Lockheed Martin Space Systems Readies NASA's Space Infrared Telescope Facility For August 25 Launch

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NASA's Space Infrared Telescope Facility (SIRTF) has completed integration, testing and pre-launch checkout at Lockheed Martin facilities in Sunnyvale, California, and is being prepared for a launch at the NASA Kennedy Space Center in Florida no earlier than August 25, 2003. SIRTF's Cryogenic Telescope Assembly, which includes the scientific instruments, was built by Ball Aerospace in Boulder, Colo., and was delivered to Lockheed Martin Space Systems in Sunnyvale in February 2002 and integrated with the Lockheed Martin-built spacecraft. Lockheed Martin Space Systems will also provide mission support for SIRTF spaceflight operations in conjunction with the Jet Propulsion Laboratory (JPL) and the California Institute of Technology.

"We are extremely proud of our decades of work on behalf of NASA, and such a key role in NASA's newest space observatory," said John Straetker, Lockheed Martin SIRTF program manager. "It is particularly satisfying for our team to be putting SIRTF through its final paces on the ground before sending it into space to begin its historic mission."

SIRTF is a cryogenically cooled space observatory that will conduct infