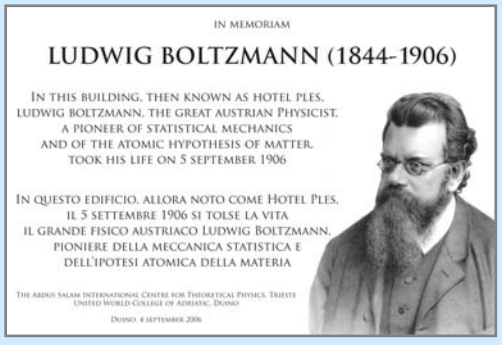
Boltzmann honored on death centenary

This month, which marks the 100th anniversary of his death, the Austrian physicist and mathematician Ludwig Boltzmann is being honored with a commemorative plaque in Duino, Italy. The plaque is to hang in the hotel—now a college—where Boltzmann committed suicide on 5 September 1906 while on vacation with his family.



The plaque is the doing of the International Centre for Theoretical Physics (ICTP) in nearby Trieste and its director, Katepalli Sreenivasan. "We are the physics center in the vicinity," he says. "And Boltzmann had a tremendous impact on me personally." Sreenivasan recalls being about 19 years old when he first learned about Boltzmann: "He had to struggle for recognition. He killed himself at least partly because he couldn't come to terms with the criticism of his work. I resolved that I would never allow the criticism of my work to destroy my creativity."

A ceremony at the plaque hanging includes talks by physicists and local dignitaries. ICTP is also hosting an exhibition about Boltzmann's life and work.

Toni Feder

the market—everything from the calcium powder to cosmetics to neck-support pillows filled with silver nanoparticles. Maynard also calls for international coordination of risk research, establishing a joint government–industry research institute, and creating an interagency oversight group with the authority to coordinate and direct the risk research program.

Given the budget constraints plaguing the entire federal government, Duncan and other environmental safety experts doubt there will be new money for nanotechnology risk research. And Teague said creating "one über agency" to regulate research throughout the government would be difficult to implement. "But [Maynard's] report is a thoughtful analysis of what's being done and where things are going," he said. "There needs to be a solid strategy for moving forward."

Jim Dawson

NASA aeronautics lacks money, relevance, NRC says

For more than a year, NASA has been taking flak from legislators and scientists for ongoing cuts to science missions as the agency shifts its priorities to a new manned space vehicle and a goal, mandated by President Bush, of returning humans to the Moon and eventually sending them to Mars. Now concern is growing on Capitol Hill and in the aeronautics industry that NASA's aeronautics program, represented by the first "A" in NASA, is being underfunded to such an extent that it might be, in the words of a recent National Research Council report, on "a glide path to irrelevance."

Two recent NRC reports, one a decadal survey of civil aeronautics and the other a study of the aeronautics programs at NASA, raise serious concerns about the administration's cuts in aeronautics funding and the space agency's failure to restructure the program to reflect its shrinking budget. The decadal survey, which offers a detailed list of "51 challenges" NASA should address so as to maintain its aeronautics program, notes that funding has been "severely cut during the past few years, falling from over $1 billion in fiscal year 2004 to a proposed $724 million in fiscal year 2007."

The budget cuts are even worse than that, Michael Romanowski, a representative of the Aerospace Industries Association of America, told the space and aeronautics subcommittee of the House Committee on Science in July. Funding for NASA's Aeronautics Research Mission Directorate was $1.54 billion in FY 1994, he said, and 13 years of consistent cuts have resulted in a more than 50% reduction in federal support.

The NRC study on aeronautics challenges faced by NASA says the space agency's aeronautics program is "overshadowed in resources, managerial attention, and political support by the

agency's principal mission of space exploration and discovery." The administration's Moon and Mars initiatives have made the relatively lower status of aeronautics within NASA "if anything more pronounced," the study says.

NASA's aeronautics program "supports research and development in advanced airframe, engine, emissions, air safety, and air traffic control technologies," the study says, and has historically played a critical role in the development and global leadership of the US aeronautics industry. But a lack of a national consensus on the role of government involvement in civilian aviation persists.

