APS physics

Capitol Hill Quarterly

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JUNE 2007 VOLUME 2, NO. 1

House Speaker Pelosi & Sen. Alexander Recognized for Leadership in U.S. Innovation & Competitiveness

Speaker of the House Nancy Pelosi (D-CA) and Sen. Lamar Alexander (R-TN) recently received the 2007 George E. Brown Jr. Science, Engineering and Technology Leadership Award for their leadership in ensuring that the United States meets global competitiveness challenges of the 21st century.

Pelosi was chosen for the House Democratic Innovation Agenda, which she announced in late 2005. The agenda, which follows recommendations of the National Academy of Sciences' report *Rising above the Gathering Storm*, proposes concrete measures for an educated and skilled U.S. work force and revitalized research at U.S. universities and national laboratories. Since announcing the agenda, Pelosi has championed its proposals, most notably after becoming Speaker of the 110th Congress, when science research was made a priority in the Fiscal Year 2007 joint funding resolution.

Alexander was chosen for tirelessly publicizing, with Sen. Jeff Bingaman (D-NM), the report *Rising Above the Gathering Storm*, which has played an important

role in bringing attention to the issues of competitiveness and innovation in the United States. Alexander has co-sponsored many pieces of legislation most notably the America COMPETES Act, S.761, which passed the Senate overwhelmingly on April 25. The Act would codify into law most of the recommendations of the *Rising Above the Gathering Storm* report.

The Science, Engineering and Technology Work Group (SETWG) present the Brown award annually to members of Congress who are effective advocates of federal science and technology programs. The award is named for the late Rep. George E. Brown Jr., a long-time member of Congress, who made outstanding contributions to federal support for science and technology.

Pelosi and Alexander were honored during a reception on Capitol Hill on May 1 in connection with the 12th Annual Congressional Visits Day (CVD)–the preeminent yearly event during which hundreds of scientists and engineers from around the country come to Washington for two days of briefings and visits to their members of Congress. It is sponsored by the SETWG, which comprises more than 40 companies and organizations representing a broad cross section of science and technology institutions in academia, the government and in private industry.

Promoting Science

APS members recently visited members of Congress to underscore the importance of federal funding for basic scientific research. Seen here visiting with Sen. Charles Grassley of Iowa (center) are Professor John Hill (left), an experimental nuclear physicist and user of the Relativistic Heavy Ion Collider–a physics research machine at Brookhaven National Laboratory in New York; and Professor Michael Tringides, an experimental condensed matter physicist and senior physicist at the Ames National Laboratory in Iowa.

APS Panel Report Assesses Nuclear Waste Storage Issues

The APS Panel on Public Affairs (POPA) recently released a report assessing some of the issues involved in developing one or more consolidated interim storage sites where nuclear waste could be stored until a permanent repository at Yucca Mountain in Nevada is opened.

Approximately 54,000 tons of spent nuclear fuel are stored at operating nuclear power plants and several decommissioned power plants throughout the country. Current storage facilities at reactor sites were not meant to be permanent, but the schedule for opening Yucca Mountain continues to slip. The federal government is incurring increasing liability costs the longer spent fuel remains at reactor sites, and there is concern that continuing to store spent fuel at power plants will make it more difficult to find sites for new nuclear power plants and to build them.

The POPA Nuclear Energy Study Group examined issues associated with the centralized interim storage of spent nuclear fuel and has issued a technical and programmatic assessment.

"We found no major technical benefit to developing a consolidated interim storage site," said John Ahearne, one of the study group co-chairs. "There may be some programmatic benefits to a consolidated storage site," he said.

One advantage of a consolidated storage site is that it could "relieve impediments to the growth of nuclear power," the report says. A consolidated site would decouple the private sector nuclear power plant operators from uncertainties inherent in the federal long-term spent fuel management program, the report notes. "The assurance that spent fuel can be removed from a reactor to a storage site may reduce the difficulty in siting new plants," the report says.

The study group determined that there are no technical barriers to long-term safe and secure interim storage either at nuclear reactor sites or at a consolidated site. "The safety and security risks associated with storage of spent fuel are not appreciably different whether the fuel is stored at plant sites or in one or more consolidated facilities," the report states.

Even if Yucca Mountain opens as scheduled in 2017, it will take several decades to move all the currently stored spent fuel to the site. Interim storage, either at reactors or at one or more consolidated sites, will still be necessary, the study group reports. The study group also found that there is sufficient storage capacity at current nuclear reactors to hold all spent fuel for the duration of the plant licenses.

The full report is available online under "Reports and Studies" on the Policy and Advocacy page of the APS Web site, www.aps.org.

Major Donation Launches New Math and Science Education Initiative

A donation of $125 million from ExxonMobil Foundation will support a new program to help America regain its global leadership position in technological innovation by supporting programs that improve math and science education. The new program, the National Math and Science Initiative (NMSI), was announced by ExxonMobil and leaders in America's education community on March 9.

The NMSI was created in response to the National Academies' 2005 report, *Rising Above the Gathering Storm*, which called for improving American students' performance in math and science to ensure U.S. global competitiveness.

The NMSI will scale-up two existing programs. One is training and incentive programs for Advanced and pre-Advanced Placement courses. The AP program enables high-school students to take college-level material and often to gain college credit for their work. The other is UTeach, a program at the University of Texas at Austin that has become a national model for science teacher preparation. The UTeach

program has doubled the number of UT Austin students receiving math and science teacher certification.

The University of Texas at Austin is a member of the Physics Teacher Education Coalition (PTEC), an association of physics departments dedicated to the improvement of K-12 physics and physical science teacher preparation. PTEC grew out of the APS-led Physics Teacher Education Coalition (PhysTEC) program for improving teacher preparation.

UTeach has implemented the practices that PhysTEC and PTEC promote to improve science teacher preparation. One factor in the program's success is the significant collaboration among the College of Natural Science, the College of Education, and teachers from local schools, said Michael Marder, a professor of physics and co-director of UTeach.

"The most important element in UTeach is the fact that groups of people who used to work separately have come together," said Marder, who is also the chair of the APS Committee on Education.

Capitol Hill Quarterly is a publication of the American Physical Society, www.aps.org. APS is a nonpartisan, professional society of physicists with more than 46,000 members.

On the Back Page

Congressman Rush Holt Discusses Science & Research Development

APS Members in the Media

"If we're going to delay global warming, what we can do in a big hurry is energy efficiency: better cars, better buildings, better industry."

***Arthur Rosenfeld**, California Energy Commission,* **(CA-9th)**, (*February 17, 2007)*

"There's a tremendous amount of work building the apparatus, getting the experiment to work. But sitting there late at night in the lab, and knowing light is going at bicycle speed, and that nobody in the history of mankind has ever been here before–that is mind-boggling. It's worth everything."

***Lene Hau**, Harvard University,* **(MA-8th)**, (*March 17, 2007)*

"In physics, there's a sense of discovery, and what it contains is far beyond what we imagined we could have imagined."

***Nima Arkani-Hamed**, Harvard University,* **(MA-8th)**, *on what motivates scientists, (February 12, 2007)*

"For 28 years, we've done what we wanted to do, and there's no reason to stay and generate more of the same data. If people don't believe us after all the results we've produced, then they never will."

***Robert G. Jahn**, Princeton University,* **(NJ-12th)**, *on the closing of Princeton's engineering anomalies lab, which studied paranormal phenomena, (February 10, 2007)*

"You can't buy a $20 phone without being offered an extended warranty. If you said 'No' every single time, you would save more than enough in the long run to pay for the few repairs you actually need."

***Joseph Ganem**, Loyola College,* **(MD-3rd)**, *February 18, 2007*

"Bubble chamber pictures have played an important role in conveying science without oversimplifying the fundamentals. It's like, 'What you see is what you get.' These pictures are, in my mind, masterpieces of nature's abstract art."

