

## SPACE SCIENCE

## NASA Declares No Room for Antimatter Experiment

The Alpha Magnetic Spectrometer (AMS) is a model of international cooperation, led by a dynamic Nobel Prize winner, and promises to do impressive science in space. But it may never get a chance to do its thing.

The problem is that NASA has no room on its space shuttle to launch the \$1.5 billion AMS mission, which is designed to search for antimatter from its perch on the international space station. "Every shuttle flight that I have has got to be used to finish the station," NASA Administrator Michael Griffin told a Senate panel on 28 February.

Griffin's categorical statement could spell doom for the innovative experiment, which received a glowing review in December from an independent scientific review panel appointed by the mission's sponsor, the U.S. Department of Energy (DOE). The decision is sure to send ripples around the world, considering that 16 countries have con-

tributed large sums of money to the effort. And it is one of the only significant scientific facilities planned for the space station.

AMS is the brainchild of Samuel Ting, a physicist at the Massachusetts Institute of Technology in Cambridge and Nobel laureate. One of its major goals is to understand the uneven distribution of matter and antimatter in the universe by searching for antimatter. The experiment, nearing completion in Geneva, Switzerland, could also help search for dark matter and a new form of quark matter called strangelets.

NASA and Ting announced the experiment with much fanfare in 1995, and the shuttle flew a small prototype in 1998. Although the loss of the Columbia orbiter put launch of the AMS on indefinite hold, Ting has continued work on the spacecraft, which should be ready to be shipped to Kennedy Space Center in Florida by 2008

after testing at Geneva's CERN and the European Space Agency's facility in Noordwijk, the Netherlands.

NASA has spent \$55 million to build the skeleton, which will hold the device in the shuttle hold—the 6800-kg AMS would take up nearly half a shuttle bay—and be attached to the long truss on the space station. Although DOE has contributed about \$30 million, the vast bulk of AMS funding has come from international partners such as Italy and France, as well as the unlikely combination of Taiwan and China. "The AMS project is sure to be viewed as a model for international collaboration in science," noted one reviewer in the DOE study chaired by Barry Barish, a physicist at the California Institute of Technology in Pasadena. That study "had only praise and some wonder" at Ting's ability to create such a far-reaching coalition.

Barish last week called the NASA news "disappointing" and said it would be "a big blow for international collaborators." He added that Ting has already been looking for other routes into space. One alternative is to launch the AMS on an expendable rocket with a robot that could guide it to the space station. The only realistic candidate, NASA officials say, is the Japanese H-2 transfer vehicle now under development. To alter both that vehicle and the AMS for such a mission, however, would cost between \$254 million and \$564 million, says Mark Sistilli, NASA AMS program manager.

Another alternative would be to place it in orbit aboard a rocket, which could leave the AMS in orbit until the shuttle could pick it up. That option could cost \$380 million to \$400 million and would entail a complex docking maneuver. A final option, according to Sistilli, would be to turn the AMS into a free-flying spacecraft with its own radiators and solar panels. Such a conversion, however, could top \$1 billion.

DOE officials declined comment, and Ting was traveling in Asia and could not be reached. But Sistilli, who agrees that "the science is terrific and the international commitment is huge," says that NASA will continue to fund its portion of the project and hope for a positive outcome. "We didn't want to outright kill it," he says. "We don't really know how to handle the situation."

—ANDREW LAWLER



**Not stationary.** AMS needs another way to get to the international space station after NASA said that the shuttles are booked.