APS physics

Capitol Hill Quarterly

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FY08 Budget Causes Irreparable Harm to Science APS Presses Congress For Emergency Funding

The American Physical Society, representing more than 46,000 physicists in universities, industry and national laboratories, regards the Fiscal Year 2008 omnibus spending bill as extraordinarily damaging to the nation's science and technology enterprise. The bill fails to fund appropriately the research and education programs authorized in the bipartisan America COMPETES Act, which President Bush signed into law only four months ago. The consequential layoffs of scientists and engineers throughout the nation will discourage American youth from pursuing these fields, just as the country needs their participation to sustain economic growth and national security.

While other nations are aggressively challenging American leadership in physical sciences and technology, the omnibus bill sets our country on the wrong course. It fails to provide the necessary resources for long-term research in the physical sciences and engineering. It fails to provide the requisite resources for developing new cutting-edge scientific laboratories and even for operating existing national user facilities. It fails to provide adequate funding for university-based research that is so essential for educating the next generation of scientists and engineers. It also fails to provide the appropriate incentives for American industry to innovate at an accelerated pace.

Furthermore, as we as a nation strive to reduce our dependence on foreign oil, mitigate global warming and put a lid on escalating energy costs, the omnibus bill abandons the long-term transformational research that is necessary to achieve all these essential goals. The bill is bad for our energy future and economic future.

Finally, apart from its failings on global competitiveness and energy, the omnibus legislation also places at grave risk U.S. participation in two large international scientific collaborations. Just one year ago, the United States made a major commitment to the construction of the International Thermonuclear Experimental Reactor (ITER). Today, Congress has pulled the plug. In so doing, it critically damages American credibility as a reliable scientific partner throughout the world and compromises the nation's standing as a host of future international scientific facilities. Congress has also cut the lifeline of the International Linear Collider, which represents the future of American high-energy physics. This action sends a strong message to the world: The U.S. is prepared to turn its back on one of our flagship areas of science that probes fundamental laws of the universe.

The APS notes with some dismay that had Congress applied the same discipline to earmarking as it did last year, the damage to the science and technology enterprise could have been avoided.

For these reasons, the American Physical Society urgently calls on Congress and the White House to provide emergency funding for Fiscal Year 2008.

Supporters of America COMPETES Bill Praise Its Passage, Urge Federal Funding

Capping a 10-year science advocacy campaign, Congress last year finally passed landmark innovation legislation that President Bush quickly signed into law. The America COMPETES Act lays the groundwork for keeping the nation a global economic leader. Now the battle has shifted to making sure the authorization measure, which calls for improved science education, innovation and basic research, is fully implemented.

Photo by Marvin T. Jones & Associates

Judy Franz, American Physical Society executive officer, greets Congressman Vernon J. Ehlers (R-MI 3rd) during the reception to celebrate the passage of the America COMPETES legislation.

"We've got to get it funded," said Congressman Vernon J. Ehlers (R-MI 3rd) a member of the House Science and Technology Committee, who has supported similar legislation for many years. Ehlers shared his remarks with nearly 200 supporters during a recent Capitol Hill reception lauding the bill's passage.

Michael Lubell, APS director of public affairs, who also addressed the enthusiastic crowd, noted that the effort by science societies to focus congressional attention on the competitiveness issue began in 1997, with the impetus of the late D. Allan Bromley, who had previously served as science adviser to President George H.W. Bush and later as APS president.

Lubell also noted that many members of Congress had played key roles during the intervening years. In addition to Ehlers, he cited the work of former Sens. Phil Gramm (R-TX) and Bill Frist (R-TN), Sens. Lamar Alexander (R-TN), Jeff Bingaman (D-NM), Pete V. Domenici (R-NM) and Joseph I. Lieberman (I-CT), Reps. Judy Biggert (R-IL 13th), Bart Gordon (D-TN 6th), Rush Holt (D-NJ 12th), George Miller (D-CA 7th) and House Speaker Nancy Pelosi (D-CA 8th).

"Without the extraordinary efforts in recent years by Craig Barrett, chairman of the board of Intel Corp., and Norm Augustine, retired CEO of Lockheed Martin," Lubell said, "the legislation might never have been enacted into law." Lubell also praised former Under Secretary of Commerce Mary Good for bringing American industry to the table.

