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Legal, Financial Issues Impact APS Name Change Decision

At its September 24 meeting, the APS Executive Board grappled with the issue of whether or not to recommend changing the name of APS to the American Physics Society.

As reported in the August/September *APS News*, that issue had been the subject of an informal email survey sent out to the entire APS membership, in which 23.9% of those who were asked for an opinion responded. Of these, 51.3% were strongly in favor of the name change, primarily because the word "physical" does not clearly connote physics, and thereby limits the effectiveness of APS in its lobbying and public outreach activities.

But 11.5% of the respondents were strongly opposed, many because the word "physical" was broader than "physics", and therefore helped APS include among its members those working in interdisciplinary areas.

In addition, 24.1% of those participating were moderately in favor of the name change, and 6.5% were moderately opposed. The remaining 6.6% were neutral.

At the September meeting, the Board heard expert opinion on sobering legal and trademark issues. Changing the name legally would require re-incorporation of the Society, and potentially renegotiation of many contracts, and reregistering APS as the publisher of the *Physical Review* in numerous international jurisdictions. If the name were not changed legally, but APS merely chose to do business under the name American Physics Society, APS could still lose the trademark rights to "American Physical Society", which would be potentially damaging especially in the area of journal publication. The Board considered using both names, depending on the context, but concluded (as did most of the respondents in the survey) that it would probably be too complicated and confusing.

APS Name Change continued on page 3

Famous Equation Holds Big Birthday Celebration

Photo credit:Kendra Rand

September 27, 1905 was the day that Einstein's paper containing the equation $E=mc^2$ arrived at the editorial offices of Annalen der Physik. Exactly one hundred years later, a reception and preview showing of the docudrama "Einstein's Big Idea" were held at the National Academy of Sciences building across from the Mall in Washington. About six hundred attendees sampled $E=mc^2$ birthday cake, watched the preview, and listened to a panel discussion about the equation and the making of the docudrama. The event was sponsored by the Department of Energy, Universities Research Association, the APS, the National Academies, and Washington PBS station WETA.

The panel was moderated by APS President Marvin Cohen (in the photo at extreme right).Other panelists included (l to r): Paula S. Apsell, the Senior Executive Producer of NOVA and the Director of the Science Unit of WGBH in Boston; Walter Isaacson, President and CEO of the Aspen Institute and former Managing Editor of TIME, who is at work on an Einstein biography; David Kaiser, associate professor of the history of science in MIT's Program in Science, Technology, and Society; Gary Johnstone, Producer/Director/Writer of "Einstein's Big Idea"; and David Bodanis, author of the book $E=mc^2$, on which "Einstein's Big Idea" is based. "Einstein's Big Idea" aired on NOVA on PBS stations around the country on Tuesday, October 11, at 8 pm.

Photo credit: Alan Chodos

Apker Award Finalists

Photo credit: Shelly Johnston

The Apker Award is given annually for undergraduate research in two categories. One award is for a student doing his or her research at an institution that grants the PhD degree; the other is for research at an institution that does not grant the PhD. The selection committee picks six finalists from the submitted nominations, and then interviews the finalists in a daylong session to make its recommendations for the recipients. These recommendations are then forwarded to the APS Executive Board for final approval. This year the interviews took place on September 8 at the Cosmos Club in Washington. The six finalists were (l to r): Nathaniel Craig (Harvard); Cary Pint (University of Northern Iowa); Matthew Paoletti (Bucknell); David Miller (University of Chicago); Jeffrey Falkenbach (MIT); and Eliot Kapit (Reed College). The recipients will be reported in next month's APS News.

With One Data Set Analyzed, Einstein@Home Forges Ahead in Search for Gravitational Waves

By Ernie Tretkoff

The Einstein@home distributed computing effort, which searches for gravitational waves, recently finished analyzing its first set of scientific data. Over 60,000 individuals from over 150 countries are now running Einstein@home on their computers, and more people are joining every day.

Begun earlier this year as part of the World Year of Physics, Einstein@home is a distributed computing project, which relies on volunteers' donated computing time. While a user's computer is idle, the Einstein@home program searches for gravitational waves in data from LIGO, the Laser Interferometer Gravitational Wave Observatory, which consists of two facilities, one located in Livingston, Louisiana and the other in Hanford, Washington.

In August Einstein@home finished sifting through data from LIGO's science run S3, which ran from late 2003 to early 2004. Einstein@home is now searching through data from the more sensitive science run S4. In late 2005, LIGO will begin a long data-taking run, S5, at its design sensitivity, and Einstein@home will analyze that data when it becomes available.

Gravitational waves, often

Gravitational Waves continued on page 5

OPA's Regan Spearheads Efforts to Develop New Grassroots Program

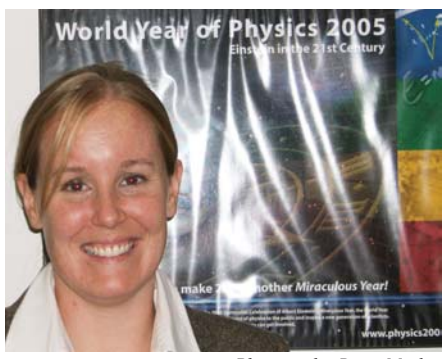


Photo credit: Brian Mosley

Kimberly Regan

The APS Office of Public Affairs (OPA) is instituting a new District Advocate Program that will assign an APS member as point person in each Congressional district. The goal of the new program is to build a volunteer network of district and state advocates within the physics community to facilitate the Society's grassroots activities, according to Kimberly Regan, the new science policy fellow at OPA.

"We thought that having a constituent representative in each district would be a great way to ensure that the voices of individual scientists are heard," explains Regan, who joined the OPA in August. Whenever a policy issue arises, the OPA can contact the local district advocates, who can then contact other scientists in their district to take action, whether it be contacting a Congressional office, or circulating a departmental letter within their university.

The DA program is still in its early days. Regan is in the process of recruiting the first 50 volunteers. There are currently 20 members so

OPA's Reagan continued on page 5

Three Physicists Share 2005 Nobel Prize in Physics

Two APS fellows–Roy Glauber of Harvard University and John L. Hall of NIST/University of Colorado–shared the 2005 Nobel Prize for physics with Theodor Hänsch of the Max Planck Institut für Quantenoptik. The prize was announced on October 4. All three recipients' prize-winning work is linked to landmark papers published by the *Physical Review* and *Physical Review Letters*.

Glauber received half of the roughly $1.3 million prize; he was honored "for his contribution to the quantum theory of optical coherence." Hall and Hänsch each collected a quarter of the prize, and were honored "for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique."

Both APS President Marvin Cohen and APS Editor-in-Chief Martin Blume extended their congratulations to the recipients on behalf of the Society. "The APS has long been aware of the stature of these three great physicists," said Cohen, adding that all had been honored with APS prizes. Glauber won the 1996 Dannie Heinemann Prize; Hänsch won the 1996 Arthur Schawlow Prize and the 1986 Herbert P. Broida Prize; and Hall won the Schawlow Prize in 1993 and the Davisson-Germer Prize in 1988.

Glauber laid the foundations of quantum optics, showing how the

Nobel Prize continued on page 4

Members in the Media

"Think of it almost like nano-Velcro."

–Ali Dhinojwala, University of Akron, on synthetic gecko hairs he developed, The New York Times, August 30, 2005

"Zero-point energy is so tiny that nobody can feel it. But when you get to the realm of quantum mechanics, it exists. The question is, how do you harness it? I have not seen any meaningful theory or demonstration of that. It's not impossible, but I don't know how you would do it."

–Hossein Sadeghpour, Harvard-Smithsonian Center for Astrophysics, on the possibility of generating usable power from zero-point energy, San Francisco Chronicle, September 7, 2005

"Our study is the first step, in some sense, in trying to understand what's the most stable angle that one can build, say, a retaining wall. And if it fails, where would the material end up? How much part of the land will give way?"

–Arshad Kudrolli, Clark University, on his study of the maximum angle of stability in a granular pile, Reuters, September 29, 2005

"When operas are good, they last an incredibly long time. In 200 years, 'Doctor Atomic' may be the historical memory of the Manhattan Project."

–Marvin Cohen, UC Berkeley, on the opera Dr. Atomic, The New York Times, September 25, 2005

"It's really a compelling adventure, and the value to society is huge. Our mission is to uncover the structure of the universe, but there's also tangential value that will come out of this."

–James Brau, University of Oregon, on the International Linear Collider, The Register-Guard (Eugene, Oregon) September 5, 2005

"Your waistline may be spreading but you can't blame it on the expansion of the universe."

–Richard Price, University of Texas at Brownsville, on which objects are stretched by cosmological expansion, New Scientist, October 1, 2005

"If we do this it has worldwide consequences, and it will stir up some kind of hornet's nest."

–Burton Richter, Stanford University, on a Secretary of Energy Advisory Board report that recommends that the United States design new nuclear weapons, Contra Costa Times, October 5, 2005

"Basically physicists are too undisciplined to let anyone else tell us what to name something. It's mainly whatever name catches on."