"On the one hand, the community of industry, academic, and other . . . experts support an expansive public [R&D] program with NASA playing a lead role," the NRC study says. "On the other hand, successive administrations and sessions of Congress have over the past seven or eight years reduced NASA's aeronautics budget without articulating how the programs should be scaled back." NASA has tried to keep most of its aeronautics programs running with less and less money, and as a result, the programs are losing their value to the aeronautics industry, the study concludes.

Although NASA's overall budget is on track to remain flat for FY 2007, the R&D budget will actually increase by about 7.6% to $12.2 billion because the agency has moved money around. But almost all of the increase will go to human space vehicle development, leaving aeronautics with a 7% cut. And that cut would be even bigger without the $100 million House appropriators have added back to the aeronautics budget. Science spending will rise only 0.8%.

The problem at NASA aeronautics, the NRC study concludes, is "extremely acute." **Jim Dawson**

Zero-gravity flights aim to boost interest in S&T careers

When you were young, did you ever dream you could fly? Florida science teacher Nicole Notz did, and the dream propelled her into an initial career as a helicopter pilot. Later, she switched to science education, but she always remembered her fantasy excursions. During the past few months—thanks to a defense and aerospace company's program that sent teachers on weightless flights—Notz got to live her dream, and now she can't wait to get back to her classroom.

Notz, who teaches science to students in grades 9 through 12, said that floating and flying around inside a specially outfitted aircraft during its zero- and low-gravity phases was unlike anything she'd ever experienced, even as a helicopter pilot.

"You're sitting on the floor and you feel your whole body lift up. You can't help but smile," she said. "Does this boost your enthusiasm [for teaching]? Oh, gosh. We can show [students] all these things, not just talk about them."

Notz's reaction to going weightless, and her eagerness to bring her enthusiasm to her students, is what Northrop Grumman Corp was banking on when it helped create Weightless Flights of Discovery. Through the program, which began in June and wraps up this month, some 240 teachers from the US and other countries participated in flights that briefly created weightless and low-gravity environments. The company is hoping the teachers' flight experiences, along with their participation in pretakeoff workshops and onboard science experiments, will heighten their zeal for teaching science and in turn spur their students to pursue careers in space exploration, science, or technology.

"Dinosaurs and space are the two things that excite children, and we want to inspire our future generations," said Sophia Kim, manager for strategic studies at Northrop Grumman's integrated systems sector.

For the program, Northrop Grumman—which is not disclosing its costs—teamed up with Zero Gravity Corp of Fort Lauderdale, which operates a Federal Aviation Administration–approved aircraft that is able to fly in parabolas and was used in the program's flights. Zero Gravity supplied the pilots for each of the program's 12 short flights and led the teacher workshops, which are based on a NASA curriculum for educators. The company also shot video of each flight from the aircraft's interior and gave copies to participating teachers.

Newton's laws in space

Deb Houts, another participant who teaches advanced chemistry and physics to Florida high-school students, is eager to convert her discoveries into tutorials. In one lesson, she'll ask her classes to identify and apply Newton's laws as they watch a video of M&M's and other small objects floating around the plane's interior during a weightless period. She said the third law, that every action has an equal and opposite reaction, is especially well illustrated in footage of teachers throwing each other around inside the aircraft.

Houts also used her weightless moments—which last about 15 seconds each as the plane plunges downward from the peak of a parabola and collectively total about 4 minutes per flight—to conduct oil-and-water experiments. In one, using a clear container, she showed how differently the two fluids interact with each other in a full-gravity environment versus in zero gravity. On Earth, the less-dense oil floats on top of the water. When gravity disappears, the oil gathers in the center of the water. After seeing a video of the experiment, her students will figure out what causes the oil to act as it does. "Removing the force of gravity, which would pull most dense material down, means you're talking about intermolecular forces," Houts said. "You get a ball of oil in the middle. It really is pretty cool." **Karen H. Kaplan**

ZERO GRAVITY CORP

Science teacher Deb Houts floats inside a plane during a zero-gravity flight that's part of a national industry program designed to redouble teachers' enthusiasm for teaching science.