The COMPETES Act authorizes the expenditure of $33.6 billion over seven years, including the doubling of funding for scientific agencies such as the Department of Energy Office of Science, the National Science Foundation and the National Institute of Standards and Technology.

Congressional members, their staffs and organizations from academia and industry attended the event sponsored by the Task Force on the Future of American Innovation. The Task Force advocates for increased federal support for research in the physical sciences and engineering.

On the Back Page

Congressman Vernon J. Ehlers discusses the presidential platform of a physicist.

'Sputnik' House Briefing Draws Trailblazing Astronauts

The launch of Sputnik more than 50 years ago served as a wake-up call for the nation as Americans confronted the reality that the U.S. was no longer considered the scientific and technical leader of the world.

The nation faces a similar clarion call today as it struggles to maintain its position as a global economic leader in the 21st century, said two former astronauts who highlighted the recent "Sputnik in the YouTube Age" briefing sponsored by the Task Force on the Future of American Innovation in conjunction with the Congressional Research and Development Caucus.

"We're not holding our own with our competitors," said Kathryn D. Sullivan, Ph.D., the first American woman to perform a space walk and director of the Battelle Center for Mathematics and Science Education Policy at the John Glenn School of Public Affairs at Ohio State University.

Added Dr. Mae Jemison, the first African-American woman to travel into space, "The U.S. is in danger of losing its leadership that it has held since World War II."

Photo by Brian Mosley/APS Staff

U.S. Rep. Rush Holt (D-NJ 12th) talks to Delaware State University student Asia Brown (far right) while U.S. Rep. Judy Biggert (R-IL 13th) looks on.

Photo by Brian Mosley/APS Staff

Mae C. Jemison (left) conveys a message to Kathryn D. Sullivan (middle) and U.S. Rep. Judy Biggert (R-IL 13th).

After the launch of Sputnik, the U.S. was not content to sit idly by. Instead, the federal government responded boldly and swiftly, pumping huge sums of money into basic research and science and math education programs. The investment led to unprecedented economic prosperity for the nation, making the U.S. the envy of the world.

Sullivan and Jemison called for increased funding of basic research and math and science programs to help the U.S. regain its position as a global economic leader.

About 150 people, including Congress members Rush Holt (D-NJ 12th) and Judy Biggert (R-IL 13th) attended the briefing, which was held Nov. 8 at the Rayburn House Office Building.

"Research and development is our future, and it's not just a platitude," said Holt.

Remarked Biggert, "We've come a long way, but there is more work to be done."

Also during the briefing, the task force announced the winner of its 2007 National American Video Innovation Contest, which asked participants to create videos on YouTube that demonstrated how science has changed American life.

Adan Vielma, a student at Lewis & Clark University, was named the winner, claiming the top $1,000 prize. Delaware State University students were awarded the first-runner-up prize of $300. The winning videos can be viewed at http://futureofinnovation.org/youtube.

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 46,000 members.

APS Members in the Media

"If either of these ice sheets were to disintegrate, it would destroy coastal civilization as we know it."

Michael Oppenheimer, *Princeton University, (NJ-12th), on the Greenland and west Antarctic ice sheets,* The Washington Post*, July 16, 2007*

"Baseball actually isn't doing too bad a job compared to other leagues. Probably the worst is the National Football League with only 16 games in a season."

Eli Ben-Naim*, Los Alamos National Lab, (NM-3rd), on his statistical study that found that the best baseball team does not always finish first in the league,* USA Today*, July 30, 2007*

"The shock wave would have spread across the whole continent. This event was large enough to directly kill most everything instantly. Those that survived would have found their food sources devastated, their water polluted, all kinds of things that would have made it difficult to go on much longer."

Richard Firestone, *Lawrence Berkeley National Lab, (CA-9th), on the possibility that a comet may have killed off the wooly mammoths,* The Washington Post*, June 11, 2007*

"Finally, after all these years, we're reaching fundamental physics limits. Racetrack says we're going to break those scaling rules by going into the third dimension."

Stuart Parkin*, (CA-16th), IBM, on a new type of memory storage,* The New York Times*, September 11, 2007*

"It always looks like there is some very difficult problem, but as we get closer, the focus and the engineering that we bring to bear on it usually remove these barriers and allow us to go by them. There is still a lot of room for creativity – it's not the end of the road."

