous God. Molana Jalal-e-Din Mohammad Molavi Rumi (Iran's most revered poet, 1207-1283 A.D.) drove these teachings to the heart and mind of many generations of Iranians. He promoted the idea that every thing (no matter how insignificant it may seem) is important and valuable as it plays its role in God's arena. Rumi in one of his celebrated poems; "The Elephant in the Dark House" [2] describes many individuals who enter a dark room where an elephant is kept. Each person learns about the animal from his/her point of reference, namely the elephant's specific anatomy that he/she has touched. The tales of observers are widely different but the whole picture comes only when one combines their descriptions.

This poem addresses the variation of human perceptions of the world and to an extent can be applied to a physicist's approach in understanding the world. To be accurate though, science starts with hypothesis and solidifies when it is confirmed with observation. As such, science is a precise endeavor of the human being.

This digression brings me to enumerate the goals of the proposed Iranian-American Physicists (IrAP) network group in promoting diversity and dialogue. Such an organization would endeavor to:

1. Provide the focal point and an arena for Iranian-American physicists who wish to broaden their professional/personal lives with cultural/historical/ancestral ties.

2. Welcome all interested members of APS who wish to join the IrAP network group.

3. Facilitate concerted efforts by its members in specific interdisciplinary fields regarding:

•Addressing the needs of developing and poor countries (sustainable economic development, general health, epidemics).

•Influencing policy-makers regarding their decisions when concerned with earthquake prediction and environmental protection.

4. Enhance the role of physics in expanding the coverage, increasing effectiveness, and popularity in utilization and application of the scientific thinking and its methods.

5. Emphasize physics education and its impact on societies.

6. Advocate physics as a tool in expanding democracy.

7. Build upon the image of a universal physics to achieve world peace.

8. Increase the interaction

*International News continued on page 6*

## OUTREACH PROJECT CONTINUED FROM PAGE 1

decode a secret message from 1778. Optional extension activities are provided online, also free of charge, for teachers who wish to expand sections of PhysicsQuest into an in-depth lesson. Once the class solves the mystery they submit their results to APS for a chance to win prizes.

This year, in addition to sending direct mailings and advertising at appropriate meetings, the Public Outreach Department is asking APS members to help recruit classes in their area. "We are asking APS members to use their existing contacts in local schools or forge new connections," says Kendra Rand, APS Public Outreach Specialist. Members can call physical science teachers and ask them to register for the project. Those who are motivated can also offer to go to the classroom to help conduct the experiments once the kit arrives, or offer to give a career talk, suggests Rand. The level of involvement for each member can vary from a phone call to a personal visit, depending on his or her own interest and that of the teacher.

"PhysicsQuest provides 6th to 9th grade students with a positive and fun experience with physics and we hope this will increase the numbers of students taking physics later in school. If we can add personal interaction with a real, live physicist, just imagine the impact on these kids' education," says Clark.

Interested members can get more information on the project and how to recruit classes on a special volunteer website, www.physicscentral.com/physicsquest/volunteers.

# INSIDE THE BELTWAY: WASHINGTON ANALYSIS AND OPINION

## Energy on My Mind

**By Michael S. Lubell,**
**APS Director of Public Affairs**

ASPEN, July 13–It does the intellect good to get outside the Beltway on occasion. And Aspen is a wonderful place to clear out the mental cobwebs, rejuvenate the spirit and breathe in the Rocky Mountain air. It also doesn't hurt to be in the company of a handful of Nobelists, a former presidential science advisor, and some of the world's experts on energy, especially if the subject is energy.

As I wrote in my last column, Washington politicos have turned on their energy policy after burners–with good reason. When gasoline is selling for $3.49 a gallon, which is what I paid for regular a few days ago in the San Francisco Bay area, Joe Six Pack gets mad, really mad. And even if the White House is distracted by world events, members of Congress in both parties are feeling the pain of each of their constituents. For some members, their political survival may be at stake.

Charlie Cook, one of the well respected Washington polling gurus, puts the number of endangered House and Senate seats at about 50. And for a number of those so dubiously anointed, November 8 could well be résumé time.

Between now and the coming election, four issues will dominate the political debate: Iraq and the Middle East, economic growth and jobs, national security and terrorism, and, in selected regions, religious and moral values, which includes gay marriage and stem cell research. Except for the values issues, energy lies at the nexus of the others.