–Gordon Kane, University of Michigan, on naming things in physics, The New York Times, October 4, 2005

"My biggest problem is having a fast enough processor (brain) to figure these out. You have to think quickly, think ahead, know where you are in the room and how to position yourself for the next figure. It keeps you on your toes."

–Brian Doyle, on ballroom dancing, The Telegraph (Nashua, New Hampshire), October 9, 2005

"Don't buy gamma ray burst insurance."

–Rocky Kolb, Fermilab, on the probability of a large gamma ray burst near Earth, San Francisco Chronicle, October 6, 2005

"I think the University of Chicago counts everyone who ever walked through there."

–Herbert Kroemer, UC Santa Barbara, on how the University of Chicago claims 78 Nobel laureates, Los Angeles Times, October 10, 2005

Quotes about this year's Nobel Prize in physics:

"In my last year of high school, I fixed TVs for a Denver company that was kind of instructive for me. But it was not a career I would've chosen."

–John Hall, JILA, on one of his first jobs, Rocky Mountain News, October 5, 2005

"I could scarcely believe it." The Swedish accents on the early morning congratulatory phone call "at least raised the possibility it was a joke."

–Roy Glauber, Harvard University, on the phone call telling him he'd won the Nobel prize, USA Today, October 4, 2005

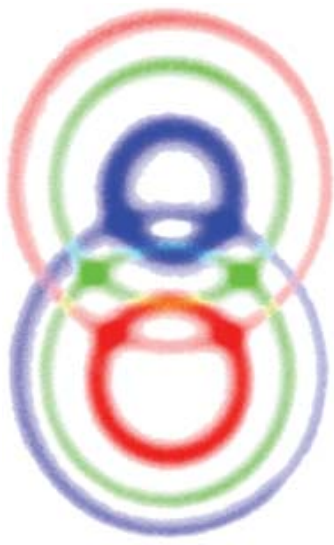
This Month in Physics History

Einstein and the EPR Paradox

By the 1920s, it had become clear to most physicists that classical mechanics could not fully describe the world of atoms, especially the notion of "quanta" first proposed by Planck and further developed by Albert Einstein to explain the photoelectric effect. Physics had to be rebuilt, leading to the emergence of quantum theory.

Werner Heisenberg, Niels Bohr and others who helped create the theory insisted that there was no meaningful way in which to discuss certain details of an atom's behavior: for example, one could never predict the precise moment when an atom would emit a quantum of light. But Einstein could never fully accept this innate uncertainty, once famously declaring, "God does not play dice." He wasn't alone in his discomfort: Erwin Schrödinger, inventor of the wave function, once declared of quantum mechanics, "I don't like it, and I'm sorry I ever had anything to do with it."

In a 1935 paper, Einstein, Boris Podolsky and Nathan Rosen introduced a thought experiment to argue that quantum mechanics was not a complete physical theory. Known today as the "EPR paradox," the thought experiment was meant to demonstrate the innate conceptual difficulties of quantum theory. It said that the result of a measurement on one particle of an entangled quantum system can have an instantaneous effect on another particle, regardless of the distance of the two parts.



Pictorial Representation of Entangled Photons

One of the principal features of quantum mechanics is the notion of uncertainty: not all the classical physical observable properties of a system can be simultaneously determined with exact precision, even in principle. Instead, there may be several sets of observable properties–position and momentum, for example–that cannot both be known at the same time. Another peculiar property of quantum mechanics is entanglement: if two photons, for example, become entangled –that is, they are allowed to interact initially so that they will subsequently be defined by a single wave function–then once they are separated, they will still share a wave function. So measuring one will determine the state of the other: for example, with a spin-zero entagled state, if one particle is measured to be in a spin-up state, the other is instantly forced to be in a spin-down state.

This is known as "nonlocal behavior;" Einstein dubbed it "spooky action at a distance." It appears to violate one of the central tenets of relativity: information can't be transmitted faster than the speed of light, because this would violate causality.

It's worth noting that Einstein wasn't attempting to disprove quantum mechanics; he acknowledged that it could, indeed, predict the outcomes of various experiments. He was merely troubled by the philosophical interpretations of the theory, and argued that, because of the EPR paradox, quantum mechanics could not be considered a complete theory of nature. Einstein postulated the existence of hidden variables: as yet unknown local properties of the system which should account for the discrepancy, so that no instantaneous spooky action would be necessary. Bohr disagreed vehemently with this view and defended the far stricter Copenhagen interpretation of quantum mechanics. The two men often argued passionately about the subject, especially at the Solvay Conferences of 1927 and 1930; neither ever conceded defeat.

There have been numerous theoretical and experimental developments since Einstein and his colleagues published their original EPR paper, and most physicists

Einstein and Bohr

today regard the so-called "paradox" more as an illustration of how quantum mechanics violates classical physics, rather than as evidence that quantum theory itself is fundamentally flawed, as Einstein had originally intended.

But the paper did help deepen our understanding of quantum mechanics by exposing the fundamentally non-classical characteristics of the measurement process. Before that paper, most physicists viewed a measurement as a physical disturbance inflicted directly on the measured system: one shines light onto an electron to determine its position, but this disturbs the electron and produces uncertainties. The EPR paradox shows that a "measurement" can be performed on a particle without disturbing it directly, by performing a measurement on a distant entangled particle.

Today, quantum entanglement forms the basis of several cutting-edge technologies. In quantum cryptography, entangled particles are used to transmit signals that cannot be intercepted by an eavesdropper without leaving a trace. The first viable quantum cryptography systems are already being used by several banks. And the burgeoning field of quantum computation uses entangled quantum states to perform computational calculations in parallel, so that some types of calculations can be done much more quickly than could ever be possible using classical computers.

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Percentage of First-Year Foreign Grad Students Falls to 43%

By Ernie Tretkoff

Physics departments reported fewer problems with foreign students getting visas in 2004 than two years earlier, according to a recent study by the AIP Statistical Research Center.

About half of PhD-granting departments reported at least one admitted student had been denied a visa or significantly delayed in fall 2004, down from about two-thirds of departments reporting such problems in fall 2002.

The AIP report also found that foreign students made up a smaller fraction of the total first-year graduate student enrollment in 2004. The percentage of first-year students from outside the United States declined from a peak of 55% in the 2000-2001 academic year to about 43% in fall 2004.

While it might be tempting to attribute this drop in the percentage of foreign students to visa problems, in fact, it is probably due mostly to an increased number of American candidates. The actual number of foreign first year graduate students declined only slightly in the past few years, from 1485 in the fall of 2000 to 1294 in the fall of 2004, while the number of US students rose from 1228 in the fall of 2000 to 1746 in the fall of 2004.

"Anecdotally, departments reported a greater number of qualified US applicants," said Patrick Mulvey of the AIP Statistical Research Center. Mulvey also pointed out that physics bachelor's degree production in the US has also increased in recent years, which tends to lead to an increase in the number of US students entering physics graduate school.

Since 9/11, there has been concern about the potential impact of stricter visa regulations and greater delays on physics departments. These concerns prompted the AIP Statistical Research Center to survey 248 US physics departments both in 2002 and again in 2004.

Overall, the report estimates that in the fall of 2004, 12% of accepted foreign students were delayed or at least initially prevented from gaining entry into a physics department because of complications insecuring a visa. This is down from approximately 20% in 2002.

Amy Flatten, APS Director of International Affairs, says, "There is some indication that the departments of State and Homeland Security are making progress in improving the visa process." The processing time for "Visa Mantis" review, the clearance required for students and researchers in many scientific fields, has declined significantly, Flatten points out. "Almost all cases are completed in less than thirty days now," she says. "In the fall of 2003, the average case took over 70 days to clear the Visa Mantis system.

The AIP report also notes that, "despite the difficulty many international students encounter in securing a visa to enter the United States in recent years, declines in the absolute number of foreign first-year physics graduate students have not been as great as one might expect." First-year enrollment for fall 2004 foreign students fell 3% from 2002, and 13% since 2000.

Though many departments reported at least one visa problem, the relative impact on physics departments is not spread evenly, according to the report. While the larger and higher-ranked physics departments reported greater absolute numbers of students denied entry, the smaller and lower-ranked departments had a larger proportion of their international students affected. Smaller departments also tend to have more trouble compensating for the loss of a small number of admitted students.

A delay or denial of a foreign student's visa can cause problems for the department, including disruptions to enrollment in graduate-level classes and a shortage of teaching and research assistants. But visa problems can be devastating to the affected students, the AIP report states, because the students have often already made plans to come to the United States, and may have already passed up other opportunities.

New students were not the only ones affected by visa problems. About 60 percent of PhD departments reported that currently enrolled foreign students had difficulty getting return visas after leaving the United States to travel to other countries.

Departments varied in how they responded to the visa problems. Most reported that they would continue as before in seeking and admitting foreign students. Some departments said that they would admit more foreign students to offset the number delayed or denied entry, while others reported accepting fewer non-citizens in order to avoid possible visa problems and uncertainty. In addition, "some departments indicated that they were starting the application procedures earlier," said Mulvey.

Although fewer foreign students were delayed or denied visas in 2004 than two years earlier, visa problems continue to occur. "The 2004 data show that a substantial number of foreign candidates continue to be impeded by the heightened stringency in visa regulations," the report states.

