Lockheed Martin-Built Gravity Probe B Spacecraft Readied For Launch

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NASA's Gravity Probe B (GP-B) space vehicle, built, integrated and tested by Lockheed Martin , is undergoing final preparations for launch, scheduled for April 17, 2004, from Vandenberg Air Force Base, Calif. Stanford University is the GP-B prime contractor. NASA Marshall Space Flight Center in Huntsville, Ala. manages the program.

During its 16-month mission, GP-B will attempt to verify two subtle physical effects predicted by Albert Einstein's General Theory of Relativity, which provides the foundations for understanding the large-scale structure of the Universe.

"We're now counting the days until launch and are enormously proud of the close collaboration with our Stanford and NASA colleagues that has brought us to this exciting point in the GP-B program," said Jim Crocker, vice president, civil space, Lockheed Martin. "We look forward to the mission ahead and the data that will increase our understanding of the fundamental structure of the universe."

"Developing GP-B has been a supreme challenge requiring the skillful integration of an extraordinary range of new technologies," said Professor Francis Everitt of Stanford University, and the GP-B principal investigator. "It is hard to see how it could have been done without the kind of unique long-term collaboration that we have had between Stanford, Lockheed Martin and NASA. It is wonderful to be ready for launch."

The GP-B space vehicle comprises the spacecraft, built by Lockheed Martin, and its payload. The payload is made up of the dewar, the key structural component around which the GP-B space vehicle was built, and the flight probe, a nine-foot-long cigar-shaped vacuum chamber. Both elements were built at the Lockheed Martin Advanced Technology Center, Palo Alto. Inside the flight probe is the very delicate and precise Science Instrument Assembly, built by Stanford University.

The GP-B experiment must be conducted in an extremely stable environment, free from all outside forces. To accommodate, Lockheed Martin designed an enclosure within the spacecraft in which the Science Instrument Assembly can operate at a temperature near absolute zero.

When Gravity Probe B is launched into a 400-mile-high polar orbit, the instrument apparatus will measure tiny changes in spin axis orientation of the four ultra-precise gyroscopes contained within. The gyros will provide a nearly perfect space-time reference system. Additionally, they will measure two predicted effects of Einstein's theory: whether and how space and time are warped by the presence of Earth, and whether and how the rotating Earth drags space-time around with it.

This will be by far the most accurate test of any of the predicted effects of Einstein's theory.

Small as the two effects measured by Gravity Probe B are, their measurement will provide an extremely important advance by testing previously unproven predictions of Einstein's theory. They may provide critical clues to modern attempts to unify the four fundamental forces observed in Nature: electromagnetism, gravity, and the so-called strong and weak interactions that govern the behavior of atomic nuclei.

"Gravity Probe B is one of the few space missions NASA has conducted with relevance to fundamental physics," stated a review of GP-B undertaken in 1995 by the Space Studies Board of the National Research Council. "If successful, it would assuredly join the ranks of the classical experiments of physics. By the same token, a confirmed result in disagreement with General Relativity would be revolutionary."

Headquartered in Bethesda, Md., Lockheed Martin employs about 130,000 people worldwide and is principally engaged in the research, design, development, manufacture and integration of advanced technology systems, products and services. The corporation reported 2003 sales of $31.8 billion.

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