Putting aside the cultural, political and spiritual bond that exists between the United States and Israel, it's hard to see why the Middle East should be such a focus of American foreign policy–except for our extraordinary dependence on foreign sources of oil. The facts are simple.

Despite having only 3 percent of the world's population, we are the world's largest economy, and, with our way of life, we use 25 percent of the world's energy. We also use oil to drive 70 percent of our transportation systems, but we are able to supply only 30 percent of what we need from our own domestic sources.

Oil is a fungible commodity, and any burp in the world's supply anywhere causes almost instant distress everywhere. Although we get only a fifth of our imported oil from the Middle East, if Iraq or any other part of that region falls into chaos, oil supplies will be threatened and prices will soar in all parts of the world.

But even if Iraqi civil strife doesn't develop into a full-scale civil war, and even if Israel doesn't take its battle with Hezbollah and Hamas to Damascus and Teheran, oil and natural gas prices will continue to climb at home. The demand pressures from rapidly developing Asian nations, particularly China, simply will outstrip the world's supplies. And as the costs of petroleum products increase, the American economy, despite its resilience, will inevitably come under great stress.

Today, polling shows that most Americans are anxious about their economic future. In the last three years, the Gross Domestic Product may have grown at a annual rate of 3.5 percent and more than 5.5 million new jobs may have been created, but most Americans say they feel threatened financially. Many claim the economic recovery has passed them by. They point their fingers at offshore outsourcing of jobs and waves of illegal immigrants.

It matters little whether the facts bear out the public concerns. In the world of politics, perceptions dictate election outcomes, which is why the White House and Republican congressional leaders are desperately trying to get out the good news on GDP growth, job creation, and shrinking deficits. But if energy prices continue to spiral upward, good news will soon turn to bad. And the anxiety the public is expressing today will have far more foundation in fact.

Terrorists would like nothing more than to see the United States suffer economically, but putting a squeeze on international oil production has proven to be problematic historically, even when OPEC has made a concerted effort to do so. There's an easier target: America's energy infrastructure. We've already seen what hurricanes can do to roil the oil and natural gas markets, and we know how easy it is for parts of the electricity grid to fail. A terrorist attack on a few refineries, nuclear plants or parts of the power grid could produce crippling results. Security analysts believe it is only a matter of time before an attack occurs.

But energy is not only a matter of economic and homeland security. It's a matter of environmental security. Global warming and the carbon emissions that drive it are real, and politicians are just now beginning to grasp the enormity of the issue. Within the next two years, as the public tunes into the issue, energy and sustainability could become the buzz words that determine the outcome of the 2008 election.

As Steve Chu, Nobelist and Director of Lawrence Berkeley Laboratory points out, we don't really have an oil or gas problem, we have a carbon problem, and science must lead the way.

**INTERNATIONAL NEWS CONTINUED FROM PAGE 5**

between its members and diverse cultures of the world with emphasis on humanity.

9. Unify the voices of Iranian-American physicists and give them a formal avenue to publicize their aspirations or to raise their concerns.

10. Provide a positive role model for members of the young Iranian immigrant community striving to assimilate with their newly adopted home, and trying to find their new identities without losing positive aspects of their cultural heritage.

11. Establish scholarship and awards to honor talented young physicists.

12. Provide guidance and mentorship to the students of physics and science.

13. Organize public lectures and events, interviews with Iranian public media in exile, and issue news and timely public announcements to raise physics awareness and the role of science within the Iranian immigrant communities across USA.

14. Recognize individuals who have contributed to humanity, world peace, and general human well-being with their research in science (specifically physics).

15. Honor individuals who have defended scientific thinking and freedom of thought around the world.

16. Stand bold and strong against injustice and discrimination against minorities and individuals. Oppose deception (especially scientific fraud).

This list is not exhaustive and is meant only as a suggestion. The goals of the proposed Iranian-American Physicists network group will be determined by its member-elected representatives.

