

## House of Representatives Supports the World Year of Physics

The field of physics and its practitioners received commendation on Capitol Hill before Congress left town for August. In recognition that next year has been designated the World Year of Physics, on July 7 the House of Representatives passed a resolution in support of physics and physics education. "This resolution encourages the American public to take note of the physics used every day and encourages them to learn more about it," said its sponsor, Rep. Vern Ehlers (R-MI). "I hope that the American people will observe the World Year of Physics by supporting physics education and research. I encourage physicists and educators to engage the public, especially the children, in physics to inspire the next generation of scientists and engineers."

The World Year of Physics in 2005 will be an international celebration of the field, timed to honor the 100<sup>th</sup> anniversary of the

publication of Albert Einstein's groundbreaking papers on the special theory of relativity, the photoelectric effect, and Brownian motion. In the US, the APS, the American Association of Physics Teachers, and the American Institute of Physics are leading efforts to organize events during the year, but individual scientists, teachers, physics departments, laboratories, science museums, and other groups are encouraged to plan local events in their communities.

The resolution was introduced by Ehlers for himself and his fellow physicist in Congress, Rep. Rush Holt (D-NJ). "This resolution recognizes the important contributions of physicists to technological progress and the health of many industries," said Ehlers. "As a physicist, I recognize the physics principles that are part of our everyday lives. "Through physics we can explore the depths of the universe and black holes, as well as

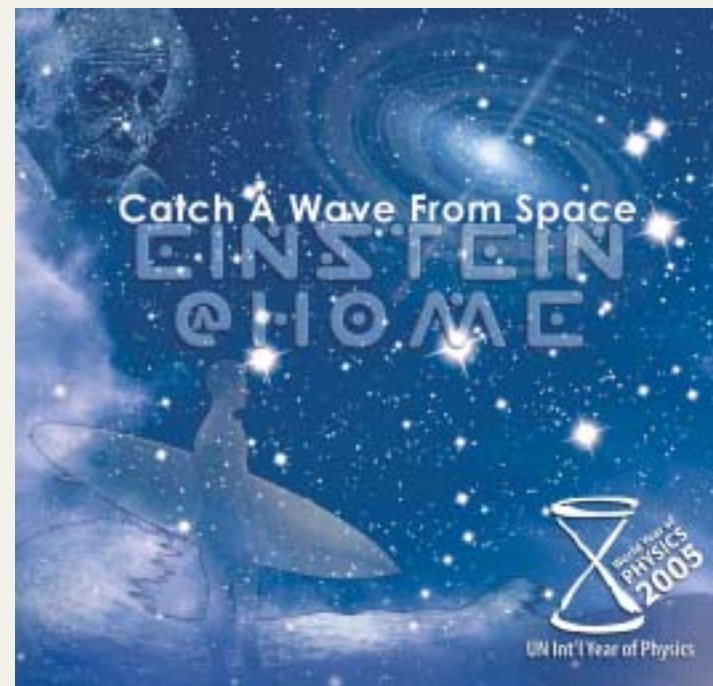
the tiniest parts of the atom. I think it is just absolutely marvelous that we can explore our world in both the smaller and larger directions and have not reached its limits at this point."

Co-sponsor Brian Baird (D-WA) remarked that he and other Members of Congress often turn to Ehlers and Holt for help in understanding technological issues. Physics, he said, "underpins all of science in some way, and so much of our technology deals with the most fundamental understanding of the properties of matter. Emerging fields such as nanotechnology, information technology and biotechnology are substantially based on the results of fundamental discoveries in physics."

"Through physics," Holt said, "we can explore the diverse phenomena from the existence of black holes to the composition of the atom and nucleus. Understanding mechanics,

See HOUSE on page 6

## Use Your Computer to Help Find Gravitational Waves



Chances are your computer spends much of its lifetime doing practically nothing. While you're at lunch, in meetings, or stuck in traffic, the PC on your

desk sits idly marking time at billions of clock cycles per second. At best, it might run a diagnostic test now and then, or See GRAVITATIONAL on page 7

## Speakers Program Will Provide Lecturers for World Year of Physics

By Ernie Tretkoff

Looking for an expert to speak to your group about Einstein's relativity? About black holes? Or quantum entanglement? Or about Einstein the person? As part of World Year of Physics 2005, the Topical Group on Gravitation (GGR) and the Forum on the History of Physics (FHP) maintain a list of physicists known to be effective public speakers on topics related to Einstein, and match interested

groups with appropriate speakers.

"Anything that's associated with Einstein is something that we can cover," said Richard Price of the University of Texas at Brownsville, who is coordinating the speakers program. Groups that want to request a speaker can fill out a form giving program administrators information including the type of group, their location, their desired dates for the lecture, and the topic they want

to hear about, and the program administrators will try to match an appropriate speaker with the group. Administrative support for the program is being made available by the Center for Gravitational Wave Astronomy at the University of Texas at Brownsville.

Even with the wide range of speakers in the pool, the program anticipates receiving many more requests than it can fill, said Price. Indeed, they have already received some requests they can't meet. Part of the problem is geographical—speakers tend to be located near research universities, while requests often come from other areas, said Price. However, the program organizers are continuing to add speakers to the list, and may be able to fill some of the requests later in the year.

Groups requesting a speaker might be high schools, colleges or universities, or clubs. "If prior-

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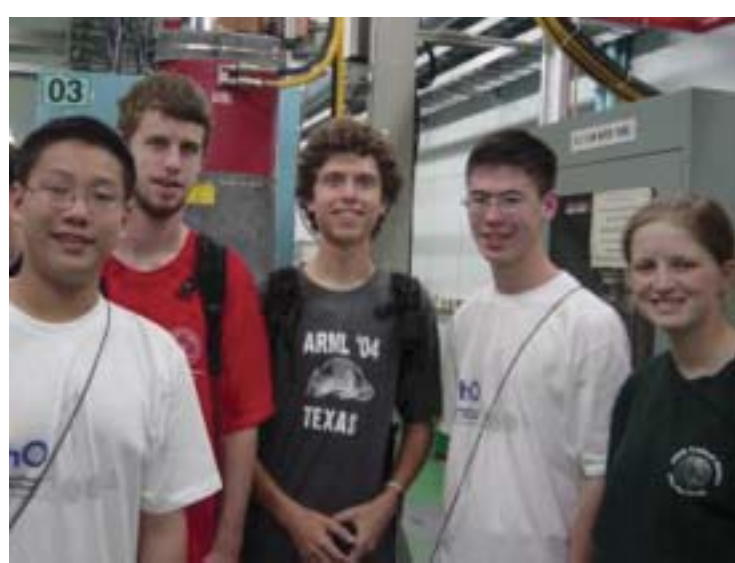


Photo Credit: Yi Sun

From left to right: Yi Sun, Eric Mecklenburg, Jeffrey Middleton, Anson Hook, Elena Udovina. Not shown: coaches Mary Mogge and Robert Shurtz.

## US Students Win Medals at International Physics Olympiad

Every US student sent to the 2004 International Physics Olympiad brought home a medal. Held this year in Pohang, South Korea, the Olympiad brings together high school physics students from 72 nations around the world to participate in the global competition.

Yi Sun (San Jose, CA) and Elena Udovina (Shaker Heights, OH) won gold medals. Anson Hook (Princeton, NJ) and Eric Mecklenburg (Gates Mills, OH) won silver medals, and Jeffrey Middleton, (Austin, TX) brought home a bronze medal. Udovina earned special honors: the most

original solution in the competition, and the best score among female participants. This is the second year in a row that the US has earned top female student honors. Coaches Mary Mogge from California State Polytechnic University in Pomona, where she chairs the physics department and Robert Shurtz, a physics teacher at the Hawkins School in Gates Mills, OH, accompanied the team to the nine-day competition.

The American Association of Physics Teachers (AAPT) is responsible for recruiting, selecting and training teams each

See OLYMPIAD on page 6

## Scientists, Engineers Invite Presidential Candidates to Virtual Town Hall Meetings

Craig Barrett, CEO of Intel Corporation, Alan Leshner, CEO of the American Association for the Advancement of Science, and Norman Augustine, retired chairman and CEO of Lockheed Martin Corporation, extended an invitation on August 16 to President George W. Bush and Senator John F. Kerry to participate in separate "virtual town hall meetings" with scientists and engineers across the nation. The effort was spearheaded by the APS Office of Public Affairs and endorsed by 48 other organizations representing a major

fraction of the 3.5 million members of the science and engineering communities working in industry, national laboratories, and universities.