Gordon Moore*, (CA-14-th), explaining that he expects Moore's law to go on for another decade,* BBC News*.com, September 19, 2007*

"It used to be if you wanted to make a mechanical change in your golf swing, it could take months to do that. But if you can hear what's going on, you can change the sound space almost instantly."

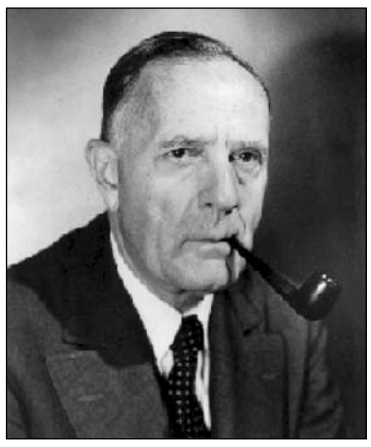
Robert Grober*, Yale University, (CT-3rd), on developing a tool that uses sounds to help people improve their golf swing,* The New York Times*, August 6, 2007*

Snapshots from Physics History

Edwin Hubble expands our view of the universe

Until the mid-1920s, most scientists thought the Milky Way was the entire universe, and that the universe was unchanging. With two discoveries, announced in January 1925 and January 1929, astronomer Edwin Hubble radically changed our idea of the cosmos, showing first that the universe was much larger than previously thought, and second, that it is expanding, getting larger and larger all the time.

Hubble was born in 1889 in Missouri. As a young man, he was tall and athletic, known especially for his talent at boxing, basketball and track. He earned an undergraduate degree in math and astronomy at the University of Chicago and then studied law at Oxford on a Rhodes scholarship, following his father's wishes. Hubble returned to the U.S. and joined the Kentucky bar, but quickly decided law wasn't for him. He taught high school Spanish for a year before heading back to the University of Chicago to earn his PhD in astronomy in 1917. After serving in the Army in World War I, he went to southern California to work at the Mt. Wilson observatory, home of the 100-inch Hooker telescope, the largest in the world at the time.



In the early 1920s, many astronomers believed that objects, then known as nebulae, were nearby gas clouds in our own galaxy, and that the Milky Way was the entire universe. Others thought the nebulae were actually more distant "island universes" separate from our own galaxy. Harlow Shapley and Heber Curtis had a famous debate on the issue in 1920.

At Mt. Wilson, Hubble began measuring the distances to nebulae to try to resolve the issue, using a method based on an earlier discovery by Henrietta Leavitt. She had found that a type of star known as a Cepheid variable had a predictable relationship between its luminosity and its pulsation rate. Measuring the period of the star's fluctuations in brightness would give absolute brightness, and comparing that with the star's apparent brightness would yield a measure of the star's distance.

Hubble found he was able to resolve Cepheid variables in the Andromeda nebula, showing that the nebula was, in fact, a separate galaxy rather than a gas cloud within the Milky Way. He also showed that the galaxy was much farther away than previously thought, greatly expanding our view of the universe. Hubble announced the finding on January 1, 1925, during a meeting of the American Astronomical Society in Washington D.C.

Following the groundbreaking announcement, Hubble continued measuring the distances to far away astronomical objects, measurements that in a few years would lead to a discovery with even more radical implications for cosmology.

It was already known that nebulae appeared redder than they should be. Astronomers, notably Vesto Slipher, had found that the light from most nebulae was redshifted, indicating that most of the nebulae were receding at high speeds. But it wasn't understood why other galaxies would all appear to be moving away from us.

Hubble continued his meticulous astronomical measurements. He collaborated with Milton Humason, who had begun working as a janitor at the Mt. Wilson observatory, then rose to become a night assistant and then an assistant astronomer. Humason observed spectra, while Hubble concentrated on finding distances to various objects.

After collecting enough data points, Hubble and Humason found a simple linear relationship between an object's velocity and its distance from us. Hubble's law, as it is known, indicates that galaxies are moving away from each other at speeds proportional to their distance. Hubble's distance measurements turned out to be incorrectly calibrated, in part because he had failed to realize that there are actually two types of Cepheid variables, but Hubble's law still holds.