*Hamid Javadi is in the Jet Propulsion Laboratory Submillimeter Wave Advanced Technology Group.*

**Note from the author:** I will offer my service to be the point of contact until the IrAP network group establishes itself. Please forward your suggestions and membership requests to my email address: hamidhjavadi@sbcglobal.net. Likewise, you can obtain more information about the aforementioned associations on the web:
OCPA–http://www.ocpaweb.org
ACIPA–http://theacipa.org
AKPA–http://www.akpa.org

**Footnotes**

1. "Al-Serat, The Interior Life in Islam," Prof. Seyyed Hossein Nasr, http://www.al-islam.org/al-serat/interior-nasr.htm.

2. "Blind Men and the Elephant" legend has originated from the Pali Buddhist Udana. Excerpts of "The Elephant in the Dark" poem can be found in http://www.khamush.com/. Also see P. Dunn, M. M. Dunn, "The IllustrateRumi, A Treasury of Wisdom from the Poet of the Soul" ISBN: 006062017X, HarperCollins Publishers, New York, NY (2000)

# Ask the Ethicist

## Retraction Infraction?

Dear Jordan:

I read in the press recently that a chemistry professor at Columbia was retracting several papers, which were mainly the work of a former graduate student. The former student claimed the work was valid and vehemently opposed the retraction. Nevertheless, apparently, the various journals involved, including the Journal of the American Chemical Society, were going ahead with the retractions.

It seems to me that the former student's reputation was being damaged without an impartial evaluation of the situation. Is this fair? How would the APS journals handle a similar situation?

*Curious in Cleveland*

***Jordan Moiers replies:***

Dear Curious,

The case you describe involves associate professor Dalibor Sames of Columbia University's chemistry department and his former graduate student Bengü Sezen. Columbia is currently conducting a review to determine if, as Sames asserts, Sezen fabricated data or spiked reactants in a series of experiments on the manipulation of carbon-hydrogen bonds. Sames, Columbia University, and the editors of the *Journal of the American Chemical Society* and *Organic Letters* (also an ACS publication) are withholding comment until the completion of the inquiry.

Setting aside the issue of Sezen's misconduct, which will be settled one way or the other through the Columbia investigation, the handling of the affair raises some serious ethical issues. Sames is the corresponding author on the retracted papers and his lab's principal investigator, and yet was apparently less than fully informed about Sezen's work until recently. Although not all authors are accountable for all portions of a given paper, Sames had the added burden of being Sezen's advisor. When it comes to graduate school, advisors and supervisors are responsible for guiding young researchers' scientific development and integrity. Nobody is perfect, but the retraction of four papers suggests a serous and chronic problem in Sames's lab that an involved coauthor and PI should have been aware of.

While Sezen shared in the credit for publishing the papers, which were based on research she conducted, Sames's unilateral retraction denied her the opportunity to weigh in on the retraction. In articles published in Science and the ACS publication *Chemical & Engineering News*, Sezen claims that she was not informed of the retractions that Sames requested of the ACS, and strongly protested when she eventually learned of them. ACS editors aren't talking in advance of Columbia's investigation, so we can't know their reasoning for accepting the contested retractions at the moment.

According to APS Editor-in-Chief Martin Blume, a case like this at the *Physical Review* might be handled quite differently. "Retraction is a very significant step," he says, "which implies that misconduct has occurred. An accusation by one author, no matter how senior, against another is not proof of misconduct, and everyone is entitled to respond to an accusation." Absent an independent investigation conducted according to institutional or funding-agency guidelines, APS would not print a retraction of the paper, Blume said. But APS could print an erratum by the disaffected authors, or an editorial note, stating their desire to remove their names from the paper.

Sames's retractions seem to have explicitly violated Columbia's published professional ethics guidelines, which state that a researcher must have the opportunity to review and rebut all allegations of misconduct, as well as the chance to appeal any formal misconduct findings, prior to the notification of funding research agencies, journals, and societies of fraudulent work.

Regardless of the outcome of Columbia's investigation, the affair's inevitable damage has already been aggravated by the premature retractions. It has directed a spotlight of suspicion on Sezen at a critical time in her career, leading to an indefinite delay in her postdoc appointment at Stanford. If a survey of blogs hosted by chemistry grad students is any indication, Sames's reputation is suffering as well, both because of his affiliation with potentially fraudulent research and because of the distaste expressed by some for his apparent hostility toward a former student who was once a promising young member of his lab.

It is too soon to tell whether Columbia's chemistry department debacle will be added to the list of high profile scientific frauds. But whether Sezen is eventually cleared (perhaps leading to a retraction of the recent ACS journal retractions) or not, the ethically flawed handling of the case will likely leave a dark cloud over the people and institutions involved for some time.

## WEN HO LEE CONTINUED FROM PAGE 4

§ 552a of the United States Code. Under the doctrine of "sovereign immunity," which traces back to the "divine right of kings," individuals quite generally may not sue US governmental agencies without permission. The Privacy Act confers this required permission for lawsuits alleging unauthorized disclosure of governmental agency records, and even explicitly permits the Court to "assess against the United States reasonable attorney fees and other litigation costs" when the complainant has substantially prevailed (some of the really great features of this nation's democracy still remain).

I emphasize that this lawsuit was wholly independent of the criminal action against Lee that ended on September 13, 2000. Listed as defendants were the DOJ, FBI and DOE, plus Jane and John Doe defendant leakers 1 through 99, whose identities the lawsuit still had to ascertain. Despite intensive efforts, including more than 20 depositions of individuals who had knowledge of the investigation that led to Lee's indictment, his lawsuit remained unable to reliably identify any of the leakers. Beginning in early August 2002, therefore, Lee issued subpoenas to five reporters who had authored obviously leak-based stories about the investigation, seeking testimony and documents concerning the sources of those leaks.

All the reporters moved to quash the subpoenas on freedom of the press grounds, essentially the same grounds Judith Miller futilely argued in October 2005 when she was jailed for refusing to reveal the sources who had leaked CIA operative Valerie Plame's name to her. On October 9, 2003 the US District Court judge handling Lee's lawsuit similarly rejected the reporters' arguments and ordered them to testify about their sources, saying Lee had shown there was no other way for him to obtain evidence which could be essential to his case.

On August 18, 2004, the reporters having defied this order, the Court found the five reporters in contempt and fined each of them $500 for every day the order was not obeyed. The Court stayed enforcement of the contempt citation, however, pending appeal. On June 28, 2005 the District of Columbia Circuit Court of Appeals upheld the contempt citation for four of the five reporters. These four reporters then appealed to the Supreme Court, which, on June 5, 2006, three days after the settlement, announced its refusal to hear the case.

I can only speculate about the reasons the parties agreed to the settlement, whose terms are unusual. According to some newspaper stories the main impetus for the settlement came from the government, which probably was forewarned the Supreme Court was not going to hear the reporters' appeal.

It is a good guess that the government feared the Supreme Court's refusal, once announced, would lead to testimony from at least one of the reporters, thereby strengthening Lee's case and concomitantly threatening to significantly increase the government's financial exposure. Under the settlement terms the government paid $895,000 toward Lee's legal expenses, but made no restitution whatsoever for Lee's damages from the leaks. Thus Lee probably would not have agreed to the settlement, had the five news organizations not been willing to make their $750,000 contribution to defray Lee's damages.

The news organizations, though not defendants in Lee's lawsuit and hence under no legal obligation to pay Lee anything, presumably were willing to do so because the $750,000 was much less than the total fines their reporters' refusals to testify already had accrued; it must have been understood that these fines would be waived if the settlement was reached. Although the settlement by no means excused the reporters' contemptuous refusals to obey the Court's order, the District Court judge probably was happy to be rid of Lee's complicated time-consuming case.

*Edward Gerjuoy is Professor of Physics Emeritus at the University of Pittsburgh and has been a practicing lawyer. Because of these qualifications and his long-continued association with the APS Committee on International Freedom of Scientists (CIFS), in 2000 he became actively involved in the defense against Wen Ho Lee's 1999 criminal indictment.*

## APS AWARDS CONTINUED FROM PAGE 1

the dynamics of complicated proteins and systems. At Harvard, McCoy's activities include cheerleading, active involvement in the Harvard Society of Black Scientists and Engineers, and serving as a course assistant for calculus classes.

Lisa Hines likes physics for the challenge it presents. She recalls that around the time she was in seventh grade, she was told that physics was the hardest subject. Instead of being scared, she was determined to challenge herself to try it. So she took physics in high school, and found that she liked it and was good at it. Hines, who grew up in Piscataway, NJ, is now double majoring in physics and astronomy at Penn State University. Hines says she still finds the subject challenging sometimes, but she is inspired by her love of science. Although she sometimes feels out of place as one of the few female or minority students in physics or astronomy, that further motivates her to do her best. "I want to make a good example of myself," she said. This summer she is conducting research on quasars and spectroscopy at Penn State, and she plans to become a researcher one day. She likes dancing, especially ballet, and says her dream is to live in California.

