

## APS Commends President Obama's Proposed Fiscal Year 2013 Budget

*Under fiscal restraint, President's budget ensures scientists continue transformational research, leading to innovation and jobs for Americans*

The American Physical Society (APS) commends President Obama's Fiscal Year 2013 budget, which prioritizes scientific research, spurs innovation and keeps the nation on a path toward economic prosperity.

APS is pleased that, in general, the President's budget reflects the priorities of key scientific agencies that are crucial to our nation's future competitiveness – the Department of Energy's Office of Science, the National Science Foundation and the National Institute of Standards and Technology. Scientists who receive funding from these agencies are engaged in research that will generate solutions to the country's most pressing challenges, including developing technologies that will generate new, clean energy for all Americans.

APS recognizes that the President had to make tough choices at a time when the nation is confronted with mounting deficits.

Even within the science agencies, important programs have been cut significantly, including those in domestic fusion research, nuclear physics and particle physics. Those cuts will be very painful to the affected segments of the physics community.

There is no question, however, that if the U.S. is to "build an economy that can last," the country must focus on scientific research, education and innovation – a proven strategy leading to job creation and sustained economic growth. "The President's proposed science spending plan recognizes the need for enhancing revenues to help reduce the deficit. It recognizes that science has provided the basis for the majority of U.S. economic growth for more than half a century, and it is the path we must follow to secure the future solvency of our nation and to build a better America," said Michael S. Lubell, Director of Public Affairs for APS.

## Burton Richter and Mildred Dresselhaus Win Presidential Enrico Fermi Award for Scientific Achievement

By Tawanda W. Johnson

The American Physical Society (APS) congratulates Nobel Laureate and SLAC Director Emeritus Burton Richter and Mildred Dresselhaus, MIT Professor Emerita of Physics and Electrical Engineering and Computer Science, on being named winners of the Enrico Fermi Award for scientific achievement.

The presidential award carries an honorarium of \$50,000, shared equally, and a gold medal. The U.S. Department of Energy administers the award on behalf of the White House. It is one of the government's oldest and most prestigious awards for scientific achievement.

"Dr. Richter and Dr. Dresselhaus have both demonstrated exceptional scientific research and leadership throughout their illustrious careers, contributing to our nation in myriad positive ways. We are honored to count them both as distinguished members and former Presidents of APS," said Kate Kirby, APS Executive Officer.

Richter earned a B.S. in 1952 and Ph.D. in 1956, both from MIT. In 1976, he shared the Nobel Prize in physics with Samuel Ting for

their co-discovery of a subatomic particle known as the J/psi. It provided evidence that Gell-mann & Zweig's theory about quarks – fun-



Burton Richter



Mildred Dresselhaus

damental building blocks of matter – was incomplete, leading to the Standard Model. Richter provided leadership at SLAC National Accelerator Laboratory, from 1984 to 1999, where he helped lead advances in accelerator science and

technology that resulted in discoveries in particles physics and laid the groundwork for advances in photon science. He has also been a formidable leader in the science policy arena, including chairing the committee that developed the APS Energy Efficiency report. He recently released a book titled, "Beyond Smoke and Mirrors: Climate Change and Energy in the 21st Century."

Dresselhaus received a B.A. from Hunter College in 1951; an M.A. from Radcliffe College in 1953; and a Ph.D. in 1958 from the University of Chicago. Her research portfolio includes discoveries leading to the fundamental understanding of various condensed matter systems, including graphite, fullerenes and carbon nanotubes. She has also served in many scientific leadership roles, including as President of APS, Director of the Department of Energy's Office of Science and President of the American Association for the Advancement of Science. Additionally, Dresselhaus is widely recognized for her unwavering commitment to mentoring students and promoting gender equity.

## APS Officials Clarify Peer Review Process

*Contrary to popular belief, peer review process isn't free*

The following letter was reprinted with permission by The New York Times, which published it on Jan. 23, 2012. The writers are, respectively, Editor in Chief and Treasurer-Publisher of the American Physical Society.

Scholarly publishing relies on peer review to validate and improve papers before publication, and peer review depends crucially on scientists' willingness to provide expert advice without charge.

Nevertheless, Michael B. Eisen's implication [*New York Times*, Jan. 10, 2012] that the peer review process is essentially free is not correct. The management of the peer review process for our 10 large journals requires 50 full-time professional editors with a Ph.D. in physics, and they must be compensated.

