shaped the union and helped us articulate our values. We are in good shape because of Fred."

Still, the AGU council felt it was time "to move into the future," Grove says. "And the way to do that is with new leadership. With the change in [US] administration, we felt it was an excellent time to seize the opportunity to begin the executive transition here." In particular, Grove adds, the council would like to see more focus on science education, research funding, outreach, and public policy issues. "Fred had a great run as director. Based on his successes, AGU is ready to move to the next phase of its growth."

PHYSICS TODAY spoke with Spilhaus in late December.

PT: How did you come to AGU?

SPILHAUS: I guess it all started when I didn't get the [US] Navy scholarship I wanted to get—to do naval ROTC [Reserve Officers' Training Corps]. I failed the eye test. My father bet me 10 bucks I couldn't get into MIT. So I applied, and I was there for the next 10 years. I got my bachelor's in chemical engineering and then went into geology briefly before ending up in oceanography, which I'd been trying to avoid because it was my father's field.

Spilhaus

When I finished, it was Vietnam war time, and I came to Washington to work for the CIA. I was having a terrific time. I learned about the infrastructure of our oceanographic community. One day a letter came to me. It said, would I be interested in the job of associate executive director at AGU. I just threw it in the wastebasket. A couple of weeks later, I mentioned the letter to my dad, and he said, you know, that wasn't too smart, what they're really looking for is someone who can replace their long-term director Waldo Smith when he retires. A few weeks later, I got another letter. And I thought, OK, somebody has their finger in this pie, I better look into it. I suspected my father at first, until I later learned that my thesis adviser was on the search committee. Anyway, I looked into it, and it couldn't have been more than a month later that I had the job. That was 1967.

When I got the job, I thought I'd have a year or two to learn. I was lucky—I got three before Waldo retired. He was a very good tutor.

PT: What is your legacy at AGU?

SPILHAUS: I started *Eos*. It started out as a monthly magazine and worked that way for 10 years. Then, in 1978—we can credit the gas crunch—I was taking the train with our publishing manager, Judy Holoviak, to look at the printing plant. We started talking to them about *Eos*, and the guy said, make it a weekly and it will get better delivery—the post office had expedited delivery for weeklies. That was late October. We had a proposal at a meeting in December, and the first weekly issue came out in January.

Two other things were really kind of bulwarks. One is the dues. I attended a council meeting in 1968 when they were changed from $16 to $20. The dues haven't changed since. I helped convince the leaders not to increase dues above the incremental cost of serving a new member. We have a huge and growing membership—we had maybe 8000 members when I first came in, and the balance sheet was zero. Today, we have 55 000 members and many tens of millions in the coffers. What I am proud of is the fact that we have one of the top scientific societies—people want to join it, the publications are well respected, the meetings are well attended.

And there is the opening up to the international community. It's really made AGU an example for the whole world in our field. Everything has to be opened up internationally, you just can't work without looking at data from other countries. Geophysics does not respect national boundaries—rivers cross boundaries, mountains cross them, the ionosphere flies around. . . . About 38% of our membership is now from outside North America.

PT: What challenges await your successor?

SPILHAUS: Scientific societies that have been heavily dependent on publishing revenues have to keep up their guard and make sure they are able to roll with the punches that we are going to get from open access and the fact that technology is going to evolve. We need to begin using the technology more effectively.

Effective public policy has also been difficult for us. We'd like to see the science used in sound policy-making around the world, not just the US.

And in the US, there is the question of travel restrictions. It makes the US less attractive for meetings. We've already talked about not holding some of our meetings in the US. But moving the San Francisco meeting—this year 16 000 people attended—would be horrendous. [The travel restrictions] could mean that some meetings get canceled or moved.

PT: What areas of geophysics are you most excited about?