The scholarship is open to any African-American, Hispanic American, or Native American US citizen or permanent resident who is majoring or planning to major in physics, and who is a high school senior, college freshman, or sophomore. More information about the scholarship can be found at http://www.aps.org/educ/com/scholars/

**New minority scholars:**
Ana Berrizbeitia
Christopher Bruner
Eduardo Hariton
Lisa Hines
Tamela Maciel
John Matte
Amanda McCoy
Richard Molina Jr.
Alexander Robel
Jessica Saiz
Aaron Sampson
Marcos Tapia
Malachi Tatum

**Renewal scholars:**
Luis Bryce
Marissa Cevallos
Rodgrigo Farnham
Anton Gereau
Collin Joseph
Hassan Korre
Marc Martinez
Eric Paniagua
Aaron Pollack
Matthew Rickert
Eduardo Ruiz-Rivera
Casey Stevens
Luis Vargas
Yonas Yemane

## US NUCLEAR CONTINUED FROM PAGE 4

euphemistic language to "deter" other nations from behaviors we don't like. But it is a small price to pay compared to global nuclear war, which the chain reaction resulting from a new US use of nuclear weapons against a non-nuclear country is likely to bring about, in a period of weeks, years or decades.

As physicists we understand the potentially devastating effects of nuclear weapons better than others. Because of that, and because physicists brought nuclear weapons into existence and have been instrumental in the buildup of nuclear arsenals, we have a special responsibility. Individually, even if we don't work in nuclear-weapon-related subjects we are all tied to the issue, either because we teach students that may work in the area or because we publish papers with knowledge that may contribute directly or indirectly to the subject. If our profession didn't exist, humanity would have no practical way to erase itself from existence. Thus, as we revel in the great joy of being physicists we should also devote some of our efforts to help prevent the unthinkable consequences that could result from the weapons our profession created. We owe it to society, and society expects no less from us.

***Jorge Hirsch***
*San Diego, CA*



# ANNOUNCEMENTS

### Estate Planning Handouts Now Available

In addition to the many research talks at the 2006 March Meeting in Baltimore, an estate planning session was once again offered for attendees and local members. Led by Jerry McCoy, an attorney from the DC area well-known for expertise in estate tax law, the session provided APS members with tips and tax savings ideas for use in planning for the long term distribution of their property to family, friends and charitable interests. Handouts from the session, including informational brochures on a broad range of estate planning topics, are available to all interested members from Darlene Logan at logan@aps.org.

### Now Appearing in RMP: Recently Posted Reviews and Colloquia

**You will find the following in the online edition of *Reviews of Modern Physics* at http://rmp.aps.org**

**Photo Crystal Heterostuctures and Interfaces,** by Emanuel Istrate and Edward H. Sargent

"Photonics" has become a household name in analogy to "electronics." This review discusses photonic crystal heterostructures, that is, devices with a periodic modulation of their dielectric constant, and hence their optical properties. An overview is given of both the experimental realization of such materials, which has led to functional devices, and the theoretical methods used to model these systems.

### AMERICAN INSTITUTE OF PHYSICS STATE DEPARTMENT SCIENCE FELLOWSHIP

Experience a unique year in Washington, DC. Make a personal contribution to US foreign policy while learning how the policy making process operates. This Fellowship is open to all qualified members of APS and other AIP Member Societies, of all ages and career levels. By sponsoring at least one Fellow a year in the State Department, this program benefits the government, the science community, and the individual Fellows. Qualifications include US citizenship; AIP Member Society membership; and PhD or equivalent in physics-related field. Applicants should possess interest or experience in scientific or technical aspects of foreign policy. APPLICATION DEADLINE: NOVEMBER 1, 2006. For details on how to apply, please visit http://www.aip.org/gov/sdf.html or contact Audrey Leath at aleath@aip.org.