Flatten concurs. "There is still much work to be done on a number of visa issues," she says.

WYP Speakers Program Going Strong, Will Continue Into 2006

By Ernie Tretkoff

Over 50 lectures on Einstein-related topics have taken place so far this year as part of the World Year of Physics Speakers Program, which is sponsored by the APS Topical Group on Gravitation (GGR) and the Forum on the History of Physics (FHP). The organizers plan to continue the program into 2006.

The program administrators maintain a list of physicists who have volunteered to speak on a wide variety of topics related to Einstein. These physicists are not only experts in their fields, but also known to be effective at speaking to non-specialists.

Groups wanting to request a lecturer fill out an online form, which can be accessed from the World Year of Physics web site, www.physics2005.org, stating their location, the type of group and the topic they wanted to hear about, and the speakers program matches as many of these requests as possible with appropriate speakers.

Organizers say the program has worked extremely well so far. "The WYP Speakers Program has been a success in the eyes of those running it and we have just been plotting the future of the program. The denouement is that the Speakers Program will live on," said Richard Price, of the University of Texas, Brownsville, who is in charge of the program, along with Virginia Trimble of the University of California, Irvine.

Since the program began about a year ago as a World Year of Physics project to meet the expected need for speakers, there have been 167 requests, many from colleges, but also a number from high schools and even middle schools and community groups, according to Trimble. Of these requests, 53 have been filled so far.

Einstein history–especially his life, theories, and overviews of his 1905 papers–has proved to be the most popular subject. Other topics in demand have included black holes, gravitational waves, and dark energy. Some groups requested general talks on special and general relativity, space and time, and cosmology and astrophysics. More recently, some groups have requested talks on more modern physics topics like nanotechnology, missions to Mars, and Einstein and space. It is expected that the topics may range even wider next year.

The main goal of the speakers program has been to reach students, who might not otherwise have the opportunity to hear such a lecture.This was meant in part to help encourage students receiving bachelor's degrees in physics to continue in the field. Therefore, four year colleges were given priority in the matching process. In fact, almost all of the requests from four year colleges were met, said Trimble.

Trimble said she was especially pleased that the speakers program had been able to serve some historically black schools including Spelman College and Tuskegee University. The program is also

WYP Speakers continued on page 6

INTERNATIONAL News

...from the APS Office of International Affairs

The Internationalization of Higher Education: Good for Physics and Other Sciences

By Nils Hasselmo

Americans are justly proud of our scientific enterprise and the extraordinary array of research universities that are responsible for a large share of it. Our universities are a critical element in the nation's economic competitiveness and national security. Yet these very American institutions are becoming increasingly intertwined with universities around the world. And that is a good thing–good for physics and other sciences and good for the US and global economies.

As president of the Association of American Universities (AAU), I have had the opportunity to work with my colleagues to strengthen ties between leading US research universities and leading research universities in Asia, Europe, and throughout the world. It is important that we continue to collaborate –and compete.

Reflecting the spirit of competitiveness, our universities compete not only with each other but also with those of other nations–educationally and scientifically. At the same time, research and education are the beneficiaries of growing international collaboration. And as competition grows, so, ironically, does collaboration. It is important that as a nation, we do all that we can to facilitate not one but both of these trends.

Earlier this year, I participated in an extraordinary meeting in Singapore between members of the Association of Pacific Rim Universities (APRU) and the AAU. Present were the presidents and chancellors of 21 leading US research universities, several of which are also APRU members, and those of 23 non-US universities, mostly Asian. Members of the Indian research university association also attended as guests.

The meeting illustrated the increasingly global nature of higher education and research – a trend toward internationalization that will benefit physics, the US and the entire world. We discussed this globalization trend and how universities can play an important role in promoting international understanding.

At the meeting, I was struck by two particular developments.

First, the appetite among Asian universities for internationalization of science and education is enormous. From Japan to India, from China to Thailand, research universities are growing, modeled more often than not on those in the US. They want to compete, and they want to cooperate. They want to promote student and faculty exchanges, expand research collaborations, and pursue the extraordinary joint research and other opportunities created by the information technology revolution.

Second, over the past few years, even as the internationalization trend has accelerated, there have been significant cultural and bureaucratic obstacles that the higher education and scientific communities on both sides of the Pacific have been addressing.

One serious cultural difference – or at least a cultural circumstance – is the concern in many of these countries about "brain drain," the decisions many of their best and brightest scientists and engineers make to remain in the US (or elsewhere) after they complete their educations. Our country has benefited enormously from the contributions of immigrant scientists and engineers. We hope that will continue. Their home countries are not so sure. That creates natural tensions, but thus far those tensions have remained largely below the surface.

Another interesting cultural issue is beginning to emerge. Some US universities are establishing, or considering establishing, their own campuses in China and elsewhere in Asia. While such efforts are generally welcome overseas, there is some ambivalence about US cultural influence. If the internationalization of science and education is to succeed at this level, American universities will need to be sensitive to these fears and learn how to coexist in sometimes challenging environments.

As for bureaucratic barriers to internationalization, these have been especially serious in the US since the terrorist attacks of September 11, 2001. In the aftermath of 9/11, the US clamped down hard on the visa process, making it extremely difficult for students seeking to study in the US. This led to sharp reductions in the numbers of students seeking to come here. After a lot of hard work by the higher education and scientific communities, the rules and procedures have been rationalized. Despite the problems that remain, it is clear that the government recognizes how America benefits from the inflow of students from abroad, and its representatives have made significant improvements.

Unfortunately, changes in the rules may have come too late to

International News continued on page 4

APS NAME CHANGE CONTINUED FROM PAGE 1

Finally, the Board considered retaining the name American Physical Society, but adopting a changed logo that would emphasize the word "physics", and perhaps also a tag line that would make it clear that the business of APS is physics. In addition, the Board took action to discover whether the name "American Physics Society" was available to be registered as a trademark, thereby keeping the option of using that name for selected purposes in the future. It is expected that the Board will take up the name change and related issues again at its next meeting on November 19, and the matter may also be brought to Council the following day.

Letters

AP Physics: Irrelevant, Boring, and Too Difficult

In his "Viewpoint" article "Scientific Literacy and Education Reform," (Aug/Sep 2005), Warren Huelsnitz states: "The scientific literacy of the general public is at an unacceptably low level and many people believe that physics is irrelevant, boring, and too difficult. ...It would be nice if the general public understood the scientific process and was able to use logic and reasoning. …We need a captive and receptive audience, one that is still impressionable, and where we have an opportunity to reach all of society. We can find this in our nation's elementary and secondary education system. We need to change the mentality of how math and physics are taught…. We need to make science interesting."

I couldn't agree more.

To achieve physics literacy as a nation we must change our approach to high school physics. Many schools offer an Advanced Placement first course for scientists that is highly mathematical and precisely of the "irrelevant, boring, and too difficult" variety of which Huelsnitz speaks. Very few non-science students will take such a course, and very few science students will learn "the scientific process and …logic and reasoning" from such a course. Many schools offer a less technical first course aimed at non-scientists, but many science students will skip this course in favor of an AP (or other math-based) course, and most such courses are patterned after standard math-based introductory courses, offer no social or cultural relevance, offer very little scientific process or critical thinking, and are boring.

Huelsnitz's admirable criteria could be met by a first physics course required for all students, future scientists and non-scientists alike, that is conceptual, process-oriented, socially relevant, and scientifically broad. More precisely, "conceptual" means using little or no algebra while still being "numerate" (metric system, powers of ten, graphs, probabilities, proportionalities, etc.). "Process-oriented" means focusing explicitly on the scientific process, and including a critique of pseudoscience and other loose thinking. "Socially relevant" means including such physics-related social issues as global warming, nuclear weapons, and the energy future. And "scientifically broad" means emphasizing so-called "modern" (an ironic term for physics since 1900!) physics and including contemporary topics such as the standard model and the current golden age of cosmology. The "physics first" movement (physics in 9th grade, then chemistry, then biology) could accomplish this, but a required course in 10th, 11th, or 12th grade could also do the job.

Art Hobson
Fayetteville, AR

Infrared Laser First Described in Dicke Patent

I would like to offer a brief personal note on "This Month in Physics History" from the August/September 2005 *APS News*, which describes the origin of the mirror-feedback ideas relevant to the laser.

As a young professor at Princeton in the mid 60's, I had the good fortune to have an office next to that of R.H. Dicke. I would often thus hear his minor musings on science and technology (major ones he saved for others). One day he came in waving two printed items, with a broad smile on his face. The first was a newspaper article describing the Townes-Gould lawsuit over who was responsible for the mirror-feedback idea in the Townes-Schawlow laser patent, "Masers and Maser Communication Systems." They had applied for the patent on July 30, 1958 with the relevant physics described in a paper sent to the *Physical Review* August 26, 1958. The other was US patent 2851652, applied for by Dicke on May 21, 1956 and issued on September 9, 1958. Dicke's patent, "Molecular Amplification and Generation Systems and Methods," describes, among other things, how to build an infrared laser, using a cavity with parallel mirrors at the ends, with many small holes in the reflective surface to couple the energy to the exterior.

