



Final shuttle will carry its mirror in search for dark matter, antimatter

City firm may help solve ancient riddle

Michelle Cohen Arizona Daily Star | Posted: Friday, October 1, 2010 12:00 am

A Tucson company is contributing to a NASA experiment that seeks to answer an age-old question: Where did the universe come from?

Composite Mirror Applications Inc. has built a mirror that will be part of the last mission of the space shuttle program. It's one component in an experiment to detect dark matter and antimatter, which scientists say may shed light on the origins of the universe.

"One theory of the beginning of the universe is there were equal amounts of matter and antimatter," said NASA's project manager, Trent D. Martin. "Antimatter is the complete opposite of matter. If there is naturally occurring antimatter, we will detect it, and detecting naturally occurring antimatter would prove one theory of the beginnings of the universe."

The experiment will be brought to the International Space Station on the last flight of space shuttle Endeavour, said Robert Romeo, president of Composite Mirror Applications. "What we've produced is one of the optics for the experiment," he said.

The Tucson company has made mirrors for CERN's Large Hadron Collider, a massive particle accelerator that straddles the border between Switzerland and France. It's used by physicists to study the smallest known particles, notes the European Organization for Nuclear Research, also known as CERN.

The company also is working with the University of Arizona's Steward Observatory Mirror Lab to build flexible optics.

Founded in 1991, Composite Mirrors has annual revenue of about \$900,000. The company specializes in making mirrors out of carbon fiber, which is sturdy and reduces costs, Romeo said.

The mirror for the NASA experiment took about two years to make and was delivered to Carlo Gavazzi Space in Italy in 2005. Composite Mirror Applications was paid \$200,000 for its work, Romeo said.

CERN scientists installed the mirror on the Alpha Magnetic Spectrometer 2, or AMS-02, which was airlifted from Geneva to Florida in late August. The experiment to detect antimatter and dark matter is scheduled to launch from Kennedy Space Center in February.

Martin said if the experiment doesn't find antimatter occurring naturally in the universe, it would mean something happened to it. Or it could disprove that theory.

"The other thing it's looking for is dark matter," he said. "We believe dark matter makes up 90 percent of the universe. Unfortunately, we can't see it, so there's a question as to, 'What is dark matter?'"

By using an extremely sensitive detector in space, scientists will likely see interactions between matter and dark matter, Martin said. Based on those interactions, they can infer what the dark matter may be, he said.

The experiment will use multiple detectors to ensure accurate measurements.

Romeo said the mirror, which is 1.3 meters in diameter and shaped like a cone, is reflective on the inside surface and will help measure the particles.

"It's a fairly complicated experiment that measures energy levels of alpha particles," subatomic particles in space, Romeo said. "These little particles will enter the front of the experiment. The experiment has a way of fooling these particles into believing it's traveling faster than light. That particle will give off radiation, and it's the radiation that the mirrors will measure in the form of

rings."

AMS-02 took about 11 years to develop and cost about \$2 billion, with about 95 percent coming from international sources, said NASA spokeswoman Kylie Clem.

At a glance

Composite Mirror Applications Inc.

- Address: 1638 S. Research Loop, Suite 100.
- Employees: 7.
- Top executive: Robert Romeo.
- Business: Maker of mirrors from carbon fiber.

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