### 48th Annual American Physical Society Division of Plasma Physics (APS/DPP) Job Fair

Philadelphia Marriott Downtown Hotel, October 30 through November 1, 2006

Whether you are looking for a job or recruiting, the American Physical Society Division of Plasma Physics (APS/DPP) Job Fair is the place to be! The Job Fair will provide job seekers and hiring managers with unsurpassed recruitment and networking opportunities. Last year, more than 50 companies met with hundreds of job seekers.

The Job Fair is free of charge to all job seekers. There is a nominal fee for employers. The pre-registration deadline for both employers and job seekers is October 16, 2006. Register today at http://www.physicstoday.org/jobs/jobfairs.html.

For additional information, please contact Alix Brice at:
American Physical Society
Career Network Division
One Physics Ellipse
College Park, MD 20740
Phone: 301-209-3187
E-mail: jobfairs@aps.org

## MEMBER SURVEY CONTINUED FROM PAGE 1

Membership Director Trish Lettieri says she uses the survey as a communication tool. Surveys such as this one help APS leadership learn what's important to members, but they also help inform members about the resources available to them. "That's one of the biggest benefits we get out of doing surveys," said Lettieri.

In fact, in the comments section, many students wrote that before the survey they hadn't known about many of the benefits APS offers. Because the survey found many student members are unaware of the benefits, the membership department has recently developed a new brochure that lists some of the member benefits for students and lists websites for more information. The brochure was distributed at student events at the March and April meetings, and can be found online at http://www.aps.org/memb/studentbrochure.pdf

When asked what additional services or benefits APS could offer, many students wrote that they want more career resources. Students requested more job postings and listings of internships, scholarships and fellowships, and advice on graduate schools, fields of physics, what classes to take, and non-academic careers. APS currently has an online career center which allows members to find job openings and employers (http://careers.aps.org). In response to the survey suggestions, the APS Committee on Careers and Professional Development is developing a handbook of career advice and resources for students, which will be available online soon.

# The Back Page

## Containing Nuclear Proliferation

Physicists Sidney Drell and Richard Garwin have been deeply involved in nuclear weapons development and policy for more than 40 years. Garwin contributed to the design of the first thermonuclear weapon in 1952 and Drell worked on a JASON study in 1960 that examined national security issues. Both went on to receive numerous distinctions and serve in prominent federal advisory positions. The conversation was led by Francis Slakey, Associate Director of Public Affairs and Jennifer Ouellette, *APS News* Associate Editor.

*Sidney Drell*

*Richard Garwin*

***Q:*** *When nuclear weapons were first developed, what did the designers believe the future held?*

**GARWIN:** Nuclear weapons were a scarcity. We finished the war with maybe one nuclear weapon in August of 1945. And, in fact, the people at Los Alamos had very different views, it turns out, of the future. Hans Bethe, shortly before he died, commented, "Nobody at Los Alamos believed that there would be thousands or tens of thousands of nuclear weapons." And yet, in November 1945 Robert Oppenheimer said that, "If there were to be a war between two nuclear-armed countries they would be used by the thousands or the tens of thousands." So, between these two people who were intimately involved in the creation of nuclear weapons to have such different views is quite striking.

**DRELL:** The first envisaged use was to confront the large Soviet army in Europe as NATO was being built. They were a substitute for large manpower if the Soviets had moved west. But, when thermonuclear weapons increased the destructive potential of these weapons by factors of a thousand beyond Hiroshima and Nagasaki, the policy became to prevent their use.

***Q:*** *There is no longer a Soviet Union to deter. What is the role for nuclear weapons today? How do you think the president views the use of nuclear weapons?*

**GARWIN:** Well, you would certainly use them in response to an attack by nuclear weapons. But there are a number of points here. One problem is that this President has said, "We'll never take any tool off the table." So, we won't promise not to use nuclear weapons against non-nuclear states. The current Administration doesn't want to limit its freedom of action in any regard. I think that is a very great mistake. It's not in our national security interest to use nuclear weapons against non-nuclear states, and in the past we have had formal commitments in that regard. These commitments have encouraged people to remain members in good standing of the Non-Proliferation Treaty (NPT) of 1970. Some folks on the military side were horrified at the cavalier approach to using nuclear weapons in the current dispute with Iran as if they were just another kind of conventional weapon.