This patent application predates all reliably dated references I know to discussions between Townes, Schawlow, and Gould about the kind of feedback cavity that would be appropriate for infrared wavelengths. Bob mused, "I wonder what I should do with this? Maybe I should send a copy of it to the judge." I believe he did so. However, the lawsuit was not about the validity of the Townes-Schawlow patent, but rather about the disputed origin of one of the seminal ideas in the patent, assuming it to be valid.

Bob never chose to pursue the legal issue–in the mid 60's he was done with his phase of invention and patenting, and a lawsuit would have distracted him from the physics he was so enthusiastically pursuing. By taking only the patent route, he failed to influence the subsequent development of laser mirror feedback ideas alluded to in the *APS News* article.

John Hopfield
Princeton, NJ

NOBEL PRIZE CONTINUED FROM PAGE 1

powerful tools of quantum mechanics could be applied to optics. Previously, the field had relied on classical physics, which treated light as though it were a wave. In the 1960s, Glauber described optical coherence in the quantum-mechanical terms necessary to understand the detection of coherent light sources such as lasers, as well as the coherence properties of light from stars.

Hall and Hänsch's work built on Glauber's advances in quantum optics and led to methods for measuring frequencies to one part in a hundred trillion–a precision of fifteen decimal places.

Viewpoint...

Remembering Bram Pais

By Ida Nicolaisen

Editor's Note: Last spring, APS awarded the first Abraham Pais Prize in the History of Physics. The Prize is named for a distinguished physicist and historian of physics, who is the author of acclaimed biographies of Albert Einstein and Niels Bohr, among other works. Pais died in 2000, and at the APS April meeting, where the Prize was awarded, his widow, Ida Nicolaisen, offered the following remembrance of him.

"An unconcern with the past is a privilege of youth," Abraham Pais wrote in the introduction to his biography of Albert Einstein, *Subtle is the Lord* (1983). Bram lived up to this dictum in the sense that an interest in the history of physics came to him only late in life. Bram more or less stumbled into the field.

Yet history was among his favorite topics for leisure reading–largely because of the grand literary style of great historians. Bram was an admirer of George Steiner; both men saw tremendous literary power in the writings of master classical historians like Thucydides, Tacitus, Edward Gibbon, and Michelet, all of whom rose above mere "documentary exactitude" or "sobriety of judgment."

Bram sought to convey insights into the marvels of physics, in crisp and poignant language that served as a vehicle to further the understanding of the achievements of physics: the questions the field has grappled with over time, the answers that have emerged, the turns of interest and even the occasional blind alleys that had led people astray. For Bram, the critical challenge was to raise awareness of the significance of physics among interested laypersons and politicians, who have such an influence over the future of science. It was of great satisfaction to him that his biographies and other writings on the history of physics were so well received and found such a broad audience.

Abraham Pais and his wife Ida Nicolaisen taken Sept. 7, 1996 by Norton M. Hintz, courtesy AIP Emilio Segre Visual Archives

A native Dutchman, Bram was the last to receive a PhD in Utrecht before the Germans closed the university to Jews. After several difficult years in cellars and other hideouts in Amsterdam during the Nazi occupation, Bram came to Copenhagen to work with Niels Bohr. Soon after, he was offered a position at the Institute for Advanced Study in Princeton by Robert Oppenheimer.

He joined a crowd of bright young physicists – T.D. Lee, Frank Yang and Freeman Dyson, among others–all of whom were immersed in discovering how to push the frontiers of our understandings of the workings of mother Nature. Such men had no time for the past.

Bram wondered about this later in life, and about the fact that he never discussed historical issues with Einstein, never asked him how he had proceeded with his work when walking him home to Mercer Street. Bram had not read Einstein's papers, in fact, on the simple grounds that he "already knew what to a physicist was memorable in time, and did not need to know what had superseded." Only later did it become obvious to Bram "that I might have been able to ask him some very interesting questions had I been less blessed with ignorance."

Concern with the history of physics is not a trademark of the discipline, but rather, a relatively late phenomenon even compared with other natural sciences, not to mention the arts and social sciences. The first historical reminiscences by distinguished physicists appeared in *Physics Today* in 1952. The very first contribution by the upcoming generation of science historians was published only in 1966. That memorable article, "Thermodynamics and Quanta in Planck's Work," was written by Martin Klein (Yale University), the first recipient of the APS Pais Prize for the History of Physics.

Bram's interest in the history of physics first stirred when he was asked to write a review article on the history of the weak interaction. Having spent several decades at the frontiers of particle physics, Bram had found no evidence of the usefulness of historical evidence, either in his own theoretical work or in that of his colleagues. He could not subscribe to Santayana's oft-quoted dictum, "Those who do not remember the past are condemned to relive it." Bram argued that this did not apply to physicists, and was fond of quoting a saying common among experimental physicists: "Yesterday's sensation is today's calibration and tomorrow's background." He did not take this to mean that knowledge of the history of physics is not enlightening in a broad sense, only that it proved of little use as a tool for doing physics.

His review work on the weak interaction proved a revelation to Bram, but the event that truly embarked him on a second career–at the age of sixty–as a historian of science was preparing for the Einstein Centennial in 1979. He contributed a talk on quantum theory, and the positive response encouraged him to write his now-famous biography of Einstein, for which he received the National Book Award.

Bram went on to write about many other great physicists he had known: Niels Bohr, Paul Dirac, Wolfgang Pauli, Isidor Rabi. T.D. Lee, Frank Yang, Oskar Klein, John von Neumann, Eugene Wigner, Victor Weisskopf, and Mitchell Feigenbaum. He also produced works that summed up his knowledge of physics history: *Inward Bound* (1986) and his own autobiography, *A Tale of Two Continents* (1997).

Ida Nicolaisen is an anthropologist at the University of Copenhagen. This article was adapted from remarks prepared for the first bestowal of the APS Abraham Pais Prize for the History of Physics at the 2005 APS April meeting in Tampa, Florida.

INTERNATIONAL NEWS CONTINUED FROM PAGE 3

overcome the view among potential students abroad that the US no longer welcomes them here. And now, the federal government is seriously considering making it more difficult for scientists from abroad to conduct research on our university campuses. The higher education and scientific communities are working with federal officials, and we hope we are making them understand the potential impact of the "export control" rules they are considering. The last thing the national or global science enterprise needs is more unnecessary bureaucratic barriers to the international flow of scientists and engineers.

On September 8, the new Under Secretary for Public Diplomacy and Public Affairs, Karen Hughes, announced that she and Secretary of Education Margaret Spellings would convene a University President's Summit "to develop an action plan to encourage more American young people to study abroad and make sure that we continue to attract foreign students to America." This is a positive step forward, and we will continue working to see that continued discussion is accompanied by sensible policies as well.

I think it is also positive that more American colleges are making international studies a part of the undergraduate experience.

Having recently announced my intention to retire as president of AAU, I find myself thinking back on my own migration to the United States as a linguistics student many years ago. While my career has been based at American universities, my particular field, my personal background, and the very nature of higher education have helped make me an advocate of international collaboration in research and education.

The internationalization of universities is inevitable, and it is going to make our world a better place. It will certainly strengthen science and its ability to address the enormous and complex challenges that mankind faces in the 21st century. This does not mean that developing these complex relationships will be without difficulties. But the society at large, and science in particular, benefit when students of all nations have the greatest opportunities to learn, when scientists of all nationalities have the greatest opportunities to conduct research, and when research universities, regardless of where they are located, have the greatest opportunities to flourish.

Nils Hasselmo is president of the Association of American Universities.

Displaced Physicists Anticipate Return To Research and Teaching in New Orleans

By Ernie Tretkoff

An outpouring of aid offers from the physics community helped ensure that physics researchers and students from the areas affected by hurricane Katrina had places to go to continue with their studies and research.

Tulane University, like other universities in and around New Orleans, evacuated and closed for the fall semester when hurricane Katrina hit in late August. The evacuation order came just after students had begun arriving on campus, but before classes had started.

For several days after the storm hit, people were out of touch and disorganized, as evacuees scattered across the country and Tulane phone and email were unavailable, said Fred Wietfeldt, a Tulane physics professor.

But within days email lists, online message boards, and emergency websites had been set up. The physics department members made contact and verified that everyone was okay.

Tulane administrators began working from offices in Houston. People from other universities quickly began sending offers of aid through online message boards and personal contacts.

Jim McGuire, chair of the Tulane physics department, said he received many generous offers of aid. "I had at least seven people call me with offers of places to go."

The rest of the department has also found places to go. "Over half of our department has taken their groups and relocated. Most research groups simply collected themselves, and found the best place they could," said McGuire. Tulane research groups have resumed their work for the fall semester at institutions including Harvard University, the University of Illinois, Rutgers University, and Rice University.

Some faculty members are simply waiting for Tulane to reopen to resume their research. Most graduate students chose to follow their research advisors.

Many universities offered lab and office space to displaced researchers, and many offered displaced students spaces in classes and help finding housing. Within days of the hurricane, George Gollin of the University of Illinois, Urbana-Champaign, offered to take the entire group of Tulane undergraduate physics majors–about 35 students–at UIUC. McGuire said that when Gollin was asked how he could manage to take such a large number of students on such short notice, he replied, "I'm in high energy physics, we're used to organizing these things on a moment's notice."