We need to sell low-cost subscriptions to pay for the peer



review process and to publish excellent journals that serve the worldwide scientific community. We also have three journals whose costs are explicitly paid for by article-processing charges, and these journals are open access and freely available.

The American Physical Society feels strongly that the public should have access to all of the physics research that we publish. We allow public libraries access to every paper we have ever published, beginning in 1893, for free use by anyone in

the library. The Library of Congress was the first of some 500 libraries to join this program.

Scientific societies play an important role as low-cost publishers. Although we do not support the Research Works Act, we know that the costs of the peer review process are not negligible and must be supported either by subscriptions or article charges.

GENE D. SPROUSE  
JOSEPH W. SERENE  
Ridge, N.Y.

## APS Applauds PCAST Report Calling for Improving Science Education

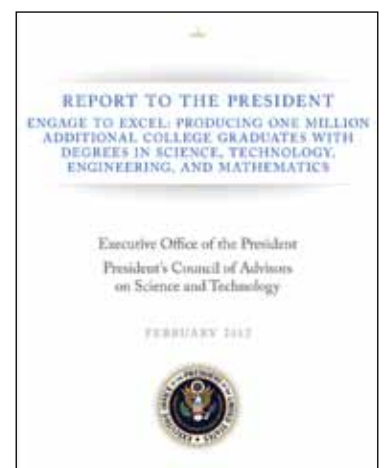
The American Physical Society applauds the recent report from the President's Council of Advisors on Science and Technology (PCAST), "Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics." The report advocates for improving science education to address the workforce needs of the United States in the 21st Century.

"This report identifies the critical juncture where we lose many talented students who intend to study science as undergraduates – the introductory courses – and also points out that recent and well-documented advances in education research have provided clear paths to improving this situation," said APS Director of Education and Diversity, Theodore Hodapp.

The physics education research community has long been involved in foundational research that has led to a wide variety of methods that increase access to, engage all students in, and improve the outcomes of our introductory courses.

APS is mentioned particularly for its role in helping to transform physics education through the New Faculty Workshops, which are operated jointly with the American Association of Physics

Teachers and the American Astronomical Society.



**Capitol Hill Quarterly is a publication of the American Physical Society, www.aps.org. APS is a non-partisan, professional society of physicists with more than 48,000 members.**

### On the Back Page

**U.S. Rep. Chaka Fattah discusses link between research and the economy.**



## APS Members in the Media

### The Washington Post

“In science we like surprises. We like big surprises. This one is too big to be true... We really like things that rock the boat and turn us in a new direction, but this one turns the boat upside down and fills it with water.”

**Michael Turner, (IL-1st)** *University of Chicago, on faster than light neutrinos, The Washington Post, November 14, 2011.*

### The New York Times

“Magnetic materials are extremely useful and strategically important to many major economies, but there aren't that many of them... To make a brand new material is very intriguing and scientifically very important.”

**Shan X. Wang, (CA-14th)** *Stanford University, on a new 12-atom nanomaterial used to store digital information, The New York Times, January 12, 2012.*

### The New York Times

“If you do this with two atoms, then they behave more like a quantum mechanical object... This is why science is interested in this work more than the technology.”

**Andreas Heinrich, (CA-11th)** *IBM, on a new 12-atom nanomaterial used to store digital information, The New York Times, January 12, 2012.*

### CNN.com

“First, you have to understand the size and scope of this problem. The debris field from this Japanese tragedy is the size of the state of California.”

**Michio Kaku, (NY-15th)** *City College of New York, on debris that washed up on the west coast of the United States, purportedly left over from the Japanese tsunami, CNN.com, December 29, 2011.*

### BBC NEWS

“El Gordo is at a distance that corresponds to a distance of about seven billion light years—we're looking at it at a time that the universe was only half as old as it is now, when structure was forming at a different rate... By looking at and understanding the properties of El Gordo, we're able to understand the time evolution of the structure formation of the universe.”

**Jack Hughes, (NM-3rd)** *Rutgers University, on discovering the largest galaxy cluster ever seen, dubbed El Gordo, BBC News, January 10, 2012.*

### The New York Times

“Physics is a true canary in the mine, so to speak, of judging America's capabilities in terms of science... If you let physics go, it's symptomatic of the fact that something has eroded in the intellectual capacity of academic institutions.”

**Carlos Handy, (TX-18th)** *Texas Southern University, on proposed program cuts throughout the public universities of Texas, The New York Times, September 15, 2011.*

## What's New in Innovation?

### A Step Toward Artificial Photosynthesis

EFRC researchers construct an artificial version of a bacterium's light-absorbing ‘antenna’

By Diana Lutz

Sometimes when people talk about solar energy, they tacitly assume that we're stuck with some version of the silicon solar cell and its technical and cost limitations.