**DRELL:** I think the President has made clear–all Presidents have made clear–that these are weapons of last-resort. At this point, I don't worry that the President would use nuclear weapons. But, what he says about their importance is quite relevant to our effort to try and prevent proliferation of nuclear weapons. You shouldn't say you'll never use a weapon, because you can't predict the future, not accurately. But the NPT calls upon the nuclear nations to reduce the salience of these weapons, and what we say matters.

***Q:*** *What do you think is the right size arsenal?*

**GARWIN:** There's no security in having vast numbers of nuclear weapons. There's insecurity in our having vast numbers, and especially having vast numbers of not very well protected nuclear weapons in Russia. The US could immediately reduce its arsenal to two thousand nuclear weapons and within a couple of years to one thousand nuclear weapons total, including reserves. And that would be on the way to having a few hundred nuclear weapons in the world all together.

**DRELL:** I can't think of any value to having more than a few hundred. If I had infinite confidence that I knew all scenarios coming I might say we should get rid of all nuclear weapons, along with other countries. But I can't envisage every possible scenario. At the Reykjavik summit, Reagan and Gorbachev came within a hair's width of saying, "We're going to get rid of all nuclear weapons." I think we should work toward that goal. But if a dictator knows that we have five, or ten, or a hundred nuclear weapons then he also knows it would be total suicide for him to act crazy. So nuclear weapons might have value while we're sorting out this new world with terrorists. I'm not quite arrogant enough to say "I know they have zero purpose, get rid of them."

***Q:*** *Some analysts warn that the US lacks the weapon to hold certain hard and deeply buried targets at risk and they proposed developing a Robust Nuclear Earth Penetrator –the "bunker buster". What do you think of that weapon concept?*

**DRELL:** If you can bury a nuclear bomb a few meters under the ground and then detonate it you can get ten to twenty times as much over pressure–shock pressure–to destroy an underground target. That's the advantage of an RNEP. But if the enemy builds a target that's reasonably hard at a depth of a thousand feet, it's going to take a hundred kilotons to do any damage and that would have tremendous fallout effects. The proposal to build a bunker buster with no side effects is just sheer nonsense. To put a number on it, just a one-kiloton bomb–one-fifteenth of Hiroshima–that is dropped and penetrates as deep as practical into hard, dry soil before detonating would still cause a crater larger than the World Trade Center and put about a million cubic feet of debris up in the atmosphere.

**GARWIN:** The typical justification for a program is to say: "Our current things are inadequate and we need this new one." And so, you show that there is something that cannot be achieved with existing systems and could be achieved with a future system.

Regarding the bunker buster in particular, General Cartwright, the head of STRATCOM, says he doesn't need it. He can have functional defeat of these underground facilities by controlling what goes in, what comes out, their communications, and so on. More generally, we need to recognize that in order to limit what other countries do, we have to accept limitations ourselves.

***Q:*** *Another proposal is to develop a Reliable Replacement Warhead. The stated motivation is to address emerging technical problems with the current stockpile, deteriorating weapons design capabilities, and the lack of "responsiveness" in the current arsenal. Is an RRW necessary?*

**DRELL:** The current arsenal is quite reliable. I think it's being maintained very well by a very strong Stockpile Stewardship Program that was initiated in 1994 soon after we announced a moratorium on testing. For ten years now the lab directors have annually reported to the Secretaries of Defense and Energy that our arsenal is reliable and safe. Now, if the RRW program is just another way of better focusing the Stewardship Program on what needs to be done to maintain confidence in the arsenal, then it makes sense. And, I think it's important to note that the enabling legislation on that RRW program has very, very powerful and restrictive words in it: "Any weapon design work done under the RRW Program must stay within the military requirements of the existing deployed stockpile," and "any new weapon design must stay within the design parameters validated by past nuclear tests." If the RRW program were used to make new weapons for new military missions, a resumption of nuclear testing would be required. That would be an invitation to other countries to become nuclear or renew their nuclear programs.

**GARWIN:** Well, this is another one of those propaganda activities. To promote RRW, proponents are not going to say: "We'll search for new weapon concepts." You're going to imply that what we're doing now does not result in reliable replacement warheads. But in fact, it does. The Stockpile Stewardship Program already generates replacement warheads. We are making them, and they are reliable. There's no problem. The argument is that our nuclear weapons are designed too close to some failure cliff. But, in fact, aging does not move them closer to that cliff, and there are ways for compensating. For example, more tritium can be added as the weapons age.

