CU telescope debuts on NASA flying observatory

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Terry Herter, left, and other members of the SOFIA crew cheer as FORCAST sees its first celestial image from the ground during mini line-ops Wednesday night/Thursday morning.

(PhysOrg.com) -- SOFIA, the Stratospheric Observatory for Infrared Astronomy, will take flight May 25 along with the Cornell-built FORCAST (the Faint Object InfraRed Camera for the SOFIA Telescope).

When the first photons meet the 2.7-meter telescope aboard SOFIA, the Stratospheric Observatory for Infrared Astronomy, in flight May 25, it will be the long-awaited result of more than 13 years of work by hundreds of scientists and engineers around the world.

It will also be the beginning of a new era in astronomy, scientists say.

And it will be a particularly sweet moment for Cornell professor of astronomy Terry Herter, leader of the team that designed and built FORCAST (the Faint Object InfraRed Camera for the SOFIA Telescope), the first instrument to fly on the observatory.

SOFIA, a modified Boeing 747SP fitted with a German-built telescope that measures radiation primarily in the infrared, is about to begin what researchers hope will be some 20 years of observing the universe. The mission is a joint program by NASA and the German Aerospace Center.

With an evolving variety of instruments that can be changed and updated as technology progresses over the years, the observatory could help answer questions about planet and star formation, the composition of nearby galaxies and the center of our own galaxy, features of the interstellar medium and the planets of our solar system.

The observatory combines the advantages of space-based telescopes like the Spitzer Space Telescope and the Hubble Space Telescope with the benefits of ground-based observatories, said University of California-Los Angeles astrophysicist Eric Becklin. Flying at 35,000-45,000 feet, it will allow researchers to see phenomena that are obscured from the ground by atmospheric water vapor. But because it returns to the ground, researchers can change instruments and make adjustments and modifications that would be impossible with a space telescope.

"The aircraft puts the two together; it's a nice partnership," said Becklin. "I haven't talked to anybody who's not excited by this project."

SOFIA is also mobile -- it can travel to different places around the world to observe transient events.

To keep it stable in flight, the telescope is suspended over a giant spherical bearing -- similar to how a puck is suspended over an air

hockey table. Small torquer motors use magnetic fields to keep the telescope centered.

Five instruments are ready for use on SOFIA (one at a time), with many more in the pipeline. First in line is FORCAST, an infrared camera that can take 100 images per second, making it ideally suited for characterizing the telescope on its initial flights. On the debut six-hour flight, FORCAST will also measure the thermal emission from the telescope itself -- vital information for every instrument to follow -- and take infrared photos of test targets in the sky.

Herter, principal investigator for FORCAST, will be on board to operate the instrument, along with three other Cornell team members and seven scientists, engineers and technicians from the United States and Germany. Once SOFIA is in regular operation, FORCAST will collect high-resolution infrared images of the galactic center, regions around forming stars and nearby galaxies.

With dozens of flights logged on SOFIA's predecessor, the Kuiper Airborne Observatory, Herter is a veteran of airborne astronomy. But he's not jaded to the concept. "Think of it: You modify a 747 airplane and cut a hole in it, and then you put a telescope in it and look out," he said. "It's pretty amazing."

Provided by Cornell University