"Economic growth and national security rely heavily on a strong science and engineering workforce," noted APS president Helen Quinn, "but presidential candidates often overlook their votes. This year could be different, especially if both campaigns recognize that these voters could determine the outcome of the presidential elec-

See TOWN HALL on page 4

## Highlights



8 The Back Page: Cultural Divide May Imperil Lab's Survival  
By Rhon Keinigs.

## Members in the Media

"It only takes a little tiny difference overall to make it so that the universe now is made out of matter,"

—Fred Gilman, *Carnegie Mellon University, on CP violation observed in B mesons by the BaBar experiment at SLAC, Los Angeles Times, August 7, 2004*

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"Only now, eight months after these storms, are the effects of these storms reaching the very outer edge of the solar system."

—Eric Christian, *NASA, on the huge solar storms that erupted last fall, Dallas Morning News, July 13, 2004*

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"I bet my professorship that the Higgs particle, or whatever stands in its place, will be found."

—Chris Quigg, *Fermilab, on the search for the Higgs, New Scientist, July 17, 2004*

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"Other technologies are big boxes. Our sensor can be in a shoebox. So it's something you should be able to mass-produce since it's so small, and in theory can be very cost-effective. You can deploy them over the whole volcano, and put antennas on them, beam to satellite, and sit anywhere in the world and monitor over the Web. It's a real advantage."

—Frank Tittel, *Rice University, on a laser-based sensor he and coworkers are developing to detect volcanoes that might be about to erupt, United Press International, July 20, 2004*

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"There is such a fire hose of data coming down that we'll need all the help we can get making sense of it, writing up the results and publishing it,"

—Stamatios M. Krimigis, *Johns Hopkins University, on data from an instrument called MIMI aboard NASA's Cassini spacecraft, which is now observing Saturn, The Baltimore Sun, July 12, 2004*

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"What we're talking about is something that could change the way we look at the most fundamental forces in the universe."

—Dave Tedeschi, *University of South Carolina, on the pentaquark, The Post and Courier (Charleston, SC), August 16, 2004*

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"People should be doing something now to reduce their oil dependence, and not waiting for Mother Nature to slap them in the face."

—Alfred Cavallo, *Department of Homeland Security, National Geographic, June 2004*

Several quotes on Stephen Hawking's announcement that he no longer believes black holes permanently swallow information, and therefore loses his bet of an encyclopedia with John Preskill:

"There has long been a split between those who believed information was really going to be lost and those who didn't."

—Sean Carroll, *University of Chicago, Newsday (New York), July 22, 2004*

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"This puzzle that Hawking raised is going to be one of the things that drives us on to the next revolution of the understanding of the laws of nature. I wouldn't have accepted the encyclopedia because I don't think the issue is closed."

—Andrew Strominger, *Harvard University, The Boston Globe, July 22, 2004*

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"Hawking is completely revising his prior belief that what goes into a black hole is washed out. Now he believes that anything emitted from a black hole can be identifiable back to its source. He's running away from what we still believe."

—Robert Wald, *University of Chicago, Associated Press, July 22, 2004*

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"Part of the problem is he's providing so few details, so it's impossible to know whether we can believe these calculations. Stephen Hawking's not stupid, so we're going to take what he says seriously...but the whole theory we're hearing seems extremely speculative."

—William Unruh, *University of British Columbia, Associated Press, July 22, 2004*

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"I'll be honest. I didn't understand the talk"

—John Preskill, *Caltech, Associated Press, July 22, 2004*

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"Betting is a part of science. It's a way to challenge colleagues about their ideas and have your ideas challenged as well. Laying a wager is really a way to organize your thinking. If you're going to bet, you've got to figure out how to set it up, what exactly you're betting on and which side you want to be on. It's a way to carry on the scientific conversation. Not to mention, it's often quite amusing."

—James Peebles, *Princeton University, Copley News Service, August 30, 2004*

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## This Month in Physics History

### October 1807: Invention of the camera lucida

Unusual optical effects have long fascinated both scientists and artists alike. Take, for example, the camera obscura. In its simplest form, the camera obscura is little more than a small hole in a shade or a wall, through which light passes from a sunlit garden, for example, into a darkened room, projecting an inverted image of the scene onto a wall opposite the hole.

An artist could tack a piece of sketch paper to the wall and trace the key outlines of the subject, then complete the painting. The 17<sup>th</sup> century Dutch painter Johannes Vermeer (1632-1675) is believed to have used the camera obscura. Later artists, such as Ingres (1780-1867), most likely used the camera lucida, an optical artist's aid invented by an English physician named William Wollaston in 1807.

Born in Norfolk in 1766, Wollaston was educated at Cambridge University, and started a medical practice in 1789. He also established a private laboratory to conduct research at the Royal Society in 1793. He quickly earned a reputation in physiology, describing the main components of urinary calculi in 1797.

But then he failed to obtain the vacant position he wanted, and abruptly abandoned his medical practice in 1800 to devote more time to scientific research. He was also becoming partially blind, which may have spurred his interest in optics. So he became an associate of Humphrey Davy at the Royal Institute, and in 1809 identified a new type of bladderstone that he dubbed "cystic oxide (now known as cystine), as well as the first known amino acid in 1812.

He was also the first to report the dark lines in the spectrum of the Sun, and he improved the design of Volta's battery by joining several cells together to make larger batteries.

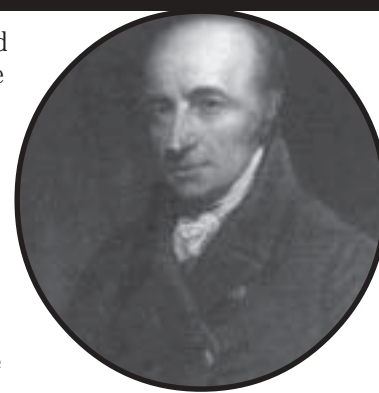
Wollaston formed a partnership with another scientist to conduct experiments in chemistry, particularly the production of platinum. In the course of his research, Wollaston discovered two new metals: palladium and

rhodium. Eventually he developed a process to produce malleable platinum in 1805, which made him a comfortable fortune by 1826, thanks to the usefulness of the technique in industry.

His work in optics began in 1802, when he developed the refractometer, an instrument for determining refractive indices. He followed this with the invention of a reflection goniometer in 1809 to measure angles on crystals.

Astronomer John Herschel declared, "This simple, cheap and portable little instrument has changed the face of mineralogy and given it all the characters of one of the exact sciences." Wollaston also designed a special type of prism that acted as a polarizing beam splitter, made from calcite or quartz, and worked extensively in designing lenses. All of this would ultimately feed into his design for the camera lucida.

The camera lucida consisted of an extendible telescopic tube in three pieces, containing a reflecting prism and sighting lens, mounted on a stick that could be attached to a drawing table or surface. The device was more portable than the camera obscura and a darkened room was no longer needed; the artist could work in direct sunlight. The prism



William Wollaston

had four sides, with one at a right angle, two at a 67.5° angle, and one at a 135° angle.

These numbers were the result of careful experimentation to produce critical angles of reflection. The prism was deliberately shaped and oriented so that the rays of light from the scene were reflected twice within the prism before reaching the eye. This way, the eye sees the image the right way up, rather than inverted, as with the camera obscura. When the stand is adjusted so that the prism half covers the pupil of the eye, the draftsman has the illusion of seeing both the object he wishes to draw—which is reflected through the prism—and its outlines on the drawing board.

The camera lucida requires considerable skill to use, since it doesn't actually project an image of the subject onto paper; the image seems to appear on the drawing surface only when the artist looks in the prism. A slight movement of the head will cause the image to move also, disrupting the accuracy of the tracing. The modern version is remarkably similar in concept and structure, using a half-silvered mirror to achieve one of the two required reflections, so that the viewer can see both the reflected scene and also the view directly through the mirror, as if it were plain glass.

Wollaston is described in contemporary accounts as being pleasant in appearance and very polished and refined in manner, but he lived alone and worked in rigid seclusion. He died of a brain tumor on December 22, 1828. The mineral wollastonite was named in his honor.



Wollaston's camera lucida

# APS NEWS

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Each year the APS sponsors two Mass Media Fellows through a program run by the AAAS. This past summer the two APS Fellows were John Veysey and Zerah Lurie. These two articles relate some of their experiences.

## Physics and Journalism: Different as Night and Day

By John Veysey

I published ten articles in the last two months. In physics, a profession that measures people by their publications, that should make me eligible for a job, an award, or at least a gold star.

I spent the summer as a journalist. But ten weeks ago, I knew nothing about newspapers. I won an APS fellowship to become an AAAS Mass Media Fellow, and spent the summer as a science reporter in Milwaukee.

My undergraduate thesis was on neutron detection. I've almost finished a PhD in physics at the University of Illinois at Urbana Champaign. But after only a three day orientation, I reported to the *Milwaukee Journal Sentinel*, where I'd been assigned.