Not so.

The invention of the solar cell, in 1941, was inspired by a newfound understanding of semiconductors, materials that can use light energy to ultimately create an electrical current.

Silicon solar cells have little in common with the biological photosystems in tree leaves and pond scum that use light energy to ultimately create sugars and other organic molecules.

At the time, nobody understood these complex assemblages of proteins and pigments well enough to exploit their secrets for the design of solar cells.

But things have changed.

At Washington University in St. Louis's Photosynthetic Antenna Research Center (PARC), scientists are exploring biological photosystems to build both hybrids that combine natural and synthetic parts as well as fully synthetic versions of natural systems. PARC is one of 46 Energy Frontier Research Centers (EFRCs) established by the DOE Office of Science in 2009 at universities, national laboratories, and other institutions around the nation to accelerate advanced basic research related to energy.

The PARC team has just succeeded in making a crucial photosystem component – a light-harvesting antenna – from scratch. The new antenna is modeled on the chlorosome, or biological antenna, found in green photosynthetic bacteria.

Chlorosomes are giant assemblies of pigment molecules. Perhaps nature's most spectacular light-harvesting antennae, they allow green bacteria to photosynthesize even in the dim light of

the deep ocean.

Dewey Holten, professor of chemistry at Washington University, and collaborator Christine Kirmaier, research professor of chemistry, are part of a team that is trying to make synthetic chlorosomes. Holten and Kirmaier use ultra-fast laser spectroscopy and other analytic techniques to follow the rapid-fire energy transfers in photosynthesis. The team's results are described in the *New Journal of Chemistry*.

**“Our goal instead is to develop fundamental understanding so that we can enable the next generation of more efficient solar-powered devices.”**

#### Next Steps

Although this project focused on self-assembly, the PARC scientists have already taken the next step toward a practical solar device. “With Pratim Biswas, the Lucy and Stanley Lopata Professor and Chair of the Department of Energy, Environmental & Chemical Engineering at Washington University, we've since demonstrated that we can get the pigments to self-assemble on surfaces, which is the next step in using them to design solar devices,” said Holten.

“We're not trying to make a more efficient solar cell in the next six months,” Holten cautions. “Our goal instead is to develop fundamental understanding so that we can enable the next generation of more efficient solar powered devices.”

As biological knowledge has exploded in the past 50 years, mimicking nature has become a smarter, more realistic strategy. While biomimicry hasn't always worked as in the case of designing early flying machines, biomimetic or biohybrid designs already have solved significant engineering problems in other areas and promise to greatly improve the design of solar-powered devices as well.

After all, nature has had billions of years to experiment with ways to harness the energy in sunlight for useful work.

—Diana Lutz, Washington University in St. Louis, dlutz@wustl.edu

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To read the entire article, go to: <http://science.energy.gov/stories-of-discovery-and-innovation/127025/>.



Image courtesy of Martin Hohmann-Marriott and Robert Blankenship

**Electron microscopic tomogram of dividing cells of the green sulfur bacterium *Chlorobaculum tepidum*, with chlorosomes rendered in simulated color**

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## Mid-East Accelerator Getting Close to Completion

By Michael Lucibella

SESAME, the long-awaited particle accelerator being built in the Middle East, seems poised to enter its final stages of construction. At SESAME's recent council meeting in Turkey, two countries have signed on to help fill its budget gap, and two more are expected to contribute. In addition, the organization reports that construction on the accelerator has been moving forward and, provided the necessary funding comes through, it is on track to start up in 2015.

The project's name stands for Synchrotron-Light for Experimental Science and Applications in the Middle East.

"I'd say the outcome was very good technical progress and encouraging news about funding, but nothing final," said Sir Chris Llewellyn-Smith, of Oxford University, who is president of the SESAME Council.

UNESCO (United Nations Educational, Scientific and Cultural Organization) is overseeing SESAME to build a 2.5 GeV (gigaelectron volt) synchrotron light source in Jordan. One GeV is equal to a billion electron volts.

When completed, SESAME will be the first such particle accelerator in the Middle East. The multinational coalition to build and run the facility is modeled after the governance of CERN and features nations that have historically been rivals, such as Israel and Iran, collaborating on the project.

Much of the buildings, tunnels and radiation shielding has been completed, and the first parts of the accelerator have been installed. The accelerator itself is, in part, made up of Germany's decommissioned BESSY1 light source.

