

Shuttle Endeavour's Mission and the Search for Origins of Universe

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Photo: NASA

The International Space Station is seen over Miami, Florida, in this 35mm frame photographed by STS-108 Commander Dominic Gorie aboard the Space Shuttle Endeavour (file photo)

Scientists hope to learn more about the origins of the universe once a sophisticated particle detector arrives at the International Space Station and starts searching for anti-matter and dark matter.

The primary objective of space shuttle

Endeavour's 14-day mission is to deliver the Alpha Magnetic Spectrometer to the earth-orbiting space station. Endeavour's commander, Mark Kelly, told journalists at a recent mission preview briefing at Johnson Space Center in Houston that this sophisticated instrument has been in development for 16 years.

"It's going to look for anti-matter, dark matter, dark energy. It's a collaboration from 16 different countries with 600 scientists, so we're pretty excited about what this means for science aboard the ISS and for, you know, real science on the origin of the universe."

Anti-matter. Dark matter. Origin of the universe. It all sounds pretty intimidating.

Not so, said the Alpha Magnetic Spectrometer's principal investigator, Samuel Ting of the Massachusetts Institute of Technology. "In physics, everything appears to be complicated, but the basic idea is always very simple."

He said our understanding of the universe comes from our understanding of light rays. But the visible matter in the universe makes up only a fraction of the total mass that is known to exist.

"We know 90 percent of the matter in the universe cannot be seen," said Ting. "Because you cannot see it, that's why you call it dark matter. Nobody knows what dark matter is because you cannot see it."

Ting explained, however, that just because you cannot see it does not mean you cannot detect it. He said the collision of dark matter with dark matter can produce particles, and if you calculate the number of particles produced in those collisions, you would see that the total is higher than what you would expect if you were measuring only ordinary cosmic ray collisions.

That sum, he said, gives you a hint of the non-visible part of the universe.

So, that's dark matter. Then there is the matter of anti-matter.

"If the universe came from the Big Bang, before the Big Bang, it is a vacuum," said Ting. "Nothing exists in a vacuum. So, at the beginning, you have an electron, you must have a positron, so the charge is balanced. So you have matter, you must have anti-matter. Otherwise you would not have come from a vacuum."

The Alpha Magnetic Spectrometer is a sophisticated detector that will look for elusive evidence of anti-matter, searching for anti-carbon and anti-helium among all the discernible particles. Ting used a down-to-earth example to explain this spectrometer's extraordinary precision.

"In the city of Houston, during a rainy season, you have about 10 billion raindrops per second. If you want to find one that's of a different color, it's somewhat difficult."

The spectrometer that will be mounted to the space station's truss will search for the equivalent of that raindrop of a different color. It will give a glimpse of what can be detected, but cannot be seen. That, Ting explained, is what makes the space station such an amazing orbiting laboratory.

Not that life aboard the space station is all work and no play.

At one point, before the shuttle Endeavour's launch was delayed to mid-April, Commander Kelly would have been on board the space station at the same time as his identical twin brother, Scott, who was part of the crew on the space station at that time. It would have been the first time brothers, let alone twins, would

have been on the ISS together. Mark Kelly divulged that the brothers had plans for a prank when the Endeavour orbiter was docked at the station.

"We've been asked to do this switch-places thing since we were in kindergarten, and we've always resisted it."

But, apparently, the temptation has grown stronger for the twins.

"My plan was to change shirts, shave my mustache. He had a fake one. I'd get back in the orbiter. You know, somebody would have thought that was him and I was on the ISS, so that was the plan."

When a reporter asked if that was really true, Kelly responded, "Yeah, yeah it is." The assembled press got a good laugh out this.

Three of this mission's six crew members have flown on Endeavour before. Astronaut Gregory Chamitoff is part of Endeavour's 25th and final flight. Chamitoff said Endeavour was the first shuttle to bring a piece of the space station into space, and now it is going to carry up the spectrometer, which is the station's final major piece of external hardware.

"Book-ending (being at both ends of) the entire construction of the space station, and, you know, that's a legacy for the whole space shuttle program, not just for Endeavour," said Chamitoff.

The shuttle fleet is being retired this year so NASA can focus on developing the next generation of spacecraft that could go beyond low-Earth-orbit.

Endeavour is set to blast off April 19.

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