By the end of my first afternoon—even before getting computer access!—I was told to cover a press conference given by EPA Administrator Leavitt. I panicked, interviewed, wrote, and saw my story published the next day.

Not many people ever read or understand anything written by a physicist. APS News has about 40,000 readers. *The Milwaukee Journal Sentinel* sells millions of papers each week. Over the course of the summer, my editor taught me how to write for a wider audience; she knocked science off its pedestal.

Good research doesn't always make for a good story.

Throughout my fellowship, I struggled to write the beginning, or "lede" (pronounced "lead") of my stories. Trying to write on a deadline, I often neglected the lede, planning to revisit it after finishing. But this often failed, with my editor sending me back to "take another crack at the lede."

I learned to see the differences between my good ledes and my bad ones. I needed to become a better writer, to craft a hook to catch the reader, and to drag them into the story. But that was the easy part.

More importantly, I had to understand that a casual reader doesn't approach the story in the same way that I do. As a scientist, the first thing I wanted in a story was the "idea", then a detailed explanation, and finally what the implications might be. An intimation of "cool" research is enough to make me read a story. But that doesn't play in Peoria—or in Milwaukee.

My editor made me change my writing, putting the essence of the story up front, immediately explaining why this science mattered, what had been done, and what the implications were. In a few sentences, I had to convince the reader that the research was relevant, not cool.

It's humbling to realize that people don't automatically care about science. But as a result, I've



learned not merely to explain interesting science, but to explain why science is interesting. Publishing in a newspaper is a lot more fun than writing for academic journals.

My editor decided it "was time for another story on tornado safety," and I reluctantly wrote a story weaving in facts with an account of a couple who survived the destruction of their house by sheltering under the stairs in the basement.

A week later, I received a call from an elderly woman who shared her enjoyment of my story. She even cut it out and put it in on her wall. That doesn't happen when you publish in *Physical Review Letters*.

Plus, she said that my prose was lucid and simple. For a well educated academic like myself, that's really an accomplishment! In graduate school, my research covers about one topic a year, but in mind numbing, hair-pulling detail. Science reporting forced me to dive into two or three disciplines a week, sometimes even within

See VEYSEY on page 6

## Physics and Journalism: Not So Different After All

By Zerah Lurie

Whenever I tell people that I am studying journalism but I used to study physics, the usual response is "That's quite the change." I have always wondered whether there was a big difference between the two and after spending the summer as one of the APS's two Mass Media Fellows, I can better answer that question.

Getting a couple of physics degrees was, let's be honest, difficult. You have to put in many hours of work where you are looking intensely at different problems in order to find solutions. In physics, you get an idea, or are given a question, and then investigate it until you come up with an answer. But journalism can be a lot like that too.

I spent this summer working at *Newsday*, a Long Island based daily newspaper that is the 10<sup>th</sup> biggest in the country. I was the seventh science journalist there and they put me to work right away. One of the first things they did was tell me that they wanted a story about antibacterial soaps.

I have a background in particle physics. I did my undergraduate degree at McGill and then went to the University of British Columbia where I got my Masters degree working on the BaBar collaboration at the Stanford Linear Accelerator Center. I know, among many other things, the mass of the muon to 4 significant digits by heart. Why did they ask me to do a story about antibacterial soaps?

But I have spent the last year doing a Masters of Journalism

degree also at the University of British Columbia and as a science journalist, I should be able to write about all things scientific.

Still, thanks to my background in physics, the way I approach an article is as if my editor just gave me a thesis project.

And what's the first thing you do when you get a thesis project? A literature review.

So I looked through various journalism and scientific databases to see what was already written on antibacterial soaps. I found that there are two dominant themes in the literature: there is no research showing that antibacterial products keep you healthy and, there is a fear of antibacterial products producing super bugs.

I took these two statements as my hypothesis and moved on to the next phase; the research. But journalists don't do research themselves and instead I have to interview other people who do. Using a list of sources I found in my literature review, I called up various people and asked about the latest research, looking for evidence to prove or disprove my hypothesis.

The latest research showed that the most common antibacterial agent, triclosan, used in approximately 70% of antibacterial soaps, works using a similar mechanism as antibiotics.



Even though resistance to triclosan has never been proved in the lab, the scientists warned it is only a matter of time. As an experimentalist, I appreciated that the fear is theoretical but this bias forced me to include a representative of the soap and detergent association making the same point.

Then there were researchers from Columbia University who recently did a study following two sets of families, one that used antibacterial products in their homes and one that didn't. The research found no significant difference in the rates of colds and infections between the two groups—pretty conclusive I thought. But, at the same time, the soap and detergent association doesn't claim that these products will make you healthier, but rather that they will kill germs, which no one disputes.

Finally it was time to write the story. I took what I had, added in a

See LURIE on page 5

## APS Seeks to Recruit "Physics on the Road" Teams for World Year of Physics

A vital part of the APS-led effort for the World Year of Physics 2005 will be an infusion of funds to Physics on the Road programs across the United States.

Many of these local touring programs currently exist in physics departments. These troupes, composed largely of volunteers, bring entertaining physics demonstrations and hands-on experiments to thousands of people, most of whom are children, each year.

"These are wonderful, fun, exciting programs," said Jessica Clark, APS outreach coordinator, "but the lack of funding and external (and, sadly, internal) recognition limits their scope to small numbers of visits in localized areas."

The APS will award at least sixteen \$10,000 grants to be

used for program supplies, vehicle maintenance, room and board for participants and other costs associated with physics on the road. These funds will allow the selected programs to expand their reach, both in terms of the number of students visited and their geographical range, including rural or remote areas not currently served by comparable programs.

The APS encourages existing programs to apply for these grants and will also accept applications from others interested in creating Physics on the Road programs at their universities.

Applications are due December 3, 2004. Recipients will be announced in January 2005.

For more information, go to [www.physics2005.org/events/physicsontheroad](http://www.physics2005.org/events/physicsontheroad)

## Washington Dispatch

A bi-monthly update from the APS Office of Public Affairs

Log on to the APS Web Site:

([http://www.aps.org/public\\_affairs](http://www.aps.org/public_affairs)) for more information.

### ISSUE: RESEARCH FUNDING

**Congress made slow progress on its fiscal year 2005 spending bills this summer, amid severe budget constraints and much uncertainty about how many bills will be signed into law before the election.** The Defense spending bill, the only bill signed into law by the President at press time, provides significant increases for basic (6.1%) and applied research (9.6%). The spending bills for NSF, NIST, NASA and the DOE Office of Science have only been considered on the House side so far, with no action on the Senate side. The House Appropriations Committee cut the NSF budget by 2%, while the full House approved about a 5% increase for the DOE Office of Science and restoration of funding for the NIST core programs that plummeted in last year's omnibus bill. The House agreed with the Administration's request to eliminate the Advanced Technology Program, and it slashed NOAA R&D by almost 12%. The House Committee rejected the Administration's proposed budget for moon-mars, cutting \$1.1 billion from the total NASA request. Although NASA's overall research funding would fall 18% from the FY '04 level, space science would rise a modest 1.6%, according to the House plan. In response to the NSF budget cut, APS President Helen Quinn sent letters to House leadership and an email alert to the APS membership.

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### ISSUE: ENERGY

**The House Energy and Water FY '05 Appropriations Bill increases DOE Office of Science Funding for basic research in hydrogen storage.** The bill also requires that the funding for proposed Hydrogen Research Centers be "competitively bid" and peer reviewed. Those outcomes are consistent with recommendations in the Hydrogen Initiative report, which is posted on the APS Public Affairs website.

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### ISSUE: DEFENSE

**Senator Bennett (R-UT) is sponsoring a bill that "halts nuclear testing without an open public process and congressional vote."** In April 2003, the APS Council unanimously passed a statement calling for an open process that allows for thorough analysis and public discussion of any proposed nuclear test. More information on this issue can be found on the APS Public Affairs website.

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### ISSUE: VISAS

**Senator Norm Coleman (R-MN) has introduced a bill (S. 2715) to improve the visa process for foreign students and scholars seeking to enter the United States and establish a national strategy for enhancing access to US universities and colleges.** One of the bill's provisions would permit US consular officials to grant security clearances lasting the duration of a student's program rather than the current limit of one year, thus reducing repetitive security checks for foreign visitors who leave the US temporarily. The bill would also amend the "F" visa category language and would direct the Secretary of State, in consultation with the scientific community, to revise controls on visitors who plan to study science.

# LETTERS

## Dentistry and the Priesthood Better Career Bets than Science

Over the years we have heard many pronouncements on impending "shortages" of scientific talent. These have not corresponded with reality. The same applies to the recent pronouncements of the National Science Board, as discussed by Roman Czujko in the July *APS News*.

An honest editorial on this topic entitled "Supply without demand" was published in *Science* Vol. 303, 20 Feb. 2004, page 1105.