***Vivek Sharma**, UC San Diego,* **(CA-53rd),** *March 1, 2007*

Grave Concern About Earth Observing Satellites at Science Committee Hearing

"Flying blind" was one of the many terms that House Science and Technology Committee Chairman Bart Gordon (D-TN) used during a recent Congressional hearing to describe the nation's rapidly deteriorating system of Earth observing satellites.

Gordon's assessment was shared by committee members on both sides of the aisle during this review of a National Research Council report, *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond*.

"The United States' extraordinary foundation of global observations is at great risk," the NRC report declared. "Between 2006 and the end of the decade, the number of operating missions will decrease dramatically and the number of operating sensors and instruments on NASA spacecraft, most of which are well past their nominal lifetimes, will decrease by some 40 percent."

One of the major problems highlighted at the hearing was funding. Study co-chair Richard Anthes, president of the University Corporation for Atmospheric Research, testified that "while societal applications have grown ever-more dependent upon our Earth-observing fleet, the NASA Earth science budget has declined some 30% in constant-year dollars since 2000. This disparity between growing societal needs and diminished resources must be corrected." The report's "over-

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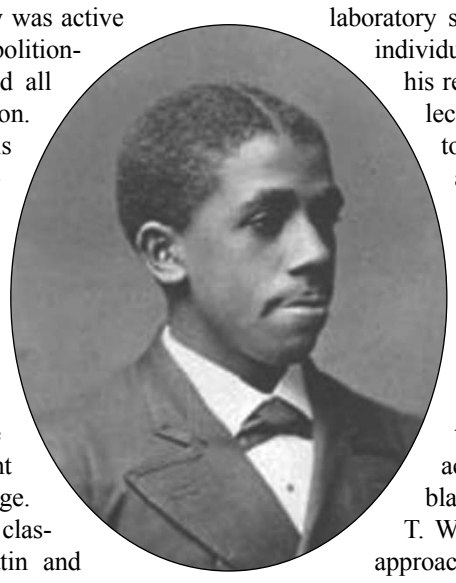
Snapshots from Physics History

June 1876: Edward Bouchet becomes the first African-American PhD in physics

In 1876, Edward Alexander Bouchet made history by becoming the first African-American PhD physicist and the sixth person of any racial background to receive a PhD in physics from an American University. Bouchet went on to educate and inspire others as a science teacher at a school for black students.

Bouchet was born in September 1852, in New Haven, Conn. His father, a freed slave, was an unskilled laborer like many black men in the town. His mother was a housewife, and he had three older sisters. The Bouchet family was active with their local church and abolitionist movement and encouraged all the children to get an education.



The local public schools were segregated, so in elementary school, Bouchet attended the Artisan Street Colored School, which had 30 students of all grade levels and one teacher. In 1868, he gained admittance to Hopkins Grammar School, a prestigious private preparatory school that sent its graduates to Yale College. At Hopkins, he received a classical education, studying Latin and Greek as well as geometry, algebra and history. Bouchet graduated first in his class in 1870 and entered Yale in the fall of the same year.

Bouchet was not the first black student to enter Yale, but he was the first to graduate. He lived at home during his time at Yale and was clearly devoted to his studies. In June 1874, he graduated sixth in a class of 124 students. He was the first black person to be nominated to Phi Beta Kappa.

As a talented young black man interested in science, Bouchet had come to the attention of Alfred Cope, a philanthropist in Philadelphia who was on the board of managers for the Institute for Colored Youth (ICY). The ICY was one of the few places in the city where black students could receive an academic high school education. Cope wanted to expand the science program there and hoped to bring Bouchet onto the staff.