Hubble submitted a paper describing the velocity-distance relation to the Proceedings of the National Academy of Sciences in January 1929, and it was published in March (the paper is available online at: http://www.pnas.org/misc/Hubble.pdf). Hubble first plotted the trend using 46 galaxies, but in the next few years continued to collect data for many more galaxies, which added further confirmation.

In his paper, Hubble didn't discuss the implications of what he had found, perhaps preferring to leave the interpretation to theorists. He simply presented the empirical law relating galaxies' distance to their velocity. But others quickly recognized that Hubble's discovery indicated that the universe was expanding and that Hubble's observations provided the first observational support for what later became the big bang theory.

Scientists had been convinced that the universe was static. Einstein had even added a fudge factor known as the cosmological constant into his equations to make them consistent with a static universe. Although physicists Alexander Friedman and Georges Lemaître had independently proposed expanding universe models based on Einstein's equations, they had no data to support their theories and were largely ignored until after Hubble's discovery. When Einstein saw that Hubble's results showed that the universe was expanding after all, Einstein famously called the cosmological constant the "greatest blunder" of his life.

Hubble became famous for his discoveries and enjoyed partying with Hollywood celebrities. He continued to work in astronomy, but remained bothered by the fact that he was ineligible for the Nobel Prize because astronomy was not then considered a branch of physics. He later helped build the 200-inch Palomar telescope and died in 1953, not long after it was completed.

APS Physics Capitol Hill Quarterly

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APS Washington, D.C. Office
529 14th St. NW, Washington, DC 20045
Email: opa@aps.org Telephone: 202-662-8700 Fax: 202-662-8711

Director of Public Affairs	Michael Lubell
Associate Director of Public Affairs	Francis Slakey
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Bienenstock Elected American Physical Society President

Arthur Bienenstock, a Stanford University professor and former associate director of the White House Office and Science Technology (OSTP), is the new APS president, following a recent election of officers by the society's membership.

Bienenstock is special assistant to the president for federal research policy at Stanford University, where he is also a professor at the Stanford Synchrotron Radiation Laboratory, and in the Applied Physics and Materials Science & Engineering departments.


Arthur Bienenstock

From 2003 to 2006, Bienenstock served as vice provost and dean of research and graduate policy and as acting provost for graduate education through December 2006.

Before taking on these positions, he served as director of the Geballe Laboratory for Advanced Materials.

From November 1997 through January 2001, while on leave from Stanford, Bienenstock was the associate director for science of OSTP.

At OSTP, Bienenstock sought to gain general recognition of the interdependences of the sciences and the need for the country to maintain broad scientific and technological strength.

He succeeds APS President Leo Kadanoff of the University of Chicago.

In other APS election news, Cherry Murray, deputy director of Lawrence Livermore National Laboratory, assumed the post of president-elect and Curtis Callan, professor and former chair of the physics department at Princeton University, won the race for vice president.

Next year, Murray will become APS president while Callan will serve as APS president-elect.

Murray joined Lawrence Livermore in 2004, where she is the senior executive responsible for overseeing the quality of science and technology in the laboratory's programs and disciplines. Before taking her position at the laboratory, she worked at Bell Labs, Lucent Technologies, where she served as senior vice president for physical sciences and wireless research.

Callan, a theoretical particle physicist, received his PhD from Princeton in 1964. In 1967, after completing postdoctoral work at Princeton, he worked as an assistant professor in physics at Harvard University, before returning to the faculty at Princeton.