Some of my former students, even recent graduates, reported they were laid off from their jobs, even in 1998, even in "good" economic times. Conditions are of course worse during a downturn such as the current one.

None of my friends who are dentists have been laid off.

On a recent trip to visit a renowned senior industrial researcher, I saw some empty offices next to his. I asked why the offices were empty. The people were laid off, some after many years of service. One senior researcher had become a patent agent, working on contract out of his home, waiting for telephone calls.

A former student, who had worked in my lab in the mechanics and materials area, was unable to find an academic position which suited his background. He ultimately found opportunity in support of computer systems. At one point the company offered an

"interview for a position in the new organization". He correctly viewed that as abusive, and fortunately found another position.

The following comment was made during the 1995 technical recession. Stanford University issued a press release announcing the results of a new study by researchers at the Rand Corporation and Stanford's Institute for Higher Education Research. Among the study's conclusions are that universities in the United States are producing about 25% more doctorates in science and engineering fields than the US economy can absorb. While some academic and science organizations have argued that government should expand research funding to avoid wasting these resources invested in doctoral training, sponsored research actually increases the long-term overproduction of doctorates, say Stanford Professor William Massy and Charles Goldman of Rand.

Following a prior technical recession, Congressional investigation was conducted of the NSF over the way it handled the "shortage" reports. The hearings were documented in *Nature* Vol. 356 (16 April 1992 p. 553).

The US is producing at least three times the number of scientists and engineers that the economy is predicted to absorb (Reference: NSF 1992 Science and Technology Pocket Data Book NSF

92-331 pp. 22-24, p. 30.)

Surpluses of scientists and engineers are deliberately created by technical societies. Specifically, D. E. Marlowe, executive director, American Society for Engineering Education (ASEE) and past president of ASME (American Society of Mechanical Engineers) wrote the following in an article "Engineering education: issues and answers" in *Mechanical Engineering* magazine, December 1980.

"We may have to create a deliberate surplus in the late 1980's and a pool 'holding' of 'post-docs' in the early 1990's to properly meet the nation's requirements for high-technology engineering in the 1990's."

The dental profession produces the number of dentists actually needed. Dentists tend not to be laid off, and they do not usually have difficulty finding work. Similarly the Episcopal Church produces the number of priests actually needed. Priests tend not to be laid off, and they do not usually have difficulty finding work.

Our profession should learn to do as well for our young people.

I know of one PhD mathematician and two PhD engineers out of work and looking for work.

If you are aware of some opportunities for them, please let me know and I will be glad to forward the information.

**Rod Lakes**  
**Madison, WI**

## Don't Suppress Debate on Evolution

Mary Lu Larsen's letter in the June issue of *APS News* was very disappointing. She tries to make her point by resorting to the old red herring of a Biblical claim of 6000 years for the age of the earth (or the age of the universe as another variant goes).

A literal reading of the Bible shows that no such claim can be found in its pages. Most of the best modern scholarship by those who do take the Bible seriously, and as literally as such literature allows, shows persuasively that the "days" ("Yom" in Hebrew) of the Genesis text were intended to be read as long periods of time (*i.e.* periods of very many days, years). Such a view has been held throughout Christian history with Augustine (A.D. 354-430) being perhaps the first to clearly write about such issues.

Genesis, when read with an awareness of the original Hebrew and within the context of the rest of the Bible record, actually offers an account in surprisingly good agreement with most key aspects of what physical cosmology and natural history is now basically telling us.

Recent books by Robert Newman, Hugh Ross and many others have made this point very lucidly. These people, often with extensive physics training and respect for the actual physical data, would also claim the title of 'creationist' and they do not hold to a 6k old earth.

It is not helpful to trot out the extreme and unfortunate views of a very vocal minority of English

speaking North American Christians and then pin those views on all Christians who would also seek the literal meaning of the Biblical text.

It would be much more useful to refocus this discussion on the fact that many professional physicists and practitioners of just about every other field of science see very serious problems with macro-evolutionary theory. As P.C.W. Davies elegantly points out in a recent paper in the *International Journal of Astrobiology* (2(0):1-6, 2003), the physical processes operating in our universe do not spontaneously generate the massive amounts of information that would have to occur to drive any credible macro-evolutionary process. The complaint that macro-evolutionary theory does not persuasively account for the colossal information content of life is one solidly rooted in hard science and not religion.

The real issue here is the suppression of dissent and debate. There are scientifically valid reasons for controversy here. As with other areas of Science, we would do best to allow the debate to occur and to teach both sides of this controversy to anyone beginning a study of Biology.

There are apparently many who very badly need macro-evolutionary theory to be true to justify a particular philosophical view of life they have chosen. This is their choice and they should be allowed to have it.

However such people should not be allowed to solely determine the

rules of this debate or to suppress questions others would ask. Science flourishes best when assumptions are ruthlessly put to the test and free inquiry is encouraged.

With regard to macro-evolutionary theory, many are concerned that this is not what is actually happening.

**Douglas L. Keil**  
**Fremont, California**

## TOWN HALL from page 1

tion in states such as Arizona, Florida, Iowa, New Hampshire, New Mexico, Ohio, Oregon, Pennsylvania and Wisconsin."

The invitation proposed that each candidate deliver remarks lasting about fifteen minutes, setting forth a vision for science and technology in the 21<sup>st</sup> century. In fitting with our high-tech age, each candidate would have his remarks webcast live to tens of thousands of scientists and engineers throughout the country. A short question and answer period via the Internet would follow. This flexible format would allow each campaign to choose a time and location convenient for its candidate. At press time, neither campaign had made a firm reply to the invitation.

Up-to-date information on the events can be found at [www.HiTechTownHall.org](http://www.HiTechTownHall.org).

## Regarding the Former Ronald Reagan

"The Back Page" of the July issue contains a sentence with this clause: "soon after the collapse of the former Soviet Union". The former Soviet Union did not collapse. Something that no longer exists can not collapse. What collapsed was the Soviet Union.

## Time To Say the "N" Word

I read with interest the commentaries upon the content of Harold Varmus's Back Page in the June 2004 issue.

It seems to me that the American Physical Society would do very well to print a Back Page that offends both political parties: Someone should lay out the actual numbers concerning energy in the future. We are NOT going to get off oil via renewables like wind and solar. It is going to take a return to

This may seem like pedantry on my part, but the inappropriate use of "former" attached to Soviet Union is a form of gloating fostered by those on the right, which has no place in *APS News*.

**Alwyn Eades**  
**Bethlehem, PA**

nuclear power on a large scale to achieve any change at all in the long-term energy policy of the United States.

In the present election, neither party will speak the "N" word, but instead recite platitudes about how renewables will save us. However, every reader of *APS News* can tell a Gigawatt from a Kilowatt. The very necessary task of educating the public begins with such extremely simple arithmetic.

**Tom Sheahen**

## Lobbying Efforts are Misdirected

I recently attended DAMOP, where it was pointed out on several occasions how the funding for physics has been decreasing under the current administration. Then in the same issue of *APS News* that reported on DAMOP, I found an article titled "Slakey's Low-Key Approach Pays Off for APS Lobbying Efforts."

The article points out that Slakey is employed to work on budget issues aimed at increasing federal funding for physics. Slakey

has instead chosen to focus on "politically volatile" issues: climate change, nuclear weapons, and creationism.

While Slakey has been very successful in pursuing his own liberal politics, the funding that he is supposed to be lobbying for has steadily decreased. I can't help but think that APS would be better served if our lobbying efforts were indeed focused on funding.

**Greg Rupper**  
**Tucson, AZ**

## Time Flies When You're Having Fun

You got it right to an order of magnitude, a decade to be precise. In "This Month in Physics History...Discovery of the Positron," you note the "thirty years" between the discovery of the antiproton (1955) and the production of the first anti-atoms (1995).

Perhaps the Sixties got lost in a

purple haze, or maybe you prefer to think that the Eighties didn't count?

**David Reis**  
**Ann Arbor, MI**

**Ed. Note:** We apologize—we did the calculation in the rest frame of the anti-proton and neglected to transform back to the laboratory frame.

## Cosmic Rays Discovered in 1911-1912

Victor Hess received the 1936 Nobel Prize for the discovery of cosmic rays in experiments during 1911-1912, not 1930 as cited in the article about the positron ["This Month in Physics History," *APS News*, August/September 2004]. To explain the increasing intensity of ionizing radiation with increasing altitude during manned balloon flights up to 16,000 feet, Hess proposed that

the radiation arrives on the earth's atmosphere from "outside."

The mysterious radiation was called "Hohenstrahlung" until Millikan coined the term "cosmic rays" in 1925. See V. Hess, *Phys. Zeit.* vol.12, p. 998 (1911); vol. 13, p. 1084 (1912).