Some students took Gollin's offer, while other undergrads chose to attend universities near their home towns. "All of the institutions have offered to let them take courses and transfer the credit to Tulane. That helps us," said McGuire.

Tulane plans to reopen in January. Wietfeldt, who had already planned to spend the year at NIST in Maryland, pointed out that a large portion of New Orleans, including Tulane's campus,

Displaced Physicists Continued on page 6

GRAVITATIONAL WAVES CONTINUED FROM PAGE 1

described as a sort of "ripple in spacetime," are predicted by Einstein's theory of general relativity, but have not been directly detected. The LIGO observatories each consist of a pair of perpendicular laser beams. A passing gravitational wave would change the path lengths of the laser beams slightly, and the detectors would note this tiny change.

Gravitational waves are expected to come from a variety of sources, including the inspiral of binary black holes, supernovas, and an overall background. Einstein@home specifically looks for signals from pulsars in LIGO data. Though the gravitational waves from pulsars would be weak, it is possible that these signals could be detected by LIGO.

Einstein@home analyzes the data by looking at each point in the sky and comparing the data from LIGO with the predicted gravitational wave pattern from a pulsar at the given point. Sorting through the data in this manner is computationally expensive, and could not be done with as much sensitivity without the help of volunteer Einstein@home users.

More users enable the project to detect weaker signals from more distant pulsars. "The distance that we can see grows with the number of computers," explained Bruce Allen of the University of Wisconsin-Milwaukee, who leads the Einstein@Home project.

Any possible signal a computer finds needs to be verified by other computers, so any detection would be made collectively, not just by an individual. "It's important to keep in mind that Einstein@home works as much by rejecting things that aren't signals as by detecting signals," says Allen, "This is really a collective effort."

Some users have gotten very excited about the project. A few have even purchased used computers from Ebay to dedicate to the project, says Allen. Users receive credits for the work their computers have done, but the credits are just for fun and motivation.

Although Einstein@Home did not find any sources of gravitational waves in the data from the S3 science run, this is not surprising, says Allen, since that data is not sensitive enough to guarantee that Einstein@home would see any pulsars. "This depends on luck: the location, shape, orientation and spin rate of the nearest pulsars to the Earth," states a progress report posted by Allen on the Einstein@home message boards.

"Our future analysis is going to be of data that's substantially more sensitive," says Allen, though it is still not certain that Einstein@home would detect gravitational waves from pulsars. In addition, says Allen, "We're close to putting into place an improved method of analysis."

Research and development work is underway to upgrade the instruments for Advanced LIGO, which is scheduled to be completed early next decade. At that point the instruments will be sensitive enough that failure to detect gravitational waves would challenge Einstein's theory.

Einstein@home is available for Windows, Linux, and Mac operating systems. The program provides a screensaver that depicts the celestial sphere with the major constellations outlined. A moving marker on the screensaver indicates the portion of sky being searched. The Einstein@Home website, which includes more information and instructions on how to sign up, is located at http://einstein.phys.uwm.edu/.

OPA'S REGAN CONTINUED FROM PAGE 1

far who have agreed to participate, and she welcomes contact from any APS members interested in volunteering their time. OPA plans to keep the program small at first to determine which methods are most effective and have the greatest impact. If successful, it will be expanded in subsequent years.

Regan comes to the APS from Princeton University, where she is just wrapping up a PhD in solid state chemistry. It might seem surprising to some that a chemist would find a home at APS, but her doctoral thesis is on magnetic properties of ruthenium oxide extended solids, and she conducted the research in collaboration with several condensed matter physicists. Regan's group made the materials, while the physicists made measurements on the properties. "So I feel quite at home interacting with physicists," she says, which made the transition from an academic chemistry department to the public affairs division of a physics society that much easier.

When she began her graduate studies, Regan intended to pursue the usual academic career track: a faculty position at a university, and head of her own research group. But she decided she wanted her career to have a larger impact on society, rather than focusing narrowly on a specific problem in chemical physics. Science policy struck her as an excellent means of combining her scientific expertise with her desire to have a positive impact on the world at large. It has meant learning an entirely different terminology, and familiarizing herself with the major players in the US House and Senate, but Regan says she has found the process both educational and invigorating.

In addition to the fledgling district advocate program, Regan handles general outreach to APS members, and is organizing a large Congressional visit event in conjunction with the 2006 APS March Meeting in Baltimore, Maryland. The goal is to get between 250 and 300 physicists to take time away from the conference to meet with their Congressional representatives and make the case for how science is relevant to every aspect of society, from driving the economy to improving national security. "People don't realize how much their lives are influenced by scientific discovery," she says. "It truly is everywhere. The smallest discoveries can have a major impact even 50 years down the road."

Washington Dispatch

A bimonthly update from the APS Office of Public Affairs

ISSUE: RESEARCH FUNDING

Congress has made little progress since the September Washington Dispatch on its appropriations bills for fiscal year 2006. Although the new fiscal year began on October 1, only two of the eleven Senate spending bills were signed into law in time for its start. As a result, most of the federal government is operating on continuing resolutions, which restricts the operations, budgets and planning of the affected accounts.

The Senate did pass the Defense appropriations bill and the Commerce, Justice, and Science (CJS) appropriations bill. The CJS bill, which the Appropriations Committee approved in July, includes NSF, NIST STRS, and NASA Science, whose values we reported in September. A summary of the Senate and House values for the accounts appears in the table below.

Account	FY04	FY05	FY06 President's Request	FY06 House	FY06 Senate
DOE Office of Science ($B)	3.48	3.60	3.46	3.66	3.70
NSF ($B)	5.61	5.47	5.61	5.64	5.53
NIST STRS ($B)	0.34	0.38	0.43	0.40	0.40
DOD 6.1 & 6.2 ($B)	5.71	6.36	5.46	6.51	6.28
NASA Science ($B)	NA	5.55	5.48	5.53	5.65

The next step is for the differences in the House and Senate versions of each bill to be worked out in "Conference." Both chambers must approve the reconciled bill before it goes to the President for his consideration. The progress of all spending bills is tracked at the AAAS website: http://www.aaas.org/spp/rd/approp06.htm.

Meanwhile, the Administration, in a closely guarded process, is working on its request for the FY07 budget, which it will announce on the first Monday of February. The President's Office of Management and Budget (OMB) is currently reviewing the requests from the Departments and independent agencies. Given the extremely tight budgets and calls for cuts to both mandatory and discretionary spending, science research funding is expected to be under great pressure.

★★★★★

ISSUE: ENERGY AND NATIONAL SECURITY

As previously reported, the APS Panel on Public Affairs (POPA) issued a Discussion Paper on nuclear power and proliferation resistance titled, "Securing Benefits, Limiting Risk." In response to the report, the National Nuclear Security Administration is establishing a Task Force on Safeguards that will evaluate needs and develop a technology roadmap. Also, bipartisan legislation is being developed that would, among other things, authorize funding for a Safeguards R&D program and authorize proliferation resistance modeling. To view the report, please go to http://www.aps.org/public_affairs/proliferation-resistance/.

★★★★★

ISSUE: GLOBAL COMPETITIVENESS

Last spring Rep. Frank Wolf (R-VA 10th), Chairman of the Appropriations Subcommittee on Science, State, Justice, Commerce and Related Agencies, directed the Department of Commerce to hold an Innovation Summit in Washington. "The National Summit on Competitiveness: Investing In US Innovation," will be held on December 6th 2005 in the Department of Commerce Building on Constitution Avenue. Co-hosted by the presidents of the American Electronics Association, the Business Roundtable, the National Association of Manufacturers, the Northern Virginia Technology Council, and George Mason University, the meeting will feature talks and discussions with CEOs of leading US companies, as well as meetings with cabinet-level federal officials. More information is available at http://www.usinnovation.org/.

★★★★★

ISSUE: CREATIONISM AND INTELLIGENT DESIGN

As previously reported, the APS Panel on Public Affairs (POPA) identified the Creationism/ID debate as an issue of concern for the Society. Under the leadership of Bob Eisenstein, the APS Washington Office is working with a number of other science organizations on a cooperative response. The Office of Public Affairs has posted information on its webpage regarding Intelligent Design, Creationism, and the APS position on this issue. For more information, please go to http://www.aps.org/public_affairs.

Log on to the APS Office of Public Affairs Website: (http://www.aps.org/public_affairs) **for more information.**

zero gravity

The Lighter Side of Science

The 2005 Ig Nobel Prize Winners

The 2005 Ig Nobel Prizes were awarded on Thursday evening, October 6, at the 15th First Annual Ig Nobel Prize Ceremony, at Harvard's Sanders Theatre.

AGRICULTURAL HISTORY: James Watson of Massey University, New Zealand, for his scholarly study, "The Significance of Mr. Richard Buckley's Exploding Trousers."

PHYSICS: John Mainstone and the late Thomas Parnell of the University of Queensland, Australia, for patiently conducting an experiment that began in the year 1927–in which a glob of congealed black tar has been slowly, slowly dripping through a funnel, at a rate of approximately one drop every nine years.