APS Board Calls for Doubling Number of Physics Bachelors

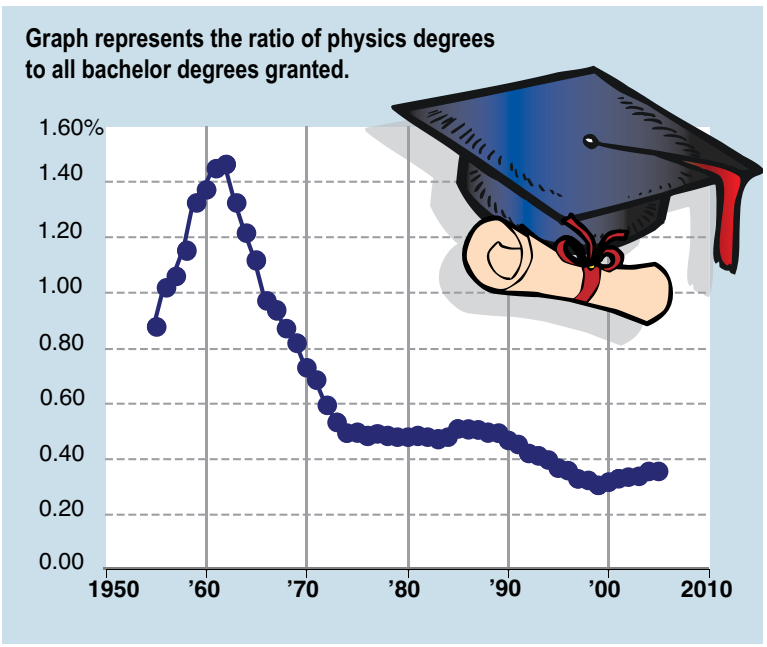
The APS Executive Board wants the number of physics majors at U.S. colleges and universities to double to keep the nation globally competitive, according to a statement recently released by the board.

"We advocate doubling the number of bachelor degrees in physics to address critical national needs, including K-12 education, economic competitiveness, energy, security and an informed electorate," said the statement.

After peaking in the early 1960s, the percentage of physics declined, reaching a low of about 3,800 majors in 1999, according to the American Institute of Physics Statistical Research Center. In recent years, there has been a turnaround, with the number of majors in 2006 reaching about 5,400. Doubling that number would mean more than 10,000 physics majors in the country, said Ted Hodapp, APS Director of Education and Diversity.

A similar goal has been endorsed by the American Association of Physics Teachers.

"There is a dramatic shortage of high school physics teachers," says Hodapp, a problem that APS is addressing through the Physics Teacher Education Coalition (PhysTEC and PTEC) programs. Hodapp added that doubling the number of physics majors would significantly increase the pool of new physics teachers and help overcome the "woeful under-representation" of women and minorities who major in the field.



Kerry G. Johnson/APS Staff

Source: American Institute of Physics Statistical Research Center

The best way to increase the number of physics majors is to make the major more welcoming, said Michael Marder, chair of the APS Committeee on Education.

"Probably the most effective strategy will be creating degree plans for physics majors that do not require them to settle on physics as freshmen if they want to finish their degree in four years, and creating supportive communities within physics departments for future physics teachers," he said.

Marder added, "I think we are most likely to meet this goal if it is part of a general change in attitude in physics departments so that the undergraduate degree is not exclusively aimed at people continuing on to graduate school in physics."

Three American Physical Society Members Receive National Medal of Science

Three APS members were recently named recipients of the 2005 and 2006 National Medal of Science, and one APS member was awarded the 2006 National Medal of Technology.

The accolades honor the nation's top scientists and innovators.

President Bush presented the medals during a ceremony at the White House last year.

APS members Daniel Kleppner, of MIT, and Lubert Stryer, of Stanford University, received the 2006 National Medal of Science.

Kleppner was cited for "his pioneering scientific studies of the interaction of atoms and light, including Rydberg atoms, cavity quantum electrodynamics, and quantum chaos; for developing techniques that opened the way to Bose-Einstein Condensation in a gas; and for lucid explanations of physics to non-specialists and exemplary service to the scientific community."

Stryer was noted "for his elucidation of the biochemical basis of signal amplification in vision and pioneering the development of high density micro-arrays for genetic analysis. His influential biochemistry textbook has influenced and inspired millions of students."

APS member Ralph A. Alpher, who died in August, was one of eight recipients of the 2005 National Medal of Science. Alpher was lauded "for his unprecedented work in the areas of nucleosynthesis, for the prediction that universe expansion leaves behind background radiation, and for providing the model for the Big Bang theory."

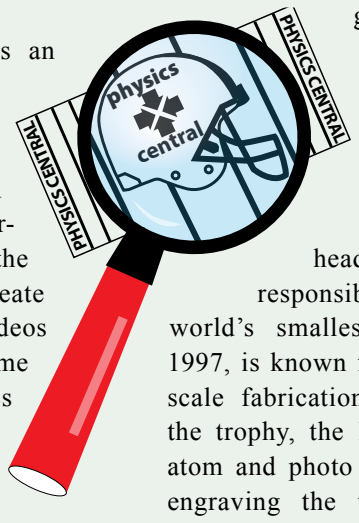
In addition, APS member Herwig W. Kogelnik, of Bell Labs, was among the five recipients of the 2006 National Medal of Technology. He was cited "for his pioneering contributions and leadership in the development of the technology of lasers, optoelectronics, integrated optics and light wave communication systems that have been instrumental in driving the growth of fiber optic transmission systems for our nation's communications infrastructure."