But before recruiting him as a teacher, Cope encouraged Bouchet to continue his studies and paid for his graduate education at Yale. Bouchet spent two more years there, completing further studies in chemistry, mineralogy and physics. His primary professor was Arthur Wright, who in 1861, had become the first person to earn a doctorate in physics from an American university. Bouchet's original research focused on geometrical optics, and he wrote a dissertation titled, "On Measuring Refractive Indices." Two years after completing undergraduate studies, Bouchet became the first black person to earn a PhD in physics.

A white person with Bouchet's credentials would have been able to obtain a university position, but even with his impressive accomplishments, not many career options were open to him as an African-American. So, in the fall of 1876, Bouchet went to teach at the Institute for Colored Youth, as Cope had wanted.

At ICY, Bouchet headed the school's new science program. In addition to physics and chemistry, Bouchet taught classes in astronomy, physical geography and physiology. An advocate for improving science education, Bouchet repeatedly asked the school's board of managers to provide laboratory space for students to perform individual experiments. In addition to his regular teaching, Bouchet gave lectures on various scientific topics for students and staff, and even reached out to the wider community by giving public lectures on science.

Bouchet taught at the ICY for 26 years. However, by around 1900, many black young people were being pushed into vocational and technical training, rather than academic education. Even black leaders, including Booker T. Washington, advocated for this approach, arguing that this type of education was what suited black people best. Bouchet's accomplishments clearly showed that black people are capable of academic and scientific pursuits, but at the ICY managers' decision, in 1902, the school gave up academic subjects and shifted its focus to industrial education. Bouchet lost his job.

Bouchet spent the next several years in several different teaching positions around the country. In 1916, he returned home to New Haven in poor health and died, in 1918, at age 66. He was survived by his mother, who died two years later at age 102.

As a black man in a segregated society, Bouchet surely faced many challenges, but he didn't leave behind many letters or notebooks, so we know little today about his life. A friend of his wrote in an obituary that Bouchet was "a man of keen sensibilities and unusual refinement. He was a prolific reader and was greatly interested in the history of his own people and of his native town."

Bouchet never married or had children. He was a member of the Franklin Institute, the American Academy of Political and Social Science, and was active in the NAACP.

Throughout his career in teaching, Bouchet had educated many black youth in science, but they were still excluded from most scientific education and careers for many years. It was not until 1918, the year Bouchet died, and 42 years after he received his PhD, that Elmer Imes became the second African- American to receive a PhD in physics.

Further reading: Ronald E. Mickens, ed., Edward Bouchet, The First African-American Doctorate*, World Scientific Publishing Company (2002)*.

APS Capitol Hill Quarterly

APS Physics Capitol Hill Quarterly is published four times yearly by the Washington Office of the American Physical Society (APS). It contains news of the Society and of physics relevant to Capitol Hill, as well as opinions. The APS Headquarters is located at One Physics Ellipse, College Park, MD 20740-3844, (301) 209-3200.

June 2007 • Series 2, Vol. 2, No. 1 • © 2007 The American Physical Society

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Nose Out of Joint

Photo by James Riordon

Tim Gay's nose is out of joint because, as shown in the picture, he tried, and failed, to balance a gyroscope on the tip of it. Gay, professor of physics at the University of Nebraska, gave a public lecture during a recent APS meeting on "the physics of football." He has written a book with the same title and is celebrated for his video spots shown at halftime on the stadium jumbotron during Nebraska football games. The gyroscope on his nose was meant to demonstrate conservation of angular momentum–a principle of physics used by quarterbacks when they throw spiral passes.

Scientists and Engineers Get the Oscar for Improving Film Production and Preservation

Each year, the Academy of Motion Picture Arts and Sciences awards its Scientific and Technical Achievement awards to the scientists and engineers that have designed and developed technologies that contribute to the progress of the film industry. These technical innovations have been successfully used in movies and have become the gold standard by which new technologies are judged.

This year's 15 awards include praise for film production and preservation.

Here is a sampling of some of this year's winners:

FILM PRODUCTION

ILM Image-Based Model System. Steve Sullivan, director of research and development at Industrial Light and Magic (ILM), worked with a team of electrical and computer engineers to design and develop the ILM Image-based Model System.