***Q:*** *Do you think the fact that North Korea and Iran are pursuing nuclear weapons means that our nonproliferation policies are failing? Is it inevitable that more countries will develop nuclear weapons?*

**GARWIN:** It's not inevitable if we focus much more seriously on nonproliferation. The current Administration is focused on freedom of action for the US rather than a path of collective security. Let me say specifically what you need to do. The big problem with the NPT is that it is perfectly legal under the NPT to be a member in good standing as a non-nuclear weapon state and get support and information from the nuclear weapons states in development of enrichment and spent fuel reprocessing. Then, after one has these facilities and created a lot of low-enriched uranium or separated plutonium, one can abandon the NPT and in three months have facilities for making nuclear weapons. That possibility has to stop. And the way it stops is for countries who are members of the NPT to sign a modification of the treaty requiring that any facilities that they have obtained as a member of the NPT will be returned or destroyed if they are no longer members of the NPT.

**DRELL:** Only eight countries have nuclear weapons–that's an extraordinarily successful achievement over 61 years. Maintaining the commitment to the nonproliferation regime is very important. With the spread of nuclear technology, it's become clear that the NPT needs to be supplemented by further restrictions in order to keep countries from becoming latent or virtual nuclear powers. I say this because when you can enrich uranium you can also make a uranium bomb. What the US has been emphasizing, and properly so, is that additional restrictions to the NPT are necessary, such as allowing challenge inspections to all suspect facilities, not just to declared facilities. There's a Proliferation Security Initiative that has countries working together to prevent the shipment of equipment that facilitates uranium enrichment. And the President has a proposal, and so does Mohamed ElBaradei at the IAEA, that restricts development of new national enrichment and reprocessing facilities and in exchange provides fuel service guarantees. I think we also need restrictions that say we're not going to build arsenals larger and that we're not going to test nuclear weapons. I think some of these things should be put in the legislation by Congress.

***Q:*** *Both of you have been working on these issues for more than four decades; how would you characterize this moment? Are we living in promising time? Critical times? Dangerous times?*

**DRELL:** We have survived the Soviet empire's confrontation and we avoided nuclear use during those years of the Cold War. That's a tremendous achievement. We are now, I think, facing a very different and more difficult problem. That is keeping the most dangerous material and weapons out of the hands of very dangerous people for whom the conventional notion of deterrence doesn't work. Nations have to work together, cooperatively, to prevent proliferation. And I think that at the moment we're really at a crossroads. If Iran and North Korea get away scot-free and have nuclear weapons then we're going to lose some if not all the benefits of the non-proliferation regime and the world will become more dangerous. It will be a different kind of danger. With more nuclear-armed countries and more confrontations, nuclear weapons will gain increasing relevance around the world and the likelihood of crossing the nuclear threshold, even at a low level, I think, will grow. So, I think we're at a very dangerous point and I just urge the leaders of countries to continue to use diplomacy as creatively as possible, balancing carrots and sticks. I see no other course.

**GARWIN:** I think that we are at a crossroads; that we are losing control. We are not spending nearly enough to resolve this problem and not spending the money we spend effectively. For example, we try to secure nuclear materials–plutonium and uranium in Russia. This is a program on which we should spend $10 billion a year instead of a billion dollars a year. So, things are bad. But they can get worse. I believe that we will see, within the next few years, one or more terrorist nuclear weapons explode in an American city and it will kill 100,000 - 200,000 people. It's going to be very bad, unless we take measures to survive the social and economic disruption that's going to follow. So, that's what I believe, because there are nuclear weapons–improvised nuclear weapons–available. A gun-type weapon will have the same yield whether it's something dropped from an airplane or something assembled on an apartment floor in Manhattan. And unless we can change the motivation of people, the technology becomes more and more available. And we certainly have not done enough to keep the materials from being available. Dr. A. Q. Kahn, who stole the Urenco centrifuge design for Pakistan, and was the founder of their nuclear weapon program, was a pro-proliferation machine, selling technology to Libya and to North Korea. So there are people who benefit from this and the forces against them are not very effective. We don't have all that much time.

*APS News* welcomes and encourages letters and submissions from its members responding to these and other issues. Responses may be sent to: letters@aps.org