**George W. Clark**  
**Cambridge, MA**

## Positron Not Predicted Until 1931

Contrary to what is stated in "This Month in Physics History," [*APS News*, August/September 2004], Dirac did not show "that Einstein's relativity implied that every particle in the universe had a corresponding antiparticle" in 1928.

Dirac published the Dirac equation in 1928, but he did not get around to thinking about an interpretation of the "Dirac sea" until 1930, when he tried to identify the

proton as the antiparticle of the electron. It was 1931 before he made the correct prediction of an anti-electron as a partner of the electron.

**J. D. Jackson**  
**Berkeley, CA**

## To Tell the Truth

Thanks to Roman Czujko ["National Science Board: Getting it Wrong Again?", *APS News*, July 2004] for his honesty.

His article reaffirms my faith in APS to tell the truth even when it's bad news.

**Alison Chaiken**  
**Palo Alto, CA**



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# zero gravity



## Triplets of Belleville: Mystery Solved?

**Editor's Note:** In the July issue of *APS News* we pointed out that Einstein's field equations for general relativity appear unexpectedly under the opening credits of the animated feature film "The Triplets of Belleville," directed by Sylvain Chomet of France.

We asked our readers for their interpretation, and offered copies of the book "Physics in the 20<sup>th</sup> Century" for particularly convincing explanations.

We received many intriguing replies. We reprint some of them here, and, at the end, a communication that may, in fact, resolve the mystery of how those equations came to be featured in the film.

\*\*\*\*\*

My girlfriend comes from a tiny town just north of Belleville, Ontario—the "big city". She is a believer in the Universe as a spiritual force—there are no coincidences and it is up to us to find the true meanings in seemingly innocuous happenings.

I am a physicist. The makers of the movie were not aware of the presence of Einstein's field equations—this image was meant for me to view in *APS News* so that I could cut out the picture, show it to my girlfriend, and convince her that the Universe intends for us to be together till the end of time.

**Vlado Zeman**  
Toronto, Canada

\*\*\*

For me the presence of the mathematical expression in the opening sequence acts as a sophisticated reference to the importance of gravity in what follows, as related to the film's subject matter (e.g. cycling), artwork (e.g. drooping faces and muscular legs), and dynamics (e.g. strained uphill climbs, falling frogs).

**Michael Wall**  
Los Alamos, NM

\*\*\*

The equations appear during the opening segment of the film, which is supposed to be an old cartoon from the 1930s, showing the Triplets during their salad days. This 'cartoon within a cartoon' illustrates the plasticity of our notion of time, and how a temporal journey is analogous to a spatial one. In a loose sense, Einstein's General Relativity also views space and time on an equal footing, and emphasizes their deformable nature.

**Steven Stahler**  
Berkeley, CA

\*\*\*

Why do Einstein's field equations appear at the foot of the screen where the credits are shown

in the Triplets of Belleville?

Because Einstein is reputed to have said about them that he conceived of the theory while riding his bicycle. I love to ride, and sometimes my insights please me as well.

**Samuel J. Petuchowski**  
Boston, MA

\*\*\*

Django Reinhart formed the Hot Club of France in 1934; much of the music of "The Triplets of Belleville" is based on Reinhart's music.

Einstein is a member of a very famous Physics Triplet of Einstein, Podolsky, and Rosen (EPR), who published their work in 1935.

Chomet wanted to use as many triplet references as he could find from that era, but he could hardly find a way to write anything about the EPR experiment that could be easily recognizable.  $E=mc^2$  would be too easy. Einstein's field equations are really the perfect choice: cryptic to the general population (might as well use hieroglyphs) but easily recognizable by the cognoscenti.

**Alain Brizard**  
Colchester, VT

\*\*\*

The film makers have used quasi-subliminal insertion of key equations as their method of operation. I believe we should be on the look-out for others, such as Maxwell's equations and Newton's laws, in upcoming feature films.

**Karland A. Kilian**  
Minot, ND

\*\*\*

The appearance of Einstein's field equations in the opening credits of "Triplets of Belleville" has a simple explanation: It was meant to provide an exercise for the students in my excellent introductory relativity course last semester. The students were instructed to view the film and report on its relevance



to the course. Only one student "got it", but she said she liked the movie anyway. It is true that I haven't actually verified the accuracy of this account with Sylvain Chomet, but what other explanation could there be?

**Lloyd Kannenberg**  
Weston, MA

\*\*\*

I think that the equation might simply be a decoration to indicate the time the opening scene is supposed to take place in. That scene is a rousing performance by the Triplets during the vaudeville era. Josephine Baker is one of their costars.

**Juan F. Lara**  
Clemson, SC

\*\*\*

Perhaps it is because the film does not distinguish between space and time in the story, and this was the director's acknowledgment of Einstein's contribution to this concept. If so, hats off to Sylvain Chomet for one of the most arcane references in film history.

**Myron S. Wecker**  
Old Westbury, NY

\*\*\*

If you've ever had to bike up a mountain, you have probably cursed gravity. As you're pedaling away, inching up the slope, you have a lot of time to think about it. And so, you eventually find out about the field equations.

In this movie, you can see the cyclists thinking about gravity during the race. The equations are an homage to cycling.

**Jeff Meth**  
Wilmington, DE

\*\*\*

Although I would like to spin a dark and convoluted tale of the secret physics past of the film makers, in which frustrated graduate students flee academia and the drudgery of tensor analysis and field theory to make big money in movies, I suspect that the truth is much simpler.

"Triplets" is a brilliant piece of animated film work, and a great deal of it was done on computers. In particular, the Belgian company GRID was involved in the production of "Triplets" and they used a product called "LightWave" by NewTek. According to Jan Ebo of GRID, one of the main software plug-ins used during production is called Relativity.

Thus, I'm pretty sure that the appearance of Einstein's equations of general relativity is a little inside joke involving the software used by the animators.

**David Voss**  
Silver Spring, MD

\*\*\*

The only connection I can make is that both the film and Einstein are associated with bicycles; i.e. the famous photo of Einstein riding his bike around the Princeton campus.

**Harold Cohen**  
Los Angeles, CA

\*\*\*

The opening sequence celebrates much of accomplishments of the 1920's, at least in the view of the director. This is shown by the appearance of Fred Astaire, Josephine Baker, Paul Whiteman(?), and Django Reinhardt. I believe that the message is that GR is one of the accomplishments of that era, possibly leading to these artistic developments since the publication of the GR theory predates the artists above.

**John Byrd**  
Berkeley CA

\*\*\*

The following 3 people pointed us in the direction of Triplets of Belleville "Physicist in Residence" Stéphane Durand. They will each be awarded the book "Physics in the 20<sup>th</sup> Century".

I purposely stayed to the end of the credits to see if there would be any explanation. There wasn't that I was able to discern, but I did get some information—namely, one person in the credits has "physicist" in his title.

My only guess is that the equation was an "easter egg" placed by this person like what one might find in a video game, a DVD, or a website. I can, of course, provide an algorithm for how to try to get the answer: Watch the film, remember this person's name in the credits, and contact him/her.

I bet she knows the answer!  
**Mason Porter**  
Atlanta, GA

\*\*\*

I'm currently studying undergrad physics at the University of Montreal, and had the pleasure of having Mr. Stéphane Durand, who works here at our university's Mathematical Research Center (CRM in French) as the

teacher in my "Introduction to Quantum Mechanics" class. Mr Durand happens to be a good friend of the creator of the movie, and told us he was even invited all the way to France to see one of the first showings. He also told us to look closely at the opening scene of the movie, where the piano being played has the inscription "S. Durand" on it, as a discreet homage to his friendship with the movie's creator. He did not tell us about Einstein's field equation but I believe that its presence there can be easily explained by a moviemaker's friendship with a physics enthusiast.

**Kevin L. Smith**  
Montréal, PQ

\*\*\*

The culprit guilty of high treason against the scientific community could well be a physicist named Stéphane Durand. Friend of the director Sylvain Chomet and researcher at the Centre de recherches mathématiques (CRM), he is involved mainly in scientific popularization and teaches physics courses at the Université de Montréal and in high school.

He also occasionally works as a consultant for scientific programs on television and contributes to magazines.

To my knowledge, the appearance of physical equations would be one of the many pranks or jokes contained in the cartoon and intended for a limited circle of initiates. Among others, one of the pianos in the cartoon apparently bears the brand name "S. Durand".

**Attila**  
Fléau de Dieu

(not the author's true name; the real "scourge of God" died in 453 AD—Ed.)

\*\*\*

And now, a communication from Stéphane Durand himself:

Sylvain Chomet, the filmmaker, is one of my best friends. He lived for ten years in Montréal, but then moved on to Europe. He was fascinated with modern physics, and I spent a lot of time talking physics with him. He was particularly impressed by the huge amount of information condensed in some formula, especially in the main equation of GR governing the evolution of the entire cosmos from the big bang to its final fate.