The system starts with one or more images of an object or scene, such as a landscape, prop, or humane face. Then, a combination of computer algorithms and artist tools are applied to create a 3D model. "The resulting model is often comparable to a laser scan of the object," said Sullivan. "The system can help visual effects artists create detailed models directly from a few photographs, even for subjects such as babies or large-scale landscapes which are impossible to scan using traditional techniques."

The software behind the making of the creepy face (below) Pirates of the Caribbean won an Oscar this year.

OpenEXR Software System. Florian Kainz, the computer graphics principal engineer with the Research and Development group at ILM, designed and engineered the OpenEXR software system. OpenEXR is a set of software libraries and a file format for storing digital images with very high fidelity, which is required for creating visual effects in movies as well as scientific visualizations. One feature of this system is the ability to store more than just the color information with each pixel. "For example, in computer graphics, when you want to simulate motion blur that results from photographic moving objects," said Kainz, "you need to know how fast and in which direction the objects in an image are meant to move."

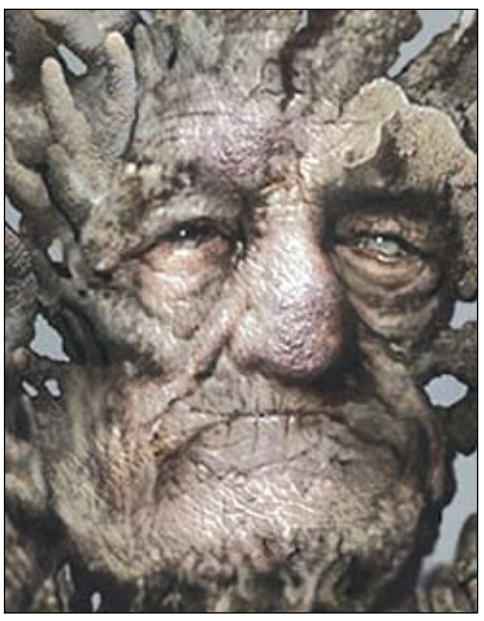


Image courtesy of Industrial Light and Magic (ILM)

"Wyvern" in Pirates of the Caribbean: Dead Man's Chest

FI+Z. Howard Preston, president of Preston Cinema, using his experimental and theoretical physics background, has designed the Preston Cinema Systems FI+Z wireless remote system. Until the early 1990s, wireless devices used to remotely control camera and lenses were unpredictable on a movie set because they interfered with the many communication devices such as high-powered walkie-talkies commonly found on the sets.

FILM PRESERVATION AND ARCHIVING

E-Film. Bill Feightner, the executive vice president and chief technology officer at E-Film, designed and developed the E-Film process. When preserving film, the colors of the film would break down over time. This made trying to keep a film perfectly intact very difficult. With E-Film, each negative is separated digitally into four different negatives: black and white, yellow, cyan (blue), and magenta (red).

Using E-Film, these digital negatives and additional information about the colored digital negatives could be recombined at a later date to produce the same vibrant colors they had during the very first time the movie played.

Courtesy of Inside Science News Service

APS Meeting Session Explores New Sources of Oil and Gas

Heavy oils and natural gas hydrates, which exist in vast reserves, could potentially become a significant source of energy, but these resources are much more difficult and expensive to produce than conventional sources of oil and natural gas. During a recent APS meeting, at a session on the future of fossil fuels, speakers provided assessments of these potential alternative sources of oil and natural gas.

Natural gas consumption has been rising rapidly and is expected to increase 70 percent by 2025, said Timothy Collett, of U.S. Geological Survey (USGS). The United States currently consumes about 25 trillion cubic feet of natural gas per year.

An alternative could be found in gas hydrates, said Collett. Hydrates are ice-like solids in which water molecules trap the methane molecules in a cage-like structure. Hydrates look a lot like ordinary ice, but they burn when lit with a match.

