NASA's Glast mission one step closer to launch

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This is a photo of the GLAST Observatory at General Dynamics, after the integration of the GLAST Burst Monitor instrument. Credit: NASA and General Dynamics

NASA's next major space observatory, the Gamma-ray Large Area Space Telescope (GLAST), is one step closer to unveiling the mysteries of the high-energy universe. Almost all the components have been

assembled onto the spacecraft, which will undergo a review this week before environmental testing begins at the primary contractor, General Dynamics Advanced Information Systems in Gilbert, Ariz.

GLAST will study the universe's most extreme objects, observing physical processes far beyond the capabilities of earthbound laboratories. GLAST's main instrument, the Large Area Telescope (LAT), operates like a particle detector rather than a conventional telescope. It is 30 times more sensitive (and even more at higher energies) than the best previous missions, enabling it to detect thousands of new gamma-ray sources while extending our knowledge of previously unidentified sources. For example, it will study how some black holes accelerate matter to near light speed and perhaps even reveal the nature of dark matter. The other instrument, the GLAST Burst Monitor (GBM), will detect roughly 200 gamma-ray bursts per year. Together with the LAT, the GBM will enable GLAST to make gamma-ray burst observations spanning a factor of a million in energy.

"These two instruments and the spacecraft have now been integrated and are working together as a single observatory," says GLAST project manager Kevin Grady of NASA's Goddard Space Flight Center, Greenbelt, Md.

"The observatory is getting ready for the final testing in the simulated environment of space, so that any problems can be fixed to ensure that it will work when we launch it," adds Kathleen Turner, the LAT program manager at the United States Department of Energy, in Germantown, Md. The Department of Energy helped build the LAT in collaboration with other institutions in the United States, France, Italy, Japan, and Sweden. NASA's Marshall Space Flight Center, Huntsville, Ala., built the GBM in collaboration with institutes in Germany.

On April 11 and 12, 2007, an independent committee of scientists and

engineers commissioned by NASA will conduct a Pre-Environmental Review (PER). This committee, chaired by Mark Goans of NASA Goddard, has been monitoring the development of the mission over the past four years. This review is expected to last two days, and will make sure that all technical problems and anomalies have been resolved, and that the 4.7-ton spacecraft is ready to be "shake and baked."

Following the PER, environmental testing will begin. Each individual subsystem has already passed its own round of environmental testing, but this new set of procedures will make sure that the integrated observatory can survive the rigors of launch and the harsh conditions of space.

In the first test, called the Electro-Magnetic Interference test, operators will bombard the spacecraft with electromagnetic radiation to ensure that certain systems do not produce signals that interfere with other systems. As project scientist Steve Ritz of NASA Goddard explains, "If electrical noise from your beating heart causes a problem with your brain, you'd want to know about it."

Next, GLAST will undergo mechanical tests, which involves exposure to vibrations, shocks, and acoustic waves. The vibration test will make certain the entire spacecraft can survive the shaking of a Delta II Heavy rocket launch. With the tall spacecraft being shaken from its base, some of the appendages will be exposed to accelerations up to 15 times the force of Earth's gravity. The shock test ensures it can survive separation from the booster. The acoustic test examines if the craft can survive the terrific roar of a Delta II launch. Engineers will bombard the spacecraft with up to about 144 decibels of noise, louder than being in close proximity to a jet aircraft.

Finally, the team will subject GLAST to the Thermal-Vacuum test, which checks the spacecraft's ability to withstand the vacuum of space and the extreme temperature swings it will experience as it goes in and

out of sunlight during each orbit. This procedure will last about six weeks, the longest of all the environmental tests.

In mid-October, GLAST is scheduled to be flown to Cape Canaveral Air Force Station, Fla., on a C5 airplane. The spacecraft is scheduled to be launched into a low-Earth circular orbit no earlier than Dec. 14, 2007.

Source: Goddard Space Flight Center