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## Research in Jeopardy: Scientists fear funding loss

By ANASTASYA LLOYD-DAMNJANOVIC AND HENRY ROME  
STAFF WRITERS

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When the Air Force wanted to learn more about the interactions between electrodes and plasma in jet propulsion systems, it turned to mechanical and aerospace engineering professor Edgar Choueiri GS '91.

This research could lead to “game-changing achievements,” according to an Air Force document announcing the funding. At the department’s urging, Choueiri said, he produced a white paper only weeks after the November request. He made the deadline and was selected to receive funding. There was only one thing missing: the five-year, \$750,000 contract.

The Air Force cannot fund the project because of a congressional budget gridlock in Washington, Choueiri said. The impasse could have drastic effects on research funding around the country.

“No matter what you are in the politics spectrum, one thing we should not be compromising on is our worldwide position in research and engineering in science,” Choueiri said. “This is really, in my opinion, shameful and dangerous.”

Six months into the fiscal year, Congress has yet to pass a budget — and the only proposal to make it through the House, HR 1, includes billions of dollars in cuts to the federal agencies that fund most scientific research, a part of the total \$60 billion of reductions.

Negotiations between the Obama administration and the leadership of both parties continued late Tuesday night. By midnight, the parties had not reached a compromise, increasing the likelihood of a complete government shutdown as early as Saturday.

Since October, Congress has passed six “continuing resolutions,” or short-term funding measures. The current one expires on Friday, April 8 at midnight. President Barack Obama said in a White House news conference on Tuesday that he will not sign another continuing resolution.

Scientists at Princeton and at other universities around the country rely heavily on federal funding to support their research: 74 percent of science funding at the University comes from federal agencies, according to an analysis of funding data by The Daily Princetonian. The majority of this funding comes from the National Science Foundation, the National Institutes of Health, the Department of Defense and the Department of Energy.

Due to the continuing uncertainty throughout the congressional debate, federal agencies have been cautious to fund projects or to provide assurances of any future funding. The resulting state of limbo for researchers could have serious impacts on America's worldwide scientific competitiveness, according to more than two dozen interviews with researchers, lobbyists, lawmakers and federal officials.

The White House has strongly criticized any cuts that would influence America's scientific competitiveness.

"As we seek a solution to the budget challenge, our position is clear: We will not accept cuts that undermine our ability to out-innovate, out-educate and out-build our global competitors," said Rick Weiss, a spokesman for the White House Office of Science and Technology Policy, in an email to the 'Prince.'

"We must protect our key investments in research and development and education," he added.

Republicans contend that across-the-board cuts to the federal budget are crucial to reducing the deficit and ensuring America's fiscal stability.

"The record \$14 trillion debt is forcing tough cuts across the board. In order to maintain our commitment to basic research, the Republican budget cuts areas of duplication and reduces applied research, which should be the function of the private sector," said Rep. Michael McCaul, R-Texas, in a statement to the 'Prince.' McCaul is a member of the House Committee of Science, Space and Technology.

"Right now America's global competitiveness is threatened by our record debt and unfriendly business climate. We must cut our excessive debt, eliminate burdensome regulations and focus on private sector growth."

There's "a great deal of uncertainty in the scientific community," said Jennifer Zeitzer, the director of legislative relations for the Federation of American Societies for Experimental Biology, a prominent group that supports research funding.

"People are sort of frozen in time," she said, "and having a hard time planning ahead for new projects or the next stage of their research."

### **Anxiety for the future**

University researchers who recently applied for new or additional funding are most at the mercy of Congress' budget decisions. Others who have just received funding or are in the middle of multi-year grants are safer but could still be impacted by funding cuts, Zeitzer said.

Spokespeople from NIH and NSF both declined to comment on the potential effects of congressional proposals.

Neuroscience professor Sabine Kastner's research on the neural mechanisms of sight and how people focus will lose funding in a couple years. If her NIH and NSF grants are not renewed, part of her program would have to close.

"This situation will affect many of us, and I am not sure how we will rescue the research," Kastner said in an email. "Bad times for scientists."

Chemistry professor Michael Hecht said he is also concerned about the future, though his work is safe for the time being. Just last week, Hecht received NSF funding for his study of synthetic biology, which involves designing new amino acid sequences.

"My recent good fortune, however, may be merely a blip in the overall trend," he said in an email. He noted that cutbacks would have destabilizing effects for both junior scientists, who would have a harder time finding funding because of their lack of experience, and senior scientists, who may have to shuffle around different universities in search of funding.

"Many scientists ... are becoming demoralized by the funding situation and its prognosis for the future," he said. "Under these circumstances, there is good reason to be concerned about the future of science in America."