So, he simply decided (with his chief decorator) to display it in the opening scene. That's it (I think).

We think so, too —Ed.

### LURIE from page 3

couple of facts, like how a survey found antibacterial products control 45% of the soap market, and added a couple of quotes like "society is afraid," from Howard Markel, a doctor and professor of medical history. And that was my final thesis (or article as they call it in journalism). I submitted it for publication and it ran as the cover story for Newsday's health insert on July 20<sup>th</sup>.

So after a summer of experiences like this, I have decided that physics isn't that different from journalism after all.

## APS Meetings Policy Boosts Non-Technical Contributions

A little-known policy governing contributed papers at the March and April meetings can allow authors to submit both technical and non-technical work to different sessions.

Because of the large number of abstracts that are submitted, it is APS policy that "a first author may present only one contributed abstract for the regular program." There is an exception, however, "if the second contributed abstract is of a non-technical nature, and is submitted for a session of broad concern to the

physics community sponsored by an APS Forum or Committee."

In a recent call for papers, the Forum on the History of Physics (FHP) notes that for the first time it is organizing contributed sessions at both March and April meetings. The FHP Executive Committee hopes the rule will encourage attendees to submit abstracts not only on the subject of their current research, but also on physics history. "What do you get out of this?" the FHP call for papers asks. "The chance to sound off!"

**OLYMPIAD** from page 1

year to compete in the international competition. High school teachers nominate their best students, and those who make the top 200 scores on a screening test advance to the semifinal round of the selection process. A second test, transcripts, and letters of recommendation are used to narrow it down to 24 members of the US physics team. Those students come to the American Center for Physics headquarters for the annual team training camp. Over nine days, the finalists receive an introduction to the first-year university curriculum in physics, accelerating their studies during their remaining time

in high school. And when it's over, five students are picked for the Traveling Team to compete in the International Physics Olympiad.

The US program was started in 1986 to promote and demonstrate academic excellence and prepare students to compete in the International Physics Olympiad. Since then, the teams have won a total of 22 gold medals; 16 silver medals; 24 bronze medals; and 10 honorable mentions.

The US Physics Team is co-sponsored by the AAPT and the American Institute of Physics. APS is also a regular contributor.

**SPEAKERS** from page 1

itization is needed of which requests to meet, our main focus will probably be on four year colleges with students who are interested in physics, who would like to have an expert from outside," said Price.

Virginia Trimble, vice-chair of FHP, is in charge of FHP's contribution to the speakers program. She said the program would especially try to reach historically black and Hispanic colleges, as well as groups in remote or less privileged areas. "We hope to be able to offer a little bit of travel support for people to go to truly poverty-stricken colleges," she said.

Another component of the program Price is organizing is a database of materials for speakers. Speakers might want to find a good graphic, a good quote, or even a complete lecture, so Price is collecting such materials and will make them accessible to the speakers.

The GGR and FHP have taken up this project because these units feel particularly associated with Einstein, said Price. "We like to say we are the topical group that Einstein would have been a member of," said Price.

The FHP will provide speakers with a historical perspective on Einstein. "There are lots of Einstein-related things besides relativity," said Trimble. Based on the number of requests the program has already received, especially from high school

groups, Price sees a great desire for an easier way for groups to make contact with experts, and hopes that someone will continue the speakers program or something similar after the World Year of Physics is over. Trimble also expects the program to carry on in some form after the World Year of Physics. "Unless it bombs in some horrible way, it will continue beyond 2005," said Trimble.

Speakers program website and instructions for requesting a speaker: <http://www.physics2005.org/events/speakers/ggr.html>

**VEYSEY** from page 3

one story. Over the summer, I covered everything from exotic species ecology to Native American archeology to aqueous geochemistry. I even wrote an obituary. It's a whole lot of fun to learn something completely new every few days, and it's a challenge to make sure you correctly understand the research.

As a reporter, I cold-called many scientists, largely ignorant of their research. Nearly everybody I spoke with was kind and helpful, taking the time to explain their work. Understanding takes time, but I know how to learn. It took me even longer to craft a story which would interest the general public. But I'm only a budding journalist.

search in physics as well as to the public's understanding of physics;

"3. Encourages all science-related government agencies and nongovernmental organizations, the private sector, and the media to highlight and give enhanced recognition to the role of physics in social, cultural, and economic development as well as its positive impact and contributions to society; and

"4. Encourages all those involved in physics education and research to take additional steps, including strengthening existing and emerging fields of physics research and promoting the public's understanding of physics, to ensure that support for physics continues and that physics studies at all levels continue to attract an adequate number of students."

The resolution has been sent to the Senate, but with Congress out of town until after Labor Day, very little time will be left to deal with the FY 2005 appropriations and other critical legislation before the November elections. That leaves prospects uncertain for Senate action on this resolution.

— Audrey T. Leath

**Hodapp is New APS Director of Education**

By Ernie Tretkoff

Ted Hodapp has joined APS as Director of Education and Outreach, replacing Fred Stein, who retired in early September.

Hodapp, who begins his position on September 27, says that he's motivated by a passion to improve education opportunities and physics education for all students. A physics researcher and teacher for many years, Hodapp loves the "human element" of education. "I really love physics. It's just cool. Being able to help other people see that has been a great joy to me," said Hodapp.

Hodapp received his PhD in quantum optics and atomic physics from the University of Minnesota in 1988, and then joined the faculty of the physics department at Hamline University in St. Paul, Minnesota. There he introduced several reforms, including a redesigned physics curriculum that included a junior-senior seminar and an undergraduate research experience.

He served as chair of the department, and chair of the Science Division, and helped develop division and college strategic plans. He also substantially modified many courses to promote more hands-on learning, supervised many undergraduate research students, and presented numerous public physics demonstrations as a member of Hamline's "Piper Physics Patrol."

Hodapp also carried out research in optics and laser cooling, and spent several years as a



Ted Hodapp

visiting scientist, first at NIST and then at the 3M Corporation, where he designed devices for display technologies, developed optical systems, and conducted research on laser ablation of materials. Several patents resulted from that work.

In addition, Hodapp worked on research in physics pedagogy, including looking at the effectiveness of video analysis, computerized data-acquisition, and data analysis tools in a physics curriculum.

While in Minnesota, Hodapp spearheaded efforts to rewrite the standards for licensure of science teachers in the state. Hodapp has also been on the Executive Board of the Council on Undergraduate Research, a member of the APS Committee on Education, and a long-term member of the American Association of Physics Teachers.

Before coming to APS, Hodapp served for two years as Program Director for the Division of Undergraduate Education of the

National Science Foundation (NSF). One of his major accomplishments was organizing a national meeting, "Invention and Impact," funded by the NSF's Course, Curriculum and Laboratory Improvement Program, on innovations in undergraduate education.

Hodapp is pleased to come to APS because he sees it as a "unique opportunity to further the goals of education." He pointed out especially the need to get more minorities involved in science. "There's a vast untapped potential that could be contributing to the workforce," he said. One key to tapping that potential is education, said Hodapp.

As Director of Education and Outreach, Hodapp will oversee all APS education programs. In particular, Hodapp plans to devote a considerable amount of his time at APS to the Physics Teacher Education Coalition (PhysTEC) program. At the PhysTEC participating institutions, physics and education departments work together to introduce changes that improve education for future teachers. PhysTEC focuses on encouraging a student-centered, inquiry-based approach to learning.

Hodapp's predecessor, Fred Stein, started the PhysTEC program in 2001. Hodapp said he believes PhysTEC has been very successful, and he plans to continue it and try

See HODAPP on page 7

**Thomas is Selected as 2004-2005 APS Congressional Fellow**

A theoretical high-energy physicist from New Jersey is the new APS Congressional Fellow for 2004-2005. Valerie Thomas, a research scientist at Princeton University's Environmental Institute, will spend the next year broadening her congressional experience through direct involvement with the legislative and political processes.

The APS Congressional Science Fellowship program is intended to provide a public service by making individuals with scientific knowledge and skills available to members of Congress. In turn, the program enables the physicist to gain experience in the political process.

Thomas attended Swarthmore College as an undergraduate, graduating with High Honors and a BS in physics in 1981. She pursued graduate studies at Cornell University, earning a PhD in theoretical high-energy physics in 1986 with a dissertation on the catalysis of magnetic monopole decay in grand unified theories.

While at Cornell, she became involved with nuclear arms control issues. That interest carried over into her postdoctoral research, which focused on verifying nuclear arms control treaties through the detection of solid-fueled rocket boosters and sea-launched cruise missiles.