SPILHAUS: We are probably going to extend in a lot of ways. One is to work more closely with those trying to make things better for mankind. Geoengineering, for example, is one very exciting area. We have to link together with different disciplines to learn what they need and give them what we have. That's where a lot of the future lies: Take the skills on both sides to attack a societal problem. There might be ways to keep the temperature down on Earth, or new energy solutions, for example.

PT: Your father was also an oceanographer. What was it like working in his shadow?

SPILHAUS: My father was very well known. Less well known was that he was responsible for the Roswell incident [when people believed they'd spotted a UFO]. He was the chief scientist [in a secret military/CIA project] and was looking for a sound channel in the atmosphere for the purpose of detecting bomb tests.

We competed a bit. A turning point came in the late eighties when my father was introduced before a talk at Texas A&M. The host said, "Today's speaker needs no introduction. He's Fred's father." I was not there but I knew the worm had turned when he told me about it.

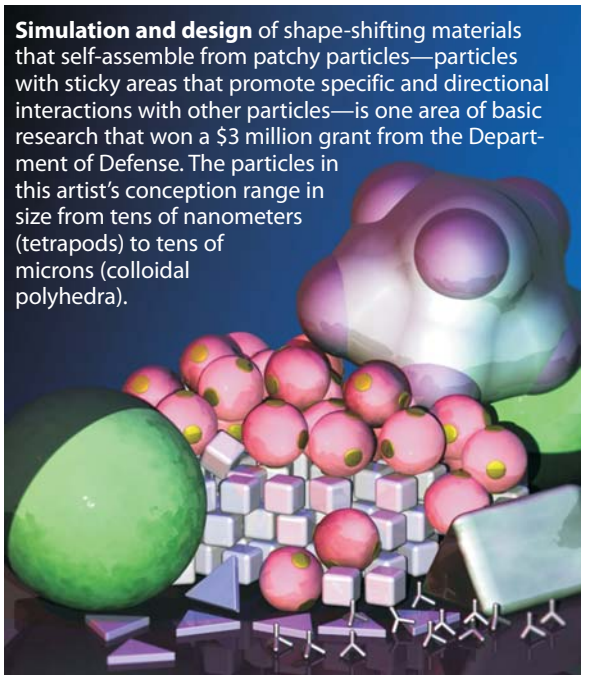
Toni Feder

DOD launches 'genius' awards

A lot of money over a long time. That's what a trickle of researchers is getting from the Department of Defense's new National Security Science and Engineering Faculty Fellowship (NSSEFF) program, which provides relatively strings-free grants of up to $3 million.

Last November the 2009 awardees—a half-dozen researchers culled from more than 500 applicants—were announced, bringing the total so far to 14. An earlier first round was for the 2008 awardees. The DOD plans to bestow up to 10 of the five-year grants annually.

"We want to have the best of the best in faculty working in national security," says William Rees, deputy under secretary of defense. By at least partially restoring a relationship between academics and the DOD that has weakened



CHRISTOPHER R. IACOVELLA AND SHARON C. GLOTZER, UNIVERSITY OF MICHIGAN

Simulation and design of shape-shifting materials that self-assemble from patchy particles—particles with sticky areas that promote specific and directional interactions with other particles—is one area of basic research that won a $3 million grant from the Department of Defense. The particles in this artist's conception range in size from tens of nanometers (tetrapods) to tens of microns (colloidal polyhedra).

over the past decade or so, he adds, the NSSEFF program is meant to serve two purposes. "Many transformative breakthroughs—GPS, the Internet—were funded by DOD. But in the 90s, with the cold war over, we decreased the amount of basic research funding. There is now a realization we want to get it back up." The second purpose is to cultivate a new pool of faculty advisers for the DOD. "Many of the top faculties in the top departments at the top universities have been advisers for national security. But younger faculty haven't really been rotating on as much as we would like," Rees says. "These are two different reasons, and each would be compelling by itself, but the combination made it a bipartisan, bicameral sell."