The National Science Foundation administers the National Medal of Science, which was established by Congress for the White House In 1959. The National Medal of Technology was established in 1980.

Physics Fans Get Chance to Win World's Smallest Trophy

A nanoscale football field and helmet, created in silicon and metal by physicists in the Craighead research group at Cornell University in Ithaca, N.Y., will be awarded as a prize in APS' football video contest.

The contest is an APS public outreach effort to get football fans interested in physics. Participants in the contest must create short YouTube videos demonstrating some aspect of physics in football. The winner will receive the trophy and $1,000.



The football field and helmet trophy will be about 1,000 times thinner than a strand of human hair, barely visible to the naked eye. Two smaller versions of the trophy will be embedded within the largest one.

The tiny plaque will be mounted on a stand, and the winner will receive micrographs that show the design through an electron microscope. Craighead's lab, also responsible for the world's smallest guitar in 1997, is known for its nanoscale fabrication. To create the trophy, the lab will use atom and photo lithography, engraving the tiny pattern by exposing the material to beams of atoms or light. For the larger image, they will use ordinary etching methods.

To win the trophy and cash, contestants must submit a video about two minutes in length that demonstrates an aspect of physics in football. Contestants can break down the forces in some footage of their favorite high school, college or NFL team. Or they can get together with friends or family to film an experiment relevant to the game and its equipment. Videos could mention air pressure inside the ball, the rotation of a spiral, the impact of tackle or acceleration in a breakaway touchdown run. Other creative approaches are welcome.

To submit a videos, contestants should upload them to YouTube with the tag "nanobowl" and send an email to physicscentral@aps.org. The film deadline is Super Bowl Sunday, Feb. 3. For more details and contest rules, see www.physicscentral.com/nanobowl. PhysicsCentral is the APS Web site for outreach to the public.

The Back PAGE

A Physicist for President?

By U.S. Rep. Vernon J. Ehlers, Ph.D.

The current presidential campaign cycle started earlier than usual, giving candidates abundant time to talk about the issues. Unfortunately, I have heard little discussion about science and technology. Candidates carefully avoid topics that might make them look too "nerdy," that is, overly interested in nuclei, Euclidian geometry or theoretical chemistry.

Later this year, millions of Americans will cast their ballot to elect the next President of the United States, but few will investigate the candidates' understanding of science. Do you know where your favorite candidate stands on science and technology issues? Have you heard any candidate explain the importance of science and math education to our national defense, energy solutions, global competitiveness, health care, or the ability of our students to obtain meaningful employment in the future? Have any discussed the necessity of adequately funding scientific research?

Before you cast your ballot, consider one additional, hypothetical candidate: "Physicist for President." Let me first make it clear: I have absolutely no desire to run for president. But as a physicist, I hope that in my lifetime someone who holds an advanced degree in physics, or some other science, will run for and win our nation's top office.

The physicist's presidential platform would give science and technology prominence. The candidate would recognize that geographic boundaries are almost meaningless in the 21st century. He or she would recognize that the Internet and other technologies have allowed financial and intellectual capital to flow freely worldwide at nearly the speed of light. The United States is no longer competing with a handful of developed countries, but with the entire world.

"Have you heard any candidate explain the importance of science and math education to our national defense, energy solutions, global competitiveness, health care, or the ability of our students to obtain meaningful employment in the future?"

On October 4, 2007, we recalled the 50th anniversary of the launch of Sputnik I into orbit. People who were alive in 1957 vividly remember this event. It shocked the American public and dwarfed the achievements of our rocket program. Sputnik spurred U.S. investment in aerospace, culminating in the Apollo moon landing. It also stimulated a great emphasis on improving our math and science education programs and sparked an intense focus on equipping our workforce with the skills needed to compete with the Russians and other foreign countries.