"SESAME is on track, and the project is very close to reaching an agreement between five countries for \$25 (million) of the \$35 million needed for completing construction," said Amy Flatten, APS Director of International Affairs, who attended the council meeting.

Until recently, the consortium had been facing a \$35 million deficit in the budget needed to complete the project. However, during the council meeting, commitments from several nations came through, along with pledges from others that will make up the majority of the needed funds. Israel pledged that it would contribute \$1 million per year for five years if four other members contributed funds as well.

"As of the beginning of this meeting, Israel has been joined by Jordan and Iran," said Herman Winick, a research professor at SLAC National Accelerator Laboratory and a member of the Executive Committee of the APS Forum on International Physics. He added that Turkey is close to securing its contributions passed by its parliament, and Egypt is also likely to contribute funding. Although only four instead of five countries have made firm pledges, Winick said that "it is expected



Courtesy of SESAME

Parts of the BESSY 1 0.8 GeV booster synchrotron as they arrived from Germany to be assembled at the SESAME facility

that Israel is going along with this."

Funding from Turkey had been delayed after it was found that its membership had not been formally approved by the country's parliament. A bill authorizing Turkey's membership in SESAME has passed through relevant parliamentary committees and is awaiting approval from its General Assembly.

Egypt's contributions have been on hold because of the recent government changeover. The new interim government has expressed interest in supporting the project, and while the SESAME Council

was meeting, the country named a new science adviser who will spearhead the process.

Palestine and Pakistan have also expressed interest in contributing funds and are currently working out their contributions.

The U.S. and the European Union have supported the project since its inception and will likely contribute the remaining \$10 million in funding that member nations haven't pledged. U.S. Rep. Rush Holt (D-NJ), a physicist and APS member, has led the effort to urge U.S. State Department to contribute to SESAME.

Other advances and mile-

stones were reported to have been reached.

The accelerator's 22 MeV electron pre-injector has reached full energy and been fully shielded. Work to install the 800 MeV booster synchrotron – contributed from Germany – is under way, and plans for the outer storage ring have been finalized. After all funding is secured, the project can order magnets and beam lines.

If funding from Turkey and Egypt comes through by early next year, Winick said the project would be on track with its first four working beam lines by 2015.

"I think there is optimism," Winick said, adding that despite many delays, the project looks close to being able to move toward the next stages of construction. "SESAME is still hanging in there. We have a site and a building courtesy of Jordan."

To help prepare scientists in the region, APS has teamed with other national scientific societies to send Middle Eastern physicists to training opportunities around the world.

"APS had started a travel program to fund opportunities for scientists in the Middle East to attend training opportunities, users' conferences, etc," Flatten said. "The efforts of APS and the other national scientific societies were recognized by several speakers for initiating the program...We got a lot of expressions of goodwill."

## Companies Pioneer New Nuclear Designs Based on R&D Data

By Calla Cofield

Two relatively new nuclear companies, NuScale Power and TerraPower, are cooking up new reactor designs, and meeting new challenges along the way.

Modern light water reactors generate, on average, 1,000 megawatts (MW) of energy. Medium reactors can dip down to 700 MW. Ideas for smaller reactors have always been around, but never made it past the drawing board, as they seemed reasonable only for small, isolated markets. But in the late 2000s, the cost of large nuclear power plants began to grow unwieldy. Even large buyers were forced to make drastic financial bets on new reactors. So around 2009, the market changed its mind about small reactors.

Paul Lorenzini is CEO of NuScale Power, which is aiming to have its first small modular reactor (SMR) up and running by 2020. Close on NuScale's heels is Babcock & Wilcox Modular Nuclear Energy LLC, with the mPower small reactor. Lorenzini says the two major factors in turning the market around were the need to build nuclear reactors without taking a major financial risk, and to demonstrate that small reactors could be built economically.

"And I am not bashful in saying that our entry into the market, followed by B&W," said Lorenzini, "were the two major events that triggered that shift."

NuScale formed in 2007, but it already had six years of research and development (R&D) data to support its small reactor design. Lorenzini says the response to the design from all different branches of the industry was overwhelmingly positive. The cost of small reactors alleviated the growing cost of large reactors, while also offering scalability – the option to add more modules to one facility if the energy demands grew.