"There are very few grants that an individual PI [principal investigator] can get of this magnitude and this duration to really go after a big problem," says the University of Michigan's Sharon Glotzer, one of this year's awardees. The NSSEFF grants make for "a profound change in the way we can do research." The $3 million, or $600 000 a year, is for basic research; on top of that, DOD pays the university overhead. "It's fantastic. A typical grant for a physicist, especially a computational scientist like myself, might be as much as $150 000 a year, including overhead," Glotzer says. Other awards in the same vein include the Pioneer Awards from the National Institutes of Health, the Howard Hughes Medical Institute investigator awards, and the MacArthur "genius" awards.

Glotzer uses simulations to design self-assembling materials whose properties can change. "Many possible applications lie ahead, provided we can work out the basic scientific principles," she says. "DOD wants to protect war fighters in extreme conditions, for which one could imagine fabrics that change their weave or switchable coatings for aircraft or subs to provide stealth capabilities. What we are doing is fundamental statistical mechanics and thermodynamics, but applied to these very new systems. I can't think of any sector that would not benefit from reconfigurable materials, but there are particular applications that would be especially interesting for DOD."

Stanford University physicist Mark Kasevich, another 2009 awardee, does atomic interferometry. "We build sensors based on the interference of atomic de Broglie waves. They perform in the lab at a very high level, and our proposed work is to continue this to enable new tests of basic principles—deviations in Newton's inverse square law and a test of Einstein's equivalence principle." Applications, he adds, "are further down the road, but if these techniques come to fruition, they would enable new inertial navigation sensors and gravitational sensors."

Far down the road is just what the DOD has in mind. In five years, says Rees, "we won't be able to tell" whether the work of an NSSEFF awardee proves to have national security applications. "In 10 years we won't be able to tell. The way to tell would be to give the grade in 20 years. One message we are trying to get out is that you can't judge basic research on the 5–10-year time scale."

The DOD is not directing how the award money is spent, Rees adds, "but we are encouraging that [awardees] be involved with DOD." Awardees get a security clearance, and they're required to visit DOD engineering and development sites.

In addition to Glotzer and Kasevich, the 2009 NSSEFF awardees are Graham Candler, who simulates hypersonic flow at the University of Minnesota; Rice University's Naomi Halas, who works in three-dimensional nanophotonics; MIT's Christine Ortiz, whose NSSEFF focus is on engineering designs for protective armor; and John Rogers of the University of Illinois, who works on stretchable electronics.

Toni Feder

Science and energy are big winners in House economic stimulus plan

Probably nowhere else but in Washington could the outlook for science and technology spending actually brighten as the economy tanks. But with President Barack Obama and Congress under pressure to inject $825 billion into the economy, and do so as quickly as possible, additional federal R&D funding—for energy research in particular—looks to be in the mix.

In his inaugural address, Obama alluded to the key role he wants science and energy to play in the unprecedented federal bid to shore up the economy. "We will restore science to its rightful place," he declared. "We will harness the sun and the winds and the soil to fuel our cars and run our factories."

As PHYSICS TODAY went to press, House appropriators were marking up a $550 billion spending bill that proposes to heap a total of $43.9 billion in new one-time spending upon the Department of Energy, an agency whose budget was less than $24 billion in fiscal year 2008. (DOE, like most federal agencies, continues to operate at FY 2008 levels, awaiting completion of the FY 2009 appropriations bills.) Much of that new spending, though, would go for loan guarantees and grants to state and local government energy programs. Government-wide, the bill proposes $10 billion in additional spending for research, equipment, and scientific facilities, plus a whopping $32 billion to modernize the nation's electric grid and expand the production of renewable energy.

Within DOE, the Office of Science, which doles out 40% of federal funding for basic physical science research, would see its budget jump from just over $4 billion to $5.9 billion. DOE's fossil energy program would get $2.4 billion for carbon capture and storage R&D. Renewable energy and energy-efficiency technologies would see a $2 billion increase, with $1 billion more for grants to support advanced battery development for vehicles.