Today, the United States is facing an equally critical challenge from overseas. Despite lacking the same public prominence as the Sputnik launch, our children are once again falling behind their peers in European and Asian countries in the subjects of math and science. As a physicist, it is clear to me how important these subjects are in preparing students for the jobs of the future. I am concerned that by the time another Sputnik-like spark comes along to wake us up to the crisis looming over our nation's competitiveness, it may be too late to act. In order to address this growing challenge, a physicist would support updating the No Child Left Behind Act, which has helped countless students in the United States improve over the past five years. This would help ensure that students are prepared for the jobs of the future.

A scientist in the Oval Office would bring good analytical skills to decision-making in the White House and would appreciate the need for a population well-versed in science. A public which understands basic scientific principles and concepts would produce analytical voters and ensure we are better stewards of our planet and all that it contains.

A physicist's platform would also include sustained investment in fundamental research. President Bush recently signed into law the America COMPETES Act of 2007. This law includes provisions to encourage innovation in manufacturing and to strengthen many of our federal research and education programs. It also provides incentives to increase the number of science, technology, engineering and mathematics (STEM) majors and teachers. Also, through its special focus on the training of teachers, it seeks to improve STEM education for all of our nation's children, not just the ones who will pursue advanced degrees. It strives to equip all high school graduates with a strong education in science and math, allowing them to excel in any career path they choose. The law establishes a pathway to double in seven years the research budgets of the National Science Foundation, the Department of Energy Office of Science, and the National Institute of Standards and Technology, and it enhances programs designed to improve K-12 teacher content knowledge in science and math. The successful passage of this $33.6 billion authorization was in large part due to advocacy by individual scientists across the nation. I was excited to see the efforts of 12 years of hard work in Congress pay off when this bill became law, and I am pleased that I was able to play a part in this success. Clearly, with a scientist as president, as well as more scientists in Congress, success could be achieved much more rapidly.

"A scientist in the Oval Office would bring good analytical skills to decision-making in the White House and would appreciate the need for a population well-versed in science."

The catch, however, is that the COMPETES Act does not ensure that this funding actually materializes, since authorization measures must be followed by Appropriation Committee actions to ensure the funds are allocated and spent. Of course, the "physicist-for-president" platform would include a plan to fully fund the COMPETES Act in the annual budget request to Congress. Though our nation's president should have a fiscally conservative view on government spending, this would be the only part of a platform where a scientist could clearly make the case that this investment is one which we must not underfund. It is truly an investment in our future and would produce a great return on investment. Americans must recognize how important basic research is to the vitality of our nation; fully funding these programs should be a proposal all would support. Additionally, I expect a scientist running for president would pledge to permanently extend the research and development tax credit; this would give companies the ability to depend on that credit when they conduct long-term planning for their research and development endeavors.

"In summary, the 'Physicist for President' platform would present our nation with a winning array of ideas developed to put us on the path toward sustained economic competitiveness and bolstered innovation."

In summary, the "Physicist for President" platform would present our nation with a winning array of ideas developed to put us on the path toward sustained economic competitiveness and bolstered innovation. It would include substantial investments in our nation's research and development programs, as well as sustained efforts to build upon our successful STEM education programs. China and India decided 20 years ago to improve the STEM education of their students, and today are reaping tangible results, especially in manufacturing. It is time for us to catch up to the substantial investments other nations are making.

Perhaps someday we will elect a scientist as president. Until then, I urge my fellow physicists to become involved in their communities and local politics. Volunteer to speak at your local high school, so you can excite students about science. Run for your local school board. Serve as a volunteer advisor to an elected official. Mentor a student and encourage him or her to pursue a college degree or career in science. Exercise your right to vote. If you interact with a real presidential candidate, ask him or her for positions on these issues. If you would like to establish a personal relationship with a candidate, I encourage you to attend their events and to volunteer to work for their campaign. Similarly, I urge current policymakers to listen to the voices of physicists. Our unique training provides us with the perspective to approach problems logically while analytically developing solutions.

I sincerely hope that our next President will share the same passion and zeal I have for improving our nation's science and education programs, and that our country will grow and prosper from scientific knowledge! Wouldn't you vote for that? And won't you work to make it happen?

Congressman Vernon J. Ehlers (R-MI 3rd) serves on the following House committees: Education and Labor; Administration Committee (ranking Republican); Science and Technology Committee; and Transportation and Infrastructure.