Like conventional natural gas, most gas hydrates are methane-based, and thus produce relatively clean burning fuel. Burning methane adds less carbon dioxide to the atmosphere than burning coal or oil.

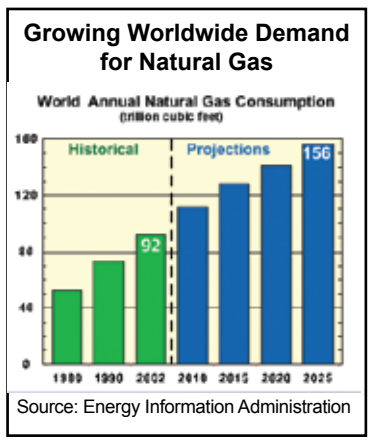
Hydrates, first discovered in 1983, can be found on the sea floor near the coasts and underneath the arctic tundra. Earth contains vastly more natural gas in hydrates than in conventional natural gas, said Collett.

"Hydrates are a very large, known source of natural gas," he explained. There has been increasing international interest in recovering and using these resources, he added. The U.S. has about 320,000 trillion cubic feet of gas hydrates, but only 1,200 trillion cubic feet of conventional natural gas reserves.

More research is under way to assess more accurately how much hydrate natural gas exists and how much of it might be recoverable, Collett said.

Recovering the gas is challenging, but possible. Several research projects have shown that gas hydrates can be produced by either heating the hydrates or decreasing the pressure to release the gas. More testing of these methods is still needed, said Collett.

Environmental concerns associated with hydrate production include possible damage to the sea floor or possible accidental release of methane gas. Any project that produces gas hydrates would have to deal with these concerns, said Collett. However, accidental release of methane is unlikely, he said.



Source: Energy Information Administration

Based on the limited studies done so far, Collett believes hydrates could become economically competitive with conventional natural gas.

Another promising source of energy is heavy oil, Doug Schmitt of the University of Alberta reported. Significant heavy oil reserves exist in Canada, South America, and Colorado, while most of the world's light oil reserves are in the Middle East.

Heavy oil looks like sand with tar added, Schmitt said. Heavy oil is abundant, but because it is so thick–its viscosity is similar to peanut butter–it is difficult to extract and use.

"The real problems are accessing it and being able to produce enough," said Schmitt.

CONCERN continued from page 2

arching recommendation" is that the U.S. government, working in concert with the private sector, academe, the public, and its international partners, should renew its investment in Earth observing systems and restore its leadership in Earth science and applications.

Also on hand at the hearing was Anthes' co-chair, Berrien Moore III, director of the Institute for the Study of Earth, Oceans and Space at the University of New Hampshire. Moore told the committee that "at a time of unprecedented need, the nation's Earth observation satellite programs, once the envy of the world, are in disarray." After describing the difficult choices that the NRC committee made in narrowing more than 100 suggested future mission concepts into a far more limited set of recommended missions for the next decade, Moore explained that "the recommended NASA program can be accomplished by restoring the Earth science budget in real terms to the levels of the 1990s."

Moore described NASA's out-year Earth science budgets as fundamentally flawed and "totally inadequate to accomplish the decadal survey's recommendations." The NOAA budget outlook is mixed, Moore said, and assessing it over the long term is difficult because it "is far from transparent."

First conceived in 2004, the report was conducted at the request of the NASA Office of Earth Science, NOAA National Environmental Satellite Data and Information Service, and the USGS Geography Division. The full text can be accessed at http://books.nap.edu/catalog/11820.html.