Also as a postdoc, she helped organize the International Summer Schools on Science and World



Valerie Thomas

Affairs for young PhD scientists from the Soviet Union, China, the US, and elsewhere who are interested in global security and the environment.

A long-time member of the APS Forum on Physics and Society, Thomas quickly developed a specialty in "policy physics." She resumed her work on arms control when she joined Princeton University in 1988, later expanding her interests to include environmental issues.

Having worked on numerous pollutants, including lead, cadmium, mercury, nitrogen, and dioxin, she has increasingly found herself applying physics approaches to policy problems.

For instance, she uses equations describing economic market demand to understand the variables that determine the

consumption of materials. In her laboratory, she is developing GPS and radio devices to track objects in the waste and recycling stream. She also teaches a course on the use of science in environmental policy at Princeton.

Thomas says she applied for the APS Congressional Fellowship to broaden her experience with policy issues and gain experience in how Congress works.

"The fellowship provides a wonderful opportunity for an academic like me to work in government," she said. "I hope to use my experience not only to help the private sector work more constructively with Congress, but more broadly, to develop a strategic vision for the continued co-development of technology, security, and environmental protection."

Following an intensive orientation process, Thomas will choose where to spend her Fellowship year, either working in a Congressional office or on the staff for one of the many associated committees. Her policy interests include environmental issues—such as reducing carbon emissions—and national security, particularly combating the growing use of nuclear, chemical or biological weapons around the world.

For more information about the APS Congressional Fellowship program, See [http://www.aps.org/public\\_affairs/fellow/index.cfm](http://www.aps.org/public_affairs/fellow/index.cfm)

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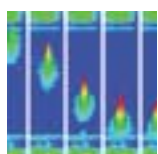
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**APS CONGRESSIONAL SCIENCE FELLOWSHIP  
2005-2006**

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

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

**TERM OF APPOINTMENT** is one year, beginning in September of 2005 with participation in a two-week orientation sponsored by AAAS. Fellows have considerable choice in congressional assignments.

**A STIPEND** of \$50,000 is offered in addition to allowances for relocation, in-service travel, and health insurance premiums.

**APPLICATION** should consist of a letter of intent of approximately two-pages, a list of key publications, a two-page resume, and three letters of reference. Please see the APS website ([http://www.aps.org/public\\_affairs.fellows.html](http://www.aps.org/public_affairs.fellows.html)) for detailed information on materials required for applying and other information on the program.

**ALL APPLICATION MATERIALS MUST BE POSTMARKED BY JANUARY 17, 2005 AND SHOULD BE SENT TO THE FOLLOWING ADDRESS:**

APS Congressional Science Fellowship Program  
c/o Jackie Beamon-Kiene  
APS Executive Office  
One Physics Ellipse  
College Park, MD 20740-3843

**AIP STATE DEPARTMENT  
SCIENCE FELLOWSHIP**

This Fellowship represents an opportunity for scientists to make a unique contribution to US foreign policy. At least one Fellow annually will be chosen to spend a year working in a bureau of the State Department, providing scientific and technical expertise to the Department while becoming directly involved in the foreign policy process. Fellows are required to be US citizens and members of at least one of the 10 AIP Member Societies at the time of application.

**Qualifications** include a PhD in physics or closely related field or, in outstanding cases, equivalent research experience.

**Applicants** should possess interest or experience in scientific or technical aspects of foreign policy. Applications should consist of a letter of intent, a two-page resume, and three letters of reference.

Please visit <http://www.aip.org/gov/sdf.html> for more details. All application materials must be postmarked by November 1, 2004 and sent to:

**AIP State Department Science Fellowship,  
American Institute of Physics,  
Attn: Audrey Leath,  
One Physics Ellipse,  
College Park, MD 20740-3843.**

**Workshops on Professional Skills  
Development for Women Physicists**

**Do you want** to influence hiring and policy within your department?

**Do you have** great ideas that you want to communicate to your colleagues?

**Do you need,** wish you had more space for your research?

\*\*\*

If so, the **Committee on the Status of Women in Physics** invites you to attend one of the five workshops entitled “Professional Skills Development for Women in Physics.”

Funded by the National Science Foundation, these workshops will coach women in key skills that are needed to enhance their careers.

Training in persuasive communication, negotiation, and leadership will be presented by experienced professionals, with an aim towards increasing the influence of female scientists within their own institutions.

In addition, these workshops will provide a special opportunity for networking among participants.

Each workshop will be limited to 30 participants for optimal benefits.

\*\*\*

Workshops at the 2005 March and April Meetings will be aimed at mid-career tenured faculty, and will take place on Sunday, March 20, 2005 in Los Angeles and Friday, April 15, 2005 in Tampa.

Future workshops will be held for junior, early-career women (2006) and for senior women physicists in industry and national labs (2007).

Workshop participants will receive a stipend to help cover the cost of travel and up to two nights lodging.

\*\*\* Details are available on the CSWP webpage at \*\*\*  
<http://www.aps.org/educ/cswp/index.cfm>

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

You will find the following in the July, 2004 online edition of *Reviews of Modern Physics* at <http://rmp.aps.org>.

**Colloquium: Exactly solvable Richardson-Gaudin models for many-body quantum systems**

—J. Dukelsky, S. Pittel and G. Sierra

This Colloquium reviews a new class of exactly solvable models for systems exhibiting strong pairing correlations. There is an exact correspondence between these models and a two-dimensional, classical electrostatic problem, permitting a simple geometrical interpretation of the solutions. Applications are given to nuclei, metallic grains, and Bose-Einstein condensates.

**GRAVITATIONAL** from page 1

generate oddly-hypnotic, but essentially useless, screensaver graphics. Perhaps you've wondered if there's something better that the beige box can do with its time. If so, you're in luck; your computer will soon be able to while away the hours crunching numbers for astrophysics research thanks to Einstein@Home.

The project is part of the World Year of Physics 2005 (WYP2005), which celebrates the importance and vitality of physics in the new millennium and marks the 100<sup>th</sup> anniversary of Einstein's miraculous year.

The Laser Interferometer Gravitational Wave Observatory (LIGO) Scientific Collaboration (LSC) and the APS are working to develop Einstein@Home to allow anyone with a broadband Internet connection to contribute their computer's

spare clock cycles to cutting-edge, gravitational wave research.

It is a distributed computing project that relies on donated computational power to search for signs of gravitational waves in data from LIGO's four kilometer, interferometric gravitational wave detectors in Hanford, WA and Livingston, LA, as well as in data from GEO, a 600 meter interferometer in Hanover, Germany.

Most signals that will be the focus of gravitational wave observations at LIGO and GEO involve brief, catastrophic events, such as black hole mergers and supernova explosions. Einstein@Home, on the other hand, is specifically intended to search for less transient, sinusoidal signals coming from rapidly rotating, aspherical, massive bodies such as some neutron stars. Because the locations

of only a few likely sources are currently known, Einstein@Home will conduct of a whole-sky search for wave sources.

These types of searches require enormous amounts of computational time, at levels that currently can only be achieved with massive supercomputing systems or through distributed computing projects that involve tens to hundreds of thousands of participants.

Distributed computing is rapidly gaining popularity as a method to address problems ranging from protein folding, to searches for radio emissions from extraterrestrial civilizations, to high precision calculations of pi.

Einstein@Home is among the first, publicly available, distributed computing efforts dedicated to a significant physics experiment. Although strong, indirect evidence

of gravitational waves already exists in studies of the spin-down of a binary pulsar, it is possible that Einstein@Home will lead to the first direct observation of the gravitational waves predicted by Einstein's general theory of relativity.

Einstein@Home will primarily be designed to run data analysis algorithms when participants' computers are idle, and will include a screen saver that displays computational progress. Calculations can also be run continuously as a background process to make more complete use of excess computational power.

Bruce Allen of the University of Wisconsin-Milwaukee's LSC group is responsible for leading the development of Einstein@Home. He and his colleagues are hopeful that as many as a million people will dedicate spare CPU cycles to

the gravitational wave search, but even with only tens of thousands of participants, Allen is confident that Einstein@Home will lead to important and interesting results.

The Einstein@Home client application will be available for download in early 2005. In the meantime, further information and an online pre-registration form are available at the WYP website [www.physics2005.org](http://www.physics2005.org).

**HODAPP** from page 6

to expand its reach, and will welcome new ideas as appropriate.

Hodapp said he would also work to “continue to build bridges between APS and other societies, such as AAPT and AIP, in order to capitalize on resources, ensure good communication, and mobilize people.”

# The Back Page

Letter from Los Alamos:

## Cultural Divide May Imperil Lab's Survival

Dear APS Members,

I was invited by the editor of *APS News* to write a letter giving a personal perspective on recently reported news concerning security at Los Alamos National Laboratory (LANL). The opinions expressed herein are solely my own, and in no manner should be construed to represent the position of the laboratory or any other laboratory employee.