The NuScale design is based on light water reactor designs, but the NuScale reactor units are only 45 megawatts. The reactor is scalable, and a single facility can host between one and 12 units. The reactor is cooled by natural circulation, so there are no pumps or pipes, which can potentially fail. The entire plant, including the containment, sits in a pool of water, so that no systems need to be running to remove heat. Lorenzini describes the technology as revolutionary, but also emphasizes its simplicity.

Work on the NuScale design began in 2000 and emerged out of a collaborative project led by Idaho National Environment & Engineering Laboratory (INEEL) with support from Oregon State University (OSU), and funded by the U.S. Department of Energy. The project ended in 2003, but

OSU continued to support R&D on the reactor design. By the time the company was officially formed in 2007, the organization had six years of strong R&D data to support the design.

It is possible that NuScale could have sold the design to a



Nuclear atom

larger nuclear company, but each meeting with a potential buyer also revealed NuScale's design to a potential competitor. Eventually, the decision was made to start an independent company.

In 2011, Fluor Corp. agreed to invest in excess of \$30 million in NuScale, which gives the company the financial security it needs to attract future purchasers. The next step will be gaining approval from the U.S. Nuclear Regulatory Commission (NRC) to start construction. The company plans to submit its application to the NRC this year.

NuScale has a major advantage

in its pursuit of approval from the NRC, because its design is based on current light water reactors. This may not be the case for companies working with more innovative designs, such as the traveling wave reactor (TWR) design by TerraPower.

The TWR reactor requires a small amount of enriched uranium to start the fission process, but the majority of its fuel is natural or depleted uranium 238: the most common isotope of uranium found in nature and a waste product from the production of LWR fuel. Inside the TWR reactor, uranium 238, which is not fissile and cannot support a chain reaction by itself, turns into plutonium 239, which is also used as fuel. This would mitigate the threat of nuclear proliferation because the plutonium 239 is never separated from the uranium and is used immediately. The TWR reactor can operate on one fuel supply for 60 or more years.

A major hurdle for a new and innovative nuclear technology is proving that it is safe. That's the responsibility of the NRC. The majority of designs that come through the NRC are based on light water reactor technology, and in those cases "the staff here at the NRC expects it to take about five years to go through all

the work necessary to show that any given design is acceptable for use in the United States," said Scott Burnell, a spokesperson for the NRC. Burnell says the commission is working to expand its knowledge base to keep up with more innovative designs on the horizon. But right now, the NRC may not have the expertise to evaluate all new technologies in the desired time frame.

"We have had conversations with vendors where we've said, 'you're going to need to do a lot of work to beef up the supporting case for this particular technology,'" said Burnell. "It's not enough to simply run a computer model if you're going to offer some innovative feature. To some extent, the NRC is going to have to see real-world empirical data to say that that particular new feature is going to do what you say it's going to do."

This appears to be the case with TerraPower, which, without the ability to build a test reactor, can't gather enough data to satisfy the NRC in the time frame the company would like. So it wants to gain approval to build a reactor in a country that has the expertise to approve the TWR design. TerraPower will then return to the U.S. with data to demonstrate the safety of the design.

# The Back PAGE

Every day for the past 10 years, human beings in the international space station have been orbiting our world, conducting NASA-supported research on the parameters of the universe, innovative food production, human biology and thousands of other experiments that will make our lives better in the 21st century.

At the bottom of our planet, on the icy landscape of Antarctica, a thousand scientists financed by the National Science Foundation are searching for answers to climate change and extreme survival.

At the repurposed Philadelphia Navy Yard, the Greater Philadelphia Innovation Cluster, a Department of Energy Innovation Hub, has created a place where scientists and engineers from a cross section of disciplines will work together to investigate new ways to make buildings more energy efficient. This collaborative environment will reduce the time it takes to turn a new idea into a new product and will help the nation to adopt a more sustainable energy mix.

When weather-related disasters struck across the nation in 2011, climatologists at the National Oceanic and Atmospheric Administration (NOAA) were on the front lines providing an accurate and timely portrait of the storm systems. Every day, NOAA researchers help the world to gain a better understanding of the effects of human-induced climate change on the planet's weather patterns. NOAA's efforts are resulting in a better understanding of climate change's effects on oceans and biodiversity, longer storm warning lead times and new knowledge about our changing climate.

Everywhere we look, big questions are being asked and far-reaching answers have been forthcoming from research sponsored and underwritten by you and me and by every American. We all benefit from this multi-billion-dollar initiative that is, in aggregate, vital to our survival as a global community and critical to our advancement as Americans.