Courtesy of FYI, the American Institute of Physics Bulletin of Science Policy News (http://aip.org/fyi)

The Back PAGE

Science and Research Deserve Long-Term Congressional Support

By Congressman Rush Holt

Congress still has not shown a good appreciation of research and development and their importance to the general economic and social welfare of our country. From time to time, Congress has shown an appreciation for research directly related to human health. Integral to the quality of life that Americans enjoy is the peace of mind that, should they or their loved ones be afflicted with a deadly or debilitating disease or injury, doctors will have access to the most technologically advanced techniques to improve their health. Many of these treatments were a direct result of the research and granting roles of the National Institutes of Health (NIH). From 1998 through 2003, the NIH budget was doubled from $13.7 billion to $27.1 billion, an explicit bipartisan goal in Congress that benefited from the support of Presidents Clinton and Bush.

The direct impact that quality healthcare has on our quality of life lends broad public support to increasing funding for medical research. Less obvious, but equally important to our quality of life, is the research and granting capacity of other federal research agencies. Often when a group of citizens comes to present their case for increased research on a particular human ailment, like juvenile diabetes, ALS, or lupus, I ask them where NIH will find the instrumentation, the methodology, and the fresh scientists to do the research. I then ask them to lobby just as hard for funds of the National Science Foundation (NSF) and the other federal agencies as they do for the NIH disease centers.

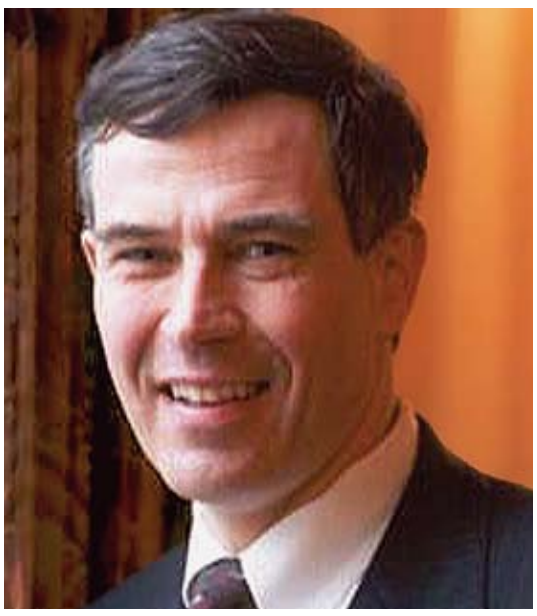
Because the NSF and the Department of Energy's Office of Science (DOE-SC) work on research more basic and less narrowly focused than the NIH, the consensus to double investment in the NIH came well before our commitment to do the same for the NSF and DOE-SC.

Both NSF and DOE-SC have broad missions, including not only the basic scientific research in areas like physics, chemistry and biology, but also applied research in areas like defense, alternative energy, and telecommunications.

"The research of the DOE, for example, is invaluable. In nearly all fields of science and engineering, our progress is dependent on obtaining a better understanding of the structure of complex molecules."

The research of the DOE, for example, is invaluable. In nearly all fields of science and engineering, our progress is dependent on obtaining a better understanding of the structure and behavior of complex molecules. One of the most effective ways to examine molecules and their behavior is to subject them to a high-energy beam, and then analyze how the beam is scattered by passing through a sample of the molecule. This information can be used to derive a three-dimensional movie that shows the location and movement of every atom. These beams might be intense X-rays, as generated by DOE-SC's four synchrotron X-ray sources, or beams of highly accelerated neutrons, as generated at DOE-SC's new Spallation Neutron Source (SNS) at Oak Ridge National Lab. The construction of SNS was completed in 2006, and the facility will take substantially more detailed measurements of materials than anything else on the planet.

Medical researchers use these beams to discover the structure of biological molecules, such as proteins and RNA. This information is crucial for the understanding of biological processes and the development of new medicines and treatments. Industrial researchers use these beams to study how materials behave under stress, and to make electronics smaller and faster. Therefore, DOE-SC facilities are used not only by academic researchers in numerous fields, but also by private corporations who rent time on the



equipment. Neither the academic researchers nor the private corporations could plausibly invest in such equipment themselves. The Spallation Neutron Source, for example, cost $1.4 billion to construct. For a single application, this is an astronomically implausible expense. Collectively, this is a sound investment. In fact, Japan will soon have a Spallation Neutron Source of its own. If the United States did not lead the world in this technology, global companies that are key to our international competitiveness and job opportunities would have little choice but to move their operations overseas.

