

# NASA tells physicists to aim for the stars

[WASHINGTON] Dan Goldin, the administrator of the US space agency NASA, has triggered fierce debate among physicists by suggesting that the next generation of instruments for exploring the fundamental nature of matter should be built in space.

Speaking to a joint meeting of astrophysicists and particle physicists at Chicago-based Fermilab, the largest US particle-physics laboratory, Goldin said that "space will be an essential laboratory in our journey beyond the Standard Model".

He told the meeting that Enrico Fermi himself had once proposed an "accelerator in space". "Fermi had it right," he continued. "Space is the way to go for the future. Fermi was a dreamer, and that's what we should be too. Fermi hadn't seen the physical and economic limitations of ground-based accelerators, but he made the leap to space anyway."

Goldin's remarks caused some consternation at Fermilab, which last week dedicated a new main injector to the world's most powerful hadron accelerator, the Tevatron, and which now needs to develop a case for a new accelerator based firmly on the ground in Illinois (see *Nature* 394, 611; 1998).

This discomfort was compounded, according to laboratory officials, by additional comments by Goldin, intimating that NASA's experience in searching for life in the Universe could assist high-energy physics, "because it's dead". (NASA officials said later that Goldin was referring only to the high-energy physics programme at NASA itself.)

However, Goldin's primary objective was not to embarrass his hosts but to tell the scientific community that NASA is prepared to spend big money on physics in space. The agency also wants to work more closely with the Department of Energy and the National Science Foundation (NSF) to support space-based physics experiments.

NASA officials say that the agency envisages that a new generation of such instruments will give the agency a broader mission in astrophysics and cosmology. Money for these projects could start to flow as soon as the 2002 fiscal year, the officials say.

Goldin plans to sell these experiments as part of a "cosmic origins" programme. Introducing the concept in Chicago, he compared it to NASA's Origins programme to determine the origins of life, which he launched three years ago and which, he pointed out, is now to be funded at \$1 billion over five years.

Although Goldin's speech avoided direct criticism of ground-based approaches to particle physics, he did describe space-based observation of gravity waves, cosmic rays and new high-energy particles as "the gateway to the new physics".

Goldin illustrated the approach by citing instruments that already exist as conceptual



programmes at NASA, such as the Laser Interferometer Space Antenna, which would detect gravity waves by measuring tiny changes in the distance between satellites positioned five million kilometres apart.

The terrestrial Laser Interferometer Gravitational-wave Observatory, currently being built by the NSF to do this, has arms that are 4 km apart, and its accuracy is limited by seismic noise.

Scientists who advised Goldin on the speech say that it was meant to provoke researchers to think up new ideas for space-based physics instruments. "Goldin is challenging the community to find ways to do fundamental physics in space," says Rocky Kolb, a cosmologist at Fermilab.

## Varmus relaunches NIH degree proposal

[WASHINGTON] Harold Varmus, director of the US National Institutes of Health (NIH), made a second attempt last week to persuade his advisory committee that the institutes should award degrees, and establish a PhD programme in "disease-oriented integrative biology".

The committee was first informed of the proposal, under which 15 students would be admitted each year, last December. In a straw vote last week, most members of the committee backed further development of the proposal.

But several remained unconvinced that the NIH should launch a PhD programme when, it has been argued, US universities are producing a glut of life scientists. Such a move would "send the wrong symbolic message," said Shirley Tilghman, a committee member who is a professor of molecular biology at Princeton University.

Tilghman chaired a panel last year for the National Research Council on the early careers of life scientists that recommended freezing the number of life sciences PhD students. It said that new PhD programmes should be started only in "rare and special

"He doesn't have any particular experiments in mind, but he senses an opportunity," says Kolb. "Scientists are conservative in that way — we have to be encouraged to dream." But he concedes that "scientists like to work on instruments that might be built one day".

Alan Bunner, who heads the section of NASA's office of space science that supports astrophysics and cosmology, says the agency is considering greater emphasis on the area as part of its strategic plan for space science.

Bunner adds that NASA would like to work more closely with the Department of Energy and the NSF to support experiments. "It is time for a new approach, bringing all three agencies together," he says.

The energy department and NSF are already jointly assessing astrophysics proposals through a panel called SAGENAP — the scientific assessment group for experiments in non-accelerator physics, chaired by Barry Barish of Caltech. It is not clear if NASA intends to join up and help to pay for experiments approved by the group.

Bob Eisenstein, head of the mathematical and physical sciences directorate at NSF, says Goldin "gave a very exciting and far-ranging speech" at Fermilab. Eisenstein adds that space has obvious advantages as a venue for many types of experiment: "Based on intellectual promise, it is the best way to go," he says. "But when you take cost into account, it is pretty damn expensive." **Colin Macilwain**

circumstances" (see *Nature* 395, 103; 1998).

Varmus disagreed last week with Tilghman, who argued that an NIH programme would be warranted only if it taught material not available anywhere else. "Things that are done at NIH do not have to be unique," Varmus said.

The PhD programme proposal was presented by Michael Gottesman, NIH deputy director for intramural research. The curriculum would focus on "special needs" in US graduate education, including bioinformatics and clinical research.

Enthusiasts for the proposal included Eric Kandel of the Center of Neurobiology and Behavior at Columbia University in New York. "Focusing on programmes that you can do better than anybody else is a terrific idea," he said. "There are very few places in the country that can do this anywhere as well as NIH," he said of teaching bioinformatics and clinical investigation.

According to Varmus, work will continue on the proposal, and the advisory committee will receive a further report in December. **Meredith Wadman**