Researchers and politicians fear that the consequences of cuts similar to HR 1 could extend beyond cancelled projects and laid-off scientists.

“Other countries who are also facing budget problems like the U.S. are still continuing to invest in science,” Zeitzer said. “If we pull back on this investment, China and some of the other countries are simply just going to leapfrog us.”

Indeed, a study released last week by the Royal Society — the United Kingdom’s national academy of sciences — concluded that China could overtake the United States in scientific productivity as early as 2013.

Pat Clemins, the director of the American Association for the Advancement of Science’s research and development budget and policy program, cautioned that a single bill affecting one year of research funding probably would not signal the decline of American scientific leadership.

But, he said in an email, “the policy debates surrounding the bill could set new precedent for the role of government in funding various stages of the innovation pipeline, and reestablish generally, the size and reach of our federal government.”

### **Politics of a cut**

In February, House Republicans passed HR 1. Under HR 1, about \$60 billion in cuts would have affected a broad base of departments, from the Department of Education to the Corporation for Public Broadcasting. In addition, HR 1 proposed cuts of \$359 million from NSF, \$893 million from the Department of Energy Office of Science and \$1.63 billion from NIH.

HR 1 failed to pass in the Democrat-controlled Senate, but the possibility remains that Congress may still propose bills with similar cuts. The Senate has not passed its own budget.

Democratic politicians have used the Republican proposal to highlight what they call differences between the parties.

Democrats argue that cuts to these areas would harm the economy and America’s long-term prosperity. Their proposals to date include either consistent funding or increases for scientific research, with cuts to the Department of Agriculture, the Department of Homeland Security and the Department of Education.

The results of a bill along the lines of HR 1 would be devastating, Rep. Rush Holt, D-N.J., whose district includes Princeton, said in an interview with the ‘Prince.’ “Those are serious

cuts, and it would be tens of thousands of research projects stopped, thousands of scientists losing their support; in other words, their salary.” Holt, a former assistant director of the Princeton Plasma Physics Laboratory, voted against HR 1.

According to Senator Frank Lautenberg, D-N.J., the cuts would have lasting impacts to science.

“Cutting funds for research limits our students and universities from developing new sources of energy, medical advancements and other scientific breakthroughs,” Lautenberg said in a statement to the ‘Prince.’ “The House Republican budget is damaging to America’s research institutions and a threat to our leadership in the sciences and innovation.”

Republicans maintain that cuts must be made to non-security discretionary spending, which includes prominent programs in education, health care and energy.

“As I’ve said throughout this process, since the spending binge in Washington is hurting job creation in this country, we’re going to fight for the largest cuts possible — real cuts, not more smoke and mirrors,” Speaker of the House John Boehner said in a statement on Tuesday.

### **Prospects of a shutdown**

If Congress does not come to a resolution by midnight on Friday, the federal government will formally shut down. Around 1.5 million federal workers will be sent home or furloughed, new research funding will be delayed and grants will not be renewed without employees to make decisions and sign checks.

Scientists “are trying to stretch their current funds as long as they can while they wait to hear back on current proposals,” Clemins said. “Most try to keep their staff on as long as they can, but when the funds run out, they have no choice but to eventually let them go.”

But Holt said that the effects of a shutdown pale in comparison to actual legislated cuts in research funding.

“If the government shut down for days, or even weeks, bad as that would be, [it] is not as serious as failing to invest in the future,” he said.

“I think what we really have to do is work to restore the idea of investment back into our vocabulary,” Holt added. “There is such a thing as investment; families know it, businesses

know it ... Many an ordinary person knows that there are some ways you can use your resources that will give you more wealth, more opportunity [for] the future. And you know, science research clearly falls in that category.”

The last two government shutdowns came in 1995-96 under President Bill Clinton and focused on controversy over domestic spending cuts. A potential shutdown could share similarities with the one in 1995, but University and science officials said the extent and vigor of proposed cuts are different.

“The determination of the new arrivals in the House to cut spending in significant ways may be greater than some of the determination in the past,” University Vice President and Secretary Bob Durkee ’69 said.

This uncertainty leaves researchers like geosciences professor Francois Morel stuck in the middle, unsure of how much funding they will receive — if any at all. Morel has a grant pending at the Department of Energy for studies of mercury in the environment.

“This grant should be funded,” he said in an email. But it “may be delayed indefinitely,” he explained.

Or, he added, it could be “altogether scuttled.”

*Senior writer Rachel Jackson contributed to this report.*

*This article is the first in a [three-part series](#) about how federal funding affects University science. Check back tomorrow to see how cuts could affect the Princeton Plasma Physics Laboratory — and the energy competitiveness of the United States. For feedback or tips, please email [investigations@dailyprincetonian.com](mailto:investigations@dailyprincetonian.com).*