However, as a member of the LANL scientific community and as a concerned citizen, I feel an obligation to respond to recent allegations of an unsecured work place and a culture of disregard for the rules. These allegations and the resulting responses they are generating are having very negative effects on the morale of the LANL workforce, and consequently, repercussions to National security.

I urge the scientific community to review the minutes of the July 13, 2004 hearings of the Energy and Air Quality (EAQ) Subcommittee of the House Energy and Commerce Committee, from which much of the information in this letter is drawn.<sup>1</sup>

Certainly LANL is experiencing a crisis of confidence and a critical point in its history, in which the Lab will either survive as a scientific institution, or it will not. LANL will either be able to continue to attract the best people to work on national security problems or it will not. To survive, the misconceptions of LANL as being an unsafe, unsecured institution must be corrected, and the reputations of many dedicated staff must be restored. A different outcome could mean that all nuclear weapons research will be conducted by our sister laboratory, Lawrence Livermore.

Since May the scientific staff of LANL has come under increasing fire for being lax on security. This criticism is being led by members of Congress, Ambassador Linton Brooks (head of the National Nuclear Security Agency) and Los Alamos Director G. Peter Nanos, and has resulted in headlines in the media such as "LANL Security Lapses Called Rampant."<sup>2</sup>

There are many other such messages being promulgated, and negative repercussions from managerial responses generated by this criticism are beginning to emerge.

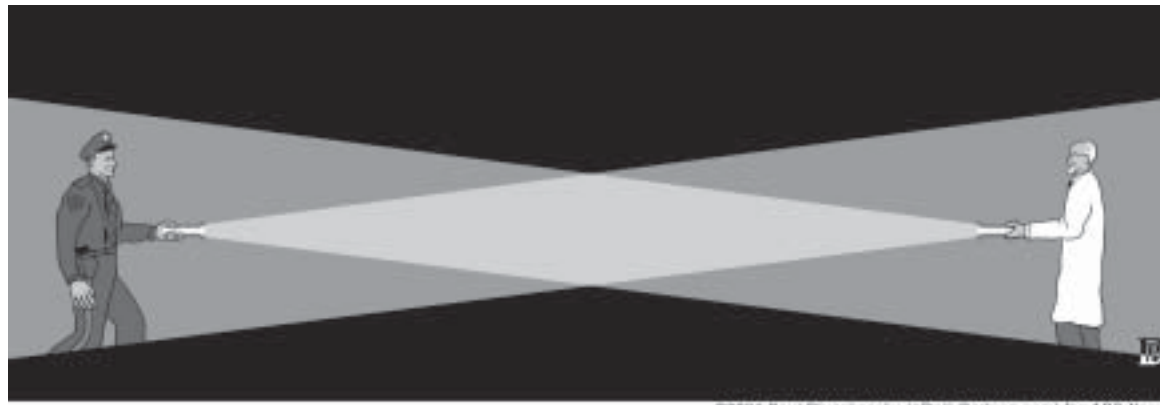
Dedicated staff members are opting for, or seriously investigating, early retirement. These are scientists and engineers with years of critical National security knowledge that we will not be able to find in any textbook. The departure of these people means a loss of important mentoring for new staff members.

I have talked with several early-career PhD staff members who are re-assessing their options. Their leaving will translate into a loss of years of monetary and education investment by the Nation, and a

laboratory with a questionable future as a scientific organization.

I recently returned from recruiting in Virginia, where I talked to engineering and physics PhD candidates about career opportunities at LANL. From questions I received it is evident that there is trepidation in beginning a career at Los Alamos, where there are so many perceived problems. How did such a perception arise?

The latest flurry of criticism was initiated by reports of an unaccounted for piece of Classified Removable Electronic Media (CREM). According to Director G. Nanos this is viewed as a recurring theme at LANL, and such continuing reports of security incidents have led to "... a belief amongst some very powerful people in Congress that academic culture and running a high security national laboratory are totally incompatible and scientists can't be trusted."<sup>3</sup>



©2004 Paul Dugowensky (aDailyCartoon.com) for APS News

Apparently a hypothesis has emerged that it is the long-standing scientific culture of Los Alamos that is responsible for the present situation at our institution.

Certainly, security and safety are critical elements of the Laboratory's national security mission; if rules and regulations are not followed, appropriate measures must be taken. However, the suggestion that "scientists can't be trusted" is an unwarranted generalization that is not supported by facts.

During the July 13 testimonies to the Energy and Air Quality Subcommittee there were 22 references made to cultural problems at Los Alamos National Laboratory, in the context of lapses in security. What data supports declarations by Subcommittee members that "... security incidents just keep happening, and happening, and happening..." and "...there continues to be an ongoing pattern of business management failure and security problems...?"

To my knowledge there has been only one serious CREM incident within the last four years, in which classified removable electronic media was actually missing.

I am referring of course to the missing hard-drives found behind a copy machine, following the great Los Alamos fire of 2000. Per-

taining to the May 2004 incident, government authorities now believe that this incident did not occur: "It appears to have been a false positive, the system says something is missing when it is not."—Senator Pete Domenici, as quoted in the *Santa Fe New Mexican*, July 22, 2004.

Every reported security incident must be treated seriously, but in defense of my colleagues, one incident, particularly one that now appears not to have occurred, does not define an ongoing pattern of blatant disregard for the rules. It certainly does not define a "culture" that is insensitive to security, as has been suggested by one Congressional member of the EAQ Subcommittee, "... as Mr. Issa [Darrell Issa (R-CA)] points out, perhaps these people don't realize, these intellectual nuts or whatever they call them, these people don't appreciate the sensitivity of what they're working on because they work with it all the time."

This does not describe the culture I have come to know in my 23

whom I work is trustworthy and dedicated and committed to performing his and her work safely and securely. This is the only laboratory culture that I know. There are security incidents that happen in a workplace of more than 7000 employees, but to imply that these are the result of a lab-wide culture is simply wrong. What is accurate, however, is that there is a deepening divide developing at LANL and staff morale is very low. This is being recognized outside of the laboratory: quoting from the recent *Nature* article, "Fear and Loathing at Los Alamos,"<sup>4</sup> "Nanos has blasted his own staff for what he termed a 'cowboy culture' at the laboratory; the tone of his public statements suggests a frightening gulf between the leader and the led".

This gulf is principally the result of growing attitudes of mistrust between the two parties, and it is being made even wider by several members of Congress.

Attitudes of mistrust toward the



Rhon Keinigs

the entire scientific community. It is my opinion that such attitudes and some of the resultant measures being taken at LANL will ultimately negatively impact our ability to fulfill our National security mission, making it very difficult to attract and maintain a productive workforce.

Personally, I know of no scientist who would willingly work in such a threatening environment.

Some final thoughts and my analysis of the present situation at Los Alamos National Laboratory: A new policy embracing the three imperatives of **A**wareness, **I**ntolerance, and **D**etermination (AID)<sup>5</sup> has been replaced by our director, and it has been made clear that every member of the laboratory work-force must understand and operate under three directives:

1. We must ensure an awareness of our work environment and strict adherence to the rules and procedures for safety, security and compliance,

2. We must be intolerant of those who put co-workers, the Laboratory and the country at risk, and

3. We must be determined to build on a foundation of excellence. Certainly, paramount to the Laboratory's ability to carry out its fundamental National security mission is excellence in science. The potential for losing this excellence is recognized by U. of California President Robert Dynes and was addressed during his recent visit to the Laboratory: "As we look to the future, my (Dynes) primary concern is, how do we maintain the quality of science? I believe this is what drives everything else."<sup>6</sup>

I fully concur. From my analysis of the present situation at Los Alamos I can only conclude that several measures being undertaken to address security issues are running the potential risk of driving away the very scientific culture that forms the backbone of the work we perform at the laboratory in the National interest.

**Respectfully submitted,**  
Rhon Keinigs

*Rhon Keinigs is a long-time staff member at Los Alamos. His research interests are in plasma physics, shock wave interactions in solids, and dynamic material properties of metals.*

1. Hearing of the Energy and Air Quality Subcommittee of the House Energy and Commerce Committee, July 13, 2004. © Copyright 2004 by Federal News Service, Inc.

2. *The Albuquerque Journal*, headline of July 21, 2004.  
3. G. Peter Nanos, (guest commentary: "Crisis at LANL affects all of us") *Albuquerque Journal North*, Aug. 4, 2004

4. *Nature*, Vol. 430, Aug 12, 2004.

5. Los Alamos Newsletter for the week of Aug. 2, 2004: "Nanos' latest message to employees: Awareness, intolerance and determination".

6. Los Alamos Newsletter for the week of Aug. 16, 2004.