While DOE-SC's beamlines are indispensable to American technology and medicine, they are only a small part of DOE-SC's overall work. In fact, DOE-SC is divided into five interdisciplinary program offices: Advanced Scientific Computing Research, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, and High Energy Physics and Nuclear Physics. Like the beamlines, the computing resources developed by the Office of Science are used broadly in research and industry on questions very different from the in-house application to fusion and fuel cell simulations. Biological and environmental sciences, in particular, make significant use of the computing facilities developed and maintained by DOE-SC.

"The need to develop sustainable energy sources is critical for our economy, national security, and environment and so the United States is cooperating internationally to develop ITER, an international experimental fusion facility."

The Department of Energy's Office of Science also works–of course–on energy science. Before coming to Congress, I served for nine years as Assistant Director of one of the DOE-SC laboratories, the Princeton Plasma Physics Laboratory (PPPL). The primary mission of PPPL is to advance the science and technology necessary for fusion energy to become a reality. The need to develop sustainable energy sources is critical for our economy, national security, and environment and so the United States is cooperating internationally to develop ITER, an international experimental fusion facility. Our partners include the European Union, Japan, China, India, Korea, and Russia. Our participation is being managed by DOE-SC and funded through its budget.

Under the Continuing Resolution from the end of the 109th Congress, funding was kept flat for every item in the budget, including the budget of DOE-SC. A flat budget item is difficult for any recipient, as inflation means that cutbacks on expenses may be required.

For DOE-SC, a flattening would have been particularly devastating. Dropping the new U.S. commitment to ITER would have had international repercussions, so dramatic cutbacks in other areas would have been required to honor that commitment. The newly constructed Oak Ridge SNS may not have been able to begin operation, thus losing a competitive edge to the Japanese Spallation Neutron Source. Cutbacks or closures in the DOE-SC national labs would not be easily reversed; experts who work in these agencies are highly specialized and experienced at working on one-of-a-kind pieces of research equipment and would be hard to replace after a closure, and industry clients of these facilities would have had to start moving overseas.

With this in mind, I recently worked with Representatives Ellen Tauscher and Judy Biggert and many of our colleagues to request that the House Committee on Appropriations fund DOE-SC at a level that would not require such dramatic and consequential cutbacks. The subsequent Continuing Resolution, which won quick approval by the House, reflected an appreciation for the importance that investment in DOE-SC plays in our nation's future. The National Science Foundation faced similar dangers, as reflected in a similar letter I circulated along with Representatives Bart Gordon and Vernon Ehlers. The new Continuing Resolution fully funds NSF at the requested and house-approved FY07 rate.

"There is still much more we can do in Congress to maintain our national competitiveness and quality of life by supporting science and research and development."

There is still much more we can do in Congress to maintain our national competitiveness and quality of life by supporting science and research and development. We must remain on the path to doubling our research agencies. As demonstrated by the cutback decisions that DOE-SC would have had to make if flat-funded, it is particularly important to recognize that research and development is a long-term undertaking. That is why we must make the R&D tax credit permanent. Members and staff must also be more informed as a decision-making body. That is why I am co-founder of the active Congressional Research and Development Caucus. Congress should also reinstitute the Office of Technology Assessment, which would provide accurate and timely advice to policymakers on issues with scientific and technical components.

The research and development projects pursued by the National Science Foundation and Department of Energy Office of Science hold the potential to improve markedly our international competitiveness, economic security, environment, health, and national security. It is in our national interest to fulfill our commitment to support them in the important work that they do.

Congressman Rush Holt (D, NJ-12th) serves on the House Committee on Education and Labor, the Committee on Natural Resources, and the Permanent Select Committee on Intelligence. Congressman Holt is serving in his fifth term in Congress.