MEDICINE: Gregg A. Miller of Oak Grove, Missouri, for inventing Neuticles–artificial replacement testicles for dogs, which are available in three sizes, and three degrees of firmness.

LITERATURE: The Internet entrepreneurs of Nigeria, for creating and then using e-mail to distribute a bold series of short stories, thus introducing millions of readers to a cast of rich characters–General Sani Abacha, Mrs. Mariam Sanni Abacha, Barrister Jon A Mbeki Esq., and others–each of whom requires just a small amount of expense money so as to obtain access to the great wealth to which they are entitled and which they would like to share with the kind person who assists them.

PEACE: Claire Rind and Peter Simmons of Newcastle University, in the U.K., for electrically monitoring the activity of a brain cell in a locust while that locust was watching selected highlights from the movie "Star Wars."

ECONOMICS: Gauri Nanda of the Massachusetts Institute of Technology, for inventing an alarm clock that runs away and hides, repeatedly, thus ensuring that people DO get out of bed, and thus theoretically adding many productive hours to the workday.

CHEMISTRY: Edward Cussler of the University of Minnesota and Brian Gettelfinger of the University of Minnesota and the University of Wisconsin, for conducting a careful experiment to settle the long-standing scientific question: can people swim faster in syrup or in water?

BIOLOGY: Benjamin Smith of the University of Adelaide, Australia and the University of Toronto, Canada and the Firmenich perfume company, Geneva, Switzerland, and ChemComm Enterprises, Archamps, France; Craig Williams of James Cook University and the University of South Australia; Michael Tyler of the University of Adelaide; Brian Williams of the University of Adelaide; and Yoji Hayasaka of the Australian Wine Research Institute; for painstakingly smelling and cataloging the peculiar odors produced by 131 different species of frogs when the frogs were feeling stressed.

NUTRITION: Dr. Yoshiro Nakamats of Tokyo, Japan, for photographing and retrospectively analyzing every meal he has consumed during a period of 34 years (and counting).

FLUID DYNAMICS: Victor Benno Meyer-Rochow of International University Bremen, Germany and the University of Oulu , Finland; and Jozsef Gal of Loránd Eötvös University, Hungary, for using basic principles of physics to calculate the pressure that builds up inside a penguin, as detailed in their report "Pressures Produced When Penguins Pooh–Calculations on Avian Defaecation."

Living the (Scientific) American Dream

By Kaspar Mossman

Ed. Note: Each year APS sponsors two mass media fellows as part of a program run by AAAS. Typically these fellows are graduate students in physics or related subjects, who spend a summer writing about science for some mass media outlet. APS News has invited this year's mass media fellows, Kaspar Mossman and Michelle Lefort, to tell of their experiences in the pair of articles on this page.

Walter Mitty is a man who spins fantastic daydreams out of his humdrum life. "Rev her up to 8500! We're going through!" he commands his imaginary aircrew as he drives his wife through slushy streets to the hairdresser.

Grad students have lots of time to daydream as we do the drudge work of science, growing wafers or combing through lines of computer code. At UC Berkeley, where I am a PhD candidate in biophysics, I daydream as I pipette cells up and down in a sterile hood. "Trim it down to 350 words!" I tell myself. "Got to get this piece in before deadline! " In my mind, I'm a hardworking writer at *Scientific American.*

Wait…I *am* at *Scientific American*, at least for the next week. This summer, I've had a rewarding

Kaspar Mossman

experience as an AAAS Mass Media fellow, working with the best editors in the science magazine business. I've written on topics as diverse as silicon lasers, handedness in chimpanzees, and the genetics of trypanosomes. APS sponsored me as a fellow. What I've most enjoyed has been the variety–that, and being able to call up top experts in every field who are thrilled to tell a reporter from *Scientific American* anything he wants to know. In the day I describe below, you'll get some idea of what it's been like:

9:04 am: I arrive at the offices of *SciAm* in Manhattan. Mariette DiChristina, executive editor and my supervisor, buzzes me in. I'm researching a calendar for *Scientific American* MIND, the quarterly psychology/neurology magazine. We decide that the "Bodyworlds" exhibit at the Franklin Museum in Philadelphia qualifies as a MIND event, since you can see exploded views of real human brains.

10:00 am: "Triage" meeting, at which we gather to discuss first drafts from feature writers. At *SciAm*, many features are written by researchers themselves, and then heavily rewritten by editors, who transmute stilted jargon into fresh, clear writing that people shell out hard cash to buy at the newsstand. It's no mistake that this first edit session is called "triage." Some of the pieces can't be saved. We must focus on the living.

10:39 am: We huddle around editor-in-chief John Rennie's television–part of a hideous multipurpose camping thing, which also functions as searchlight and distress beacon, that Steve Mirsky gave Rennie as a gag gift–to watch space shuttle Discovery lift off. All goes well. We breathe again.

SciAm is moving its offices to different floors in the same building, to save money. Editorial and art

American Dream continued on page 7

Science Matters at USA Today

By Michelle Lefort

Why physics? This is a question I was often asked about my undergraduate major. Because it matters, I'd reply with a smile.

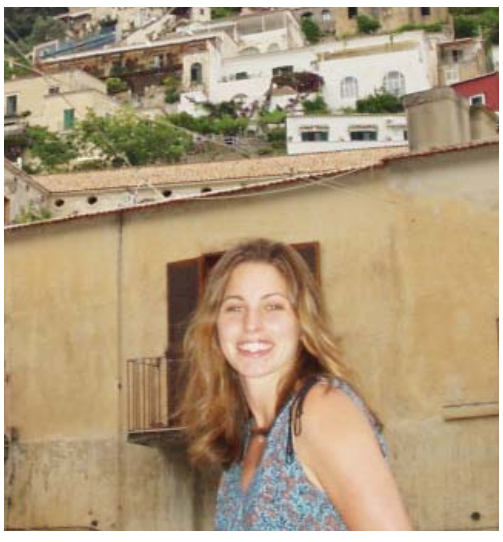
As a journalist with *USA Today*, I had the opportunity to answer this question not just to a handful of students but to millions of Americans. Of course, this wasn't limited to physics, but extended to mathematics, paleontology, chemistry, and biology.

I was fortunate to have APS sponsor me for a Mass Media Fellowship with the American Association for the Advancement of Science (AAAS). I was sent from a bench in Rochester, NY to spend ten weeks in McLean, VA at *USA Today*–the most widely circulated daily newspaper in the country.

I was accustomed to change and diving into new worlds. From physics to neuroscience to molecular biology, I had hopscotched my way around science, building a kaleidoscopic resume. I was prepared to absorb information from all corners of the scientific galaxy, but it was not as easy to transfer that into the palatable, concise world of print media.

Despite my inexperience, I was a reporter from my very first day. It was an incredible responsibility. My stories would be read across the country, and could shape people's understanding of the world. Like any person in a new environment I sought the familiar–I overresearched everything.

I spent hours on the phone with patient scientists getting all the details of their research, appropriate background, alternate interpretations, only to see it all turn into a mere three sentences.



Michelle Lefort

Research to a journalist is a different entity altogether from lab research. Instead of saddling up to do experiments, I consulted with experts whose own work could illuminate strengths and weaknesses in a given result. Instead of calculating significant differences and appropriate controls, I had to craft a story that someone without a science background could understand and hopefully enjoy–and that the scientists would respect.

As someone who has always been naturally attracted to science, it was hard to put myself in the place of a reader who doesn't like–or even care about–science. If I couldn't concretely explain why a story was interesting or important, I didn't have a chance of covering it. Just saying "Isn't that awesome?" wasn't going to convince an editor.

Over the course of my 10 weeks at *USA Today*, I calibrated my news eye. Early on I struggled to find stories that excited my editors, but I improved over time–at least I had fewer rejections near the end. I learned not only how to choose stories, but how to promote them.

One of my favorite stories covered a paper from *Physical Review Letters* on closed timelike curves. I wrote a fun article about the laws of physics, time travel and cinematic time machines.

Why physics? Because it's fun!

It was harder than I imagined communicating the awe of the scientific method, especially in a results-centered media. It was also hard to let go when pieces of the story would become mere scraps –like a discussion of the effects of quantum perturbations on the closed timelike curve solution–but print is space is money and I was happy to get my physics story in the paper.

I learned so much at *USA Today*. I learned about shark biology, prosauropod evolution and hurricane formation, but more than that I learned how to tell science as a story. I hope to continue developing this skill, promoting the coverage of science and engaging the minds of readers.

WYP SPEAKERS CONTINUED FROM PAGE 3

trying to reach institutions that give significant numbers of degrees to women, she said.

Some requests have come from high school, middle school and community groups. These requests have received lower priority so far, but program organizers hope to be able to fill more of those requests as more speakers volunteer.

The FHP and GGR will continue to sponsor the program this fall and into 2006. Groups can still request a speaker by filling out an online form, and the program administrators will try to match an appropriate speaker with the group. The FHP and GGR are also seeking more speakers who are willing to talk at an undergraduate level or high school level about history of physics, Einstein and his contributions, general relativity, and topics in astrophysics related to relativity.

Because the program has worked well so far, the main potential change is the name. They are accepting suggestions, and the best suggestion (from someone who also volunteers to be a speaker) will win a small prize.

To request a speaker: http://www.phys.utb.edu/WYPspeakers/REQUESTS/howto.html

To volunteer to be a speaker: contact Virginia Trimble, vtrimble@astro.umd.edu

DISPLACED PHYSICISTS CONTINUED FROM ON PAGE 5

wasn't badly damaged. "This was a very bad situation," he said, but not as bad as one might think from watching TV news reports. "You'd think the entire city was demolished," he said. But in fact, "many neighborhoods are physically in good shape. The human disaster was far worse than the physical disaster." He is confident that the city will rebuild, he says, "I love Tulane. It's a great place to work, and it's a great university."

As of late September, it appears there is only minor damage to the Tulane campus, and the university plans to reopen for the spring semester. In order for the university to reopen, said McGuire, the city of New Orleans needs to be functioning, with utilities such as water, sewer, and electricity all rebuilt. Some members of the university community may have extensive damage to their houses, and alternate housing will have to be found for those people. Meanwhile, McGuire and administrators are working on other plans, such as class schedules, for the university's reopening.

Announcements

Physicists Honored at Fall Division Meetings

Five physicists are being honored with APS prizes and awards at two fall divisional meetings. The Maxwell Prize, Excellence in Plasma Physics Award, and Marshall Rosenbluth Thesis Award were presented at the annual meeting of the APS Division of Plasma Physics, held October 24-28 in Denver, Colorado. The Fluid Dynamics Prize and the Andreas Acrivos Dissertation Award will be presented at the annual meeting of the APS Division of Fluid Dynamics, to be held November 20-22 in Chicago, Illinois. The recipients, their citations, and short biographical information are below

2005 JAMES CLERK MAXWELL PRIZE
Nathaniel Fisch
Princeton University

Citation: *"For theoretical development of efficient rf-driven current in plasmas and for greatly expanding our ability to understand, to analyze, and to utilize wave-plasma interactions."*

Fisch is Professor of Astrophysical Sciences and Director of the Program in Plasma Physics at Princeton University. He also is an Associated Faculty in the Department of Mechanical and Aerospace Engineering and the Associate Director for Academic Affairs at the Princeton Plasma Physics Laboratory. He studied Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, where he was an MIT National Scholar, earning his PhD degree in 1978. Fisch predicted new ways to drive electric current in hot, magnetized plasma by means of electromagnetic waves. These currents are now used to operate tokamaks continuously and to control heat transport. He is now exploring plasma-based methods of generating extreme laser intensities, plasma thrusters and related plasma devices, and fusion concepts employing magnetically or inertially confined plasma. Fisch received the APS Award for Excellence in Plasma Physics in 1992.

2005 EXCELLENCE IN PLASMA PHYSICS AWARD
Howard M. Milchberg
University of Maryland

Citation: *"For the conception and first realization of hydrodynamic shock-formed plasma channels, and for the development of diagnostics for their characterization."*

Milchberg completed his PhD in astrophysical sciences in 1985 at Princeton University, in the plasma physics program. His dissertation was on one of the first two soft x-ray lasers experimentally demonstrated. Milchberg then joined AT&T Bell Laboratories as a postdoctoral researcher, where he performed one of the first experiments in high intensity femtosecond laser-plasma interactions. In 1988 Milchberg joined the University of Maryland. He is a professor in the Institute for Physical Science and Technology, the Department of Electrical and Computer Engineering, and the Department of Physics. He is interested in all aspects of the interaction of intense short laser pulses with matter.

2005 MARSHALL ROSENBLUTH THESIS AWARD
Stefan P. Gerhardt
Princeton Plasma Physics Laboratory

Citation: *"For insightful theoretical modeling and innovative experimental measurement of plasma flows in three-dimensional toroidal geometries and demonstration of reduced parallel viscous damping with quasisymmetry."*

Gerhardt did his PhD work at the Helically Symmetric experiment, a quasiymmetric stellarator in the Electrical Engineering department of the University of Wisconsin-Madison. In addition to participation in the initial commissioning of the HSX device, his dissertation work demonstrated the reduction in neoclassical flow damping in a quasisymmetric stellarator. Gerhardt is presently employed by the Magnetic Reconnection Experiment at Princeton Plasma Physics Laboratory, studying the formation and stability of compact toroid plasmas formed by spheromak merging.

2005 FLUID DYNAMICS PRIZE
Ronald Adrian
Arizona State University

Citation: *"For his advancement of experimental techniques and their integration into experiments that have led to new insight into complex flows."*

Biographical information unavailable at press time.

2005 ANDREAS ACRIVOS THESIS AWARD
Silas D. Alben
Harvard University

Citation: *"For elegant mathematical and numerical analysis of fluid-structure interaction to elucidate deformation-induced drag reduction of flexible membranes in a wind and induction of forward flight by the symmetry-breaking flapping of wings."*

Biographical information unavailable at press time.

APS CONGRESSIONAL SCIENCE FELLOWSHIP 2006-2007

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/fellow/index.cfm) for detailed information on materials required for applying and other information on the program.

ALL APPLICATION MATERIALS MUST BE POSTMARKED BY JANUARY 15, 2006 AND SHOULD BE SENT TO THE FOLLOWING ADDRESS:

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

2006 APS Journal Policy Change

Starting in 2006, *Physical Review A-E* will no longer be available to members in a print version. Online only subscriptions will be available for these five titles. There are exceptions to the new policy, and current subscribers will be contacted with more information.

Subscription options for *Physical Review Letters, Reviews of Modern Physics, Physical Review Online Archive* (PROLA), and/or *Physical Review Index* will remain unchanged for 2006.

If you have any questions, please contact a membership representative at membership@aps.org or 301-209-3280.

Professional Skills Development for Women Physicists

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 needed to enhance their careers.
- Provide training in persuasive communication, negotiation, and leadership presented by experienced professionals, with an aim towards increasing the influence of female scientists within their own institutions.
- Provide a special opportunity for networking among participants.

Workshops at the 2006 March and April APS Meetings will be aimed at tenure track and newly-tenured women faculty, and will take place on Sunday, March 12, 2006 (Baltimore) and Friday, April 21, 2006 (Dallas). Deadline to apply for the March workshop is December 5; the deadline to apply for the April workshop is January 13.

Each workshop will be limited to 30 participants 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 are available on the CSWP webpage at http://www.aps.org/educ/cswp/index.cfm.

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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

Effective-field theories for heavy quarkonium
-Nora Brambilla, Antonio Pineda, Joan Soto, and Antonio Vairo

Quarkonium, the bound state of a heavy quark and antiquark, is a nonrelativistic system. The properties of such systems can be computed in a systematic way from QCD using effective field theory techniques. This article reviews the theoretical ideas, and their application to the spectroscopy, production and decay of quarkonium states.

AMERICAN DREAM CONTINUED FROM PAGE 6

move into temporary digs on the 15th floor, while the 12th is renovated. I get a tiny closet as an office. People stop by to look in and laugh. But I have a door which I can close when I am doing phone interviews, so I am better off than some of the senior editors, whose desks are out in the middle of big open spaces.

2:15 pm: George Musser, technology editor, hollers "Floor cleaning robot demo in the kitchen!" We crowd into the kitchen, where the floor actually could use a good scrubbing, as representatives from iRobot demonstrate the newest Roomba. The horseshoe-crab-like robot motors around the floor, bumping into shoes and table legs as it follows an algorithm which ensures it licks clean every spot on the floor at least five times. After a few minutes, it becomes clear this fantastic robot actually works. We leave it to complete its job.

George is writing about Roomba for *SciAm's* "Technicalities" column. Every month, this column reviews a *SciAm* editor's personal experience with some new technology. It's often a robot of some kind. In fact, I wasted a lot of time this July, trying to convince a Japanese company to send me their "home companion" robot for review. The *New York Times* already reviewed it, but *SciAm* wants to do it from, well, a more *technical* angle.

3:00 pm: Art meeting. In the hallway, the complete September issue is pinned to the wall, and we criticize the layout page by page. *SciAm* is justly famous for using art to explain science. Their art is so good because they are professionals, and they revise the layout over and over.

4:15 pm: I shut my "office" door for a phone interview with Devin Walton, product manager for Shimano American Corporation. Shimano is sending me a bicycle with digital automatic transmission, which I am reviewing instead of the Japanese robot. I'm excited about the bike, because I cycle all the time in Berkeley. As it turns out, the bike is fantastic–read about it in December!

6:10 pm: I'm not working as a grad student; therefore I feel no guilt at leaving the office at a reasonable hour. I disappear into the crowd on Madison Avenue; anonymous, except that I'm the only one whose shirt isn't tucked in. *SciAm* has a liberal dress code, for Manhattan.

The AAAS Mass Media program is designed to develop scientists as communicators. This July and August, the editors at *SciAm* have given me a real boost–I've improved my writing, sharpened my questions, and have a much better idea of what makes a good story. Thank you, APS, for sponsoring me.