**“Scientific research sponsored or conducted by the United States government has benefited all of us. Every project seeks to unlock a door, every scientist is impelled by the need to know more.”**

Scientific research sponsored or conducted by the United States government has benefited all of us. Every project seeks to unlock a door, every scientist is impelled by the need to know more.

Yet this imperative of our government is all too often taken for granted, denied vital resources or even challenged politically. The effort to protect and promote scientific research is never-ending and never easy in the halls of Congress.

Make no mistake, we are in global competition – with the European Union, China, India, Russia and other nations that don't flinch on their commitment to basic science. Singapore, with a population of less than five million, invests \$6 billion in research, about the same as our government funds through the National Science Foundation. China spares no expense as it reaches into space.

We must not cede our leadership because for more than half a century, science has been the driver of the American economy. The Department of Energy's Office of Sci-

## Government-backed Scientific Research Helps America Compete in Tomorrow's Global Economy

By U.S. Rep. Chaka Fattah



ence, as the largest funder of basic research in the physical sciences in the United States, has helped the nation accomplish its missions in energy security, national security, environmental restoration, and discovery-driven science. And the National Science Foundation has consistently fulfilled its unique federal role, providing support for university research that has made America's higher education the envy of the world.

President Obama has articulated a national imperative to honor science and “win the future” through innovation and manufacturing. Scientific research is key to this bright tomorrow that the President describes as attainable – but not automatic. Our will is being tested every day.

One area where our government can do more – and do it better – is neuroscience. We are on the cusp of advances in our understanding of the brain. The human brain regulates breathing, speech, and rational thought. Every aspect of our lives is dictated by synapses and responses to stimuli, yet we are only just beginning to understand the functions of this enigmatic organ. Neuroscience research can provide insight into learning and brain repair. It can help us to alleviate and prevent injury and illness, and it can help us to understand behaviors like criminality and addiction. I am committed to neuroscience and the possibilities it offers because of its interdisciplinary nature – joining the biomedical and physical sciences –

**“Make no mistake, we are in global competition – with the European Union, China, India, Russia and other nations that don't flinch on their commitment to basic science.”**

and because of the potential to dramatically improve individual lives and society.

That is why I proposed and won enactment in Congress in November 2011 for a breakthrough initiative that declares neuroscience research a federal priority and calls on the White House, through the National Science and Technology Council (NSTC), to establish an interagency working group to coordinate Federal investments in neuroscience research. This coordinated priority – signed into law by President

Obama – holds the promise of additional resources going forward.

The investments we make now in neuroscience research will have a multi-fold payoff, both in terms of the quality of life of Americans and reductions in healthcare costs. A coordinated federal policy on neuroscience is long overdue. The federal science and research agencies are best positioned to advance this vital effort, but they must work together. This directive from the Congress will go a long way to make it happen.

**“We must not cede our leadership because for more than half a century, science has been the driver of the American economy.”**

Neuroscience research is mainly supported by the National Institutes of Health, but also by NSF, the Department of Veterans Affairs, the Department of Defense, and other Federal agencies. Much of this cutting-edge research is under way in my home district. I have been privileged to visit labs and meet an impressive roster of physicians and scientists at the University of Pennsylvania, The Children's Hospital of Philadelphia, the Monell Chemical Senses Center and Drexel University – all located within a few blocks of each other in West Philadelphia's remarkable University City complex.

Neuroscience is not, of course, the only vital area of research with government input. The U.S. government has long been engaged in breakthrough research at National Laboratories that include Sandia and Los Alamos in New Mexico and Fermi outside Chicago, all of which I have visited.

As men and women of science lead us to compete on the world stage, we are not shadowboxing. They are engaged in research that cannot be done on the cheap, and it can't be done piecemeal. Our national imperative is to support our heroes of the laboratory. This is the challenge of the 21st century.

*Congressman Chaka Fattah (PA-02) is the senior Democrat on the House Appropriations Subcommittee on Commerce, Justice, Science and related agencies, which sets more than \$50 billion in spending priorities for the NSF, NASA, the NOAA, and the Departments of Commerce and Justice. He is also a member of the Appropriations Subcommittee on Energy and Water. The native Philadelphian holds a master's degree in government administration from the University of Pennsylvania Fels Center of Government. He is nationally recognized as an innovator in educational reform and is architect of GEAR UP, Gaining Early Awareness and Readiness for Undergraduate Programs, the nation's most successful college readiness program for low-income students. Fattah is co-chair of the Congressional Urban Caucus. He is in his ninth term representing portions of Philadelphia and Montgomery County and served 12 years as a state legislator prior to election to Congress in 1994.*