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# NASA Installs Device at Space Station in Long-Sought Quest for Antimatter

By WILLIAM HARWOOD

KENNEDY SPACE CENTER, Fla. — The astronauts aboard the space shuttle Endeavour attached a $2 billion cosmic ray detector to the International Space Station on Thursday, and delighted scientists immediately began detecting "thousands and thousands" of subatomic particles from deep space.

Equipped with a powerful magnet and an intricate array of sensors, computer processors and high-speed data links, the Alpha Magnetic Spectrometer is designed to measure tiny deflections in the trajectories of cosmic ray particles to look for the telltale signs of antimatter and the unseen dark matter believed to make up nearly 25 percent of the universe.

It also will be on the lookout for the unexpected as it sifts through torrents of passing protons, electrons and atomic nuclei for the next 10 years or longer, ideally for the remaining life of the space station.

"We immediately checked all the detectors; everything functioned properly," Samuel Chao Chung Ting, the project's principal investigator, told reporters. "Not a single one was broken, not a single electronic channel was malfunctioning. Right away, we began to see an enormous amount of data coming down."

Holding up sample graphs showing the passages of an electron and a carbon nucleus, Dr. Ting said, "We're very pleased. It took us 17 years to build this thing." Over time, he said, the scientists on the project hope "to make an important contribution to our understanding of the origin of the universe."

Carried aloft in Endeavour's cargo bay, the 7 1/2-ton Alpha Magnetic Spectrometer was attached to the right side of the space station's solar power truss using the orbiter's robot arm and a similar crane on the lab complex. After the instrument was locked in place, an umbilical carrying power and data was attached by remote control.

Within two to three hours, scientists and engineers at the Johnson Space Center in Houston were receiving a steady stream of data. "We have thousands and thousands of signatures already," Dr. Ting said, referring to particle signatures.

It was a welcome, long-awaited milestone for a project with a history that reads like "The Perils of Pauline."

After the 2003 explosion of the space shuttle Columbia, the project was bumped from NASA's manifest. A lobbying campaign by Dr. Ting and his colleagues eventually won over President Obama and key lawmakers, who approved financing for an extra shuttle flight to get the particle-detecting magnet into orbit.

But a decision to extend the space station's life from 2015 to 2020 and beyond prompted Dr. Ting's team to give up a more powerful but short-lived superconducting magnet in favor of a less powerful version, used in a 1998 test flight, that could last the life of the station.

All told, Dr. Ting and his team — more than 600 physicists from 60 institutions in 16 countries — have spent nearly two decades designing, building, testing and redesigning the Alpha Magnetic Spectrometer. The payoff is finally at hand.

One of the mysteries the device was designed to explore is what happened to the antimatter that must have been created when the universe was born.

"If the universe comes from a big bang, before the big bang it is vacuum," Dr. Ting said before Endeavour's launching. "Nothing exists in vacuum."

In the beginning, he said, "You have matter, you must have antimatter; otherwise we would not have come from the vacuum.

"So now the universe is 14 billion years old, you have all of us, made out of matter. The question is, where is the universe made out of antimatter?"

Another subject of study for the spectrometer is dark matter, the mysterious material believed to provide the gravitational glue that holds galaxies and clusters of galaxies together. While Dr. Ting's creation cannot directly detect dark matter, it possibly can detect the particles that would be produced in dark matter collisions.

"To my collaborators and I, the most exciting objective of A.M.S. is to probe the unknown," Dr. Ting said, "to search for phenomena which exist in nature, but yet we have not the tools or the imagination to find."

Meanwhile, as NASA continued its advances in space, on Earth — in Washington — it was scolded for tardiness in deciding what it will do after the shuttles are retired in July.

Leaders of the Senate Committee on Commerce, Science and Transportation sent a letter to Maj. Gen. Charles F. Bolden Jr., the NASA administrator, demanding documents detailing how the agency was carrying out the blueprint Congress passed last year for future space exploration. The plans called for development of a new heavy-lift rocket and spacecraft for missions beyond low-Earth orbit.

The senators said NASA had failed to provide required reports to Congress and requested that a NASA official begin briefing them every other week about the agency's efforts.

"NASA's current inaction and indecision in implementing this transition could impact our global standing and take many years and billions of dollars to repair," said the letter, signed by Senators John D. Rockefeller IV, a Democrat of West Virginia who is chairman of the committee; Kay Bailey Hutchison of Texas, the ranking Republican member; Bill Nelson, a Democrat of Florida and chairman of the space subcommittee; and John Boozman, Republican of Arkansas.

The Obama administration has placed higher priority on financing commercial companies for developing space taxis for taking NASA astronauts to orbit.

*Kenneth Chang contributed reporting from New York.*