The Back Page

Physics for Development in Africa

By Nithaya Chetty and Ahmed C. Bawa

Ed. Note: APS was a major participant in the planning and organization of the World Conference on Physics and Sustainable Development that was held in Durban, South Africa, October 31st-November 2nd.

This article deals with many of the issues related to the theme of that conference.

Physics as a discipline has suffered enormously at universities and in science systems across the African continent. The number of physics articles on the Science Citation Index emanating from institutions in Sub-Saharan Africa represents about 0.3% of the total number of papers published internationally. There are no easy answers to the obvious questions that may be asked.

Universities went into decline partly due to the impact of poor funding of higher education, partly due to the structural adjustment programs inspired by the World Bank and partly because of the collapse of African states in the decades following independence. And unlike the importance afforded to agriculture as a research enterprise, physics did not have an opportunity to establish itself. This is also due to the fact that physics had failed to re-imagine itself in these complex circumstances and thus failed to produce a convincing argument that its revival was important for development.

There is positive change in the higher education terrain due to changing local and global factors. The emergence of new understandings of the role of knowledge-producing institutions in economic growth and development and internal processes of democratization are generating new interest in universities. There is a growing understanding amongst African governments and policymakers that in terms of changes occurring in global production systems, the role of universities extends beyond their traditional role of contributing to nation-building and the production of successive generations of civil servants and professionals.

Participation rates in sub-Saharan Africa's higher education systems are exceptionally low, with most of the systems absorbing less than 1% of the 18-24 year age cohorts. This is made more complex by the fact that most low-income countries have secondary school science participation rates at the level of 5% to 10%.

The processes of democratization and the increase in local interest in building universities receives strong support from international role-players such as the governmental development agencies and the large US philanthropic foundations. The World Bank has re-entered the terrain through the development of a strategy to help developing nations to rethink their approach to higher education. In the last two to three years, the World Bank has made substantial grants to Mozambique, Uganda and Ethiopia for the development of their university systems.

An important factor that is shaping the development of African science is growth in the power and ubiquity of the information and communication technologies. One intervention has led to advances in developing the capacity of African universities to access "cheap" satellite-borne international bandwidth. Another is aimed at building large-scale research and graduate study networks amongst science research groups as a means of building critical mass in research capacity.

Africa's economy cannot be separated from that of the rest of the world and there is therefore a clear understanding that it needs to enter the knowledge and information era at a level which makes it competitive. And higher education has a fundamental role to play in building a new generation of graduates who are technology-savvy and able to lead the continent into this globalized terrain.

In light of the creation of the AU (African Union) and NEPAD (New Partnership for African Development) and the recent discourses on the re-imagination of Africa as a post-colonial entity–for instance through the development of an African Renaissance framework–it is increasingly clear that Africa must leapfrog into this knowledge and information era.

One way of doing this is to develop the capacity to excite the continent's young with the possibilities of being active generators of new knowledge and the generators of new tools for the production of that knowledge. Physics in South Africa, in particular, has positioned itself in a developmental role, and in here is its growing strength and its future in this region. The IUPAP-sponsored "World Conference on Physics and Sustainable Development" to be held later this month in Durban is the culmination of a growing trend amongst physicists, governments and funding agents in the developing world to view physics as an instrument of change.

Physics is rooted in clear, logical thinking. There is an appreciation of cause and effect. There are underlying principles that are universal–physical phenomena measured in Pietermaritzburg, Paris or Pluto are all governed by the same principles. This universal nature is one of the triumphs of physics. Physicists of all hues and creeds - including Africans–have contributed to this vast body of knowledge over the centuries.

Many of the principles by which physics is governed are relevant to society-at-large. The quest for mutual respect and appreciation for peoples' abilities and contributions independent of their background are ideals we must all strive for in this world. These attitudes are central for building democratic societies, and in this way physics has an important role to play in the development of Africa.

Africa must participate in its technological development and not be entirely dependent on foreign inputs. Africa must utilize its natural resources optimally, and must pay more attention to its environment and to safety. All these factors impact on its economic well-being which ultimately creates jobs and alleviates poverty.

Physics is an intrinsic part of the culture of all of humanity. Human beings have been curious about the world that they live in (and beyond) for time immemorial. It is precisely this curiosity that has led humans to harness energy, understand our environment, and develop technical applications that are the hallmarks of the modern era. Africa cannot afford to continue to be marginalized in this domain.

It is clear that a proper environment and culture must be established in Africa for pursuing science seriously–there is no endemic reason why Africa should fare poorly. For those who care about the continent and its people, a more serious effort must be made to help create the conditions for which mathematics and science can thrive.

If we do not make significant inroads in the near future, then other endeavors will not be able to make the strides that are anticipated: it has been suggested, for example, that the 21st century belongs to the biological sciences. It is, however, generally not appreciated that significant achievements in these disciplines will not be made without the involvement of mathematics and physics. Researchers with strong mathematical, physical and computational skills working in close collaboration with biologists are absolutely essential if this vision is to be realized. Africa must continue to invest in the basic sciences if it is going to compete on equal terms with the rest of the world. We cannot apply science if we do not have the basic sciences to apply.

The growth potential of computational physics in Africa, for example, is enormous and yet to be fully realized. At present our universities do not have a strong culture of hands-on computing. This lack of capacity is reflected in our society-at-large where there is an over-reliance on expensive commercial software to solve problems.

Africa must make maximal use of freeware software to keep expenses to a minimum. In South Africa, Mark Shuttleworth (first African in space) has very generously supported the use of Open Source, and several universities including our own have benefited from substantial donations from his foundation. Needless to say, computational physicists are at the very forefront in using these new facilities innovatively. The potential spin-offs are tremendous with local government and businesses showing a keen interest in going the Open route.

The AAIICT (African Advanced Institute for Information and Communication Technology) is currently being set up in Pretoria, and shows tremendous potential for boosting research in the computational sciences on the continent. The CHPC (Centre for High Performance Computing) is being established in Cape Town under the auspices of the AAIICT and will make available resources to scientists on a competitive basis for grand-challenge scale computational projects.

Nithaya Chetty and Ahmed C. Bawa

Southern Africa has invested significantly in the field of observational astronomy. SALT (South African Large Telescope), HARTRAO (the Hartebeeshoek Radio Observatory), HESS (the High Energy Stereoscopic System) and the proposed SKA (Square Kilometer Array) demand competent African graduates to maintain a high level of research productivity for the future, and this is creating greater incentives for students to take physics.

The recently concluded international review of physics (see http://www.saip.org.za) in South Africa has given much impetus for physics, not only in South Africa but also the rest of the continent and beyond. The proposed NITheP (National Institute of Theoretical Physics) has reached an advanced stage of planning and is due to be launched next year. The South African government has required that the Institute set as a high priority the development of quality black graduates in mathematics and theoretical physics. In addition, government has ordered that the Institute must make an impact on the continent. It is here that our international partnerships will help enormously. We need a steady stream of high quality international visitors to our shores to expose our bright young minds from the continent to current topics in physics. The Chris Engelbrecht Summer School series has established a tradition of doing precisely this–it is no exaggeration to suggest that the success of this School series strengthened the original bid to form the NITheP.

Discussions are underway to establish a South African synchrotron light source as well as a high powered laser facility, both of which will create more opportunities for intra-African as well as international collaborations.

The National Research Foundation of South Africa has supported the creation of Centers of Excellence in various fields including Materials Science. These large-scale so-called "flagship" projects have been funded as a mechanism to bootstrap scientific development in the country. South Africa has an historical interest in strong materials such as synthetic diamond, boron nitride, etc. that has made it one of the world leaders in the cutting tools and abrasives industries. There is a recognition that in order for the country to remain at the forefront in this field, quality materials research is vital.

There are a number of pan-African initiatives that have come to fruition over recent times: The African Institute for Mathematical Sciences, The African Laser Centre, The AAIICT, The African Materials Research Society, etc. More funding is becoming available from SADC (Southern African Development Corporation), NEPAD, the AU, etc. These initiatives are creating exciting opportunities for the advancement of physics as an academic discipline as well as creating quality human resources and making significant contributions toward addressing problems of relevance to Africa.

The physics community in South Africa is actively reaching out to physicists elsewhere in Africa who often toil under extraordinarily isolated circumstances. We want to see more African physicists spend more time in South Africa to strengthen collaborations, to access laboratory facilities, and to also be exposed to our international visitors.

A niche area exists for the research and development of undergraduate textbooks in physics with a focus on applications of relevance to Africa. This opens a whole new field of endeavor for those who are interested in developing teaching materials. This is an area where African physicists can get involved and make contributions on par with the rest of the world.

The declaration by SADC to increase the percentage of GDP to be spent on research and development means that we need to substantially increase graduate student production, and this is creating exciting opportunities for physics in the region. The physics community has been championing the cause of scientific development as a vehicle for progress at all levels within society, including educational, commercial, industrial and governmental. In this landscape, physics is beginning to establish itself as an instrument for change, and governments are beginning to listen.

Chetty directs the program in Computational Physics at the University of KwaZulu-Natal and is currently the president-elect of the South African Institute of Physics. Bawa is the Deputy Vice-Chancellor (Research) of the University of KwaZulu-Natal and has recently headed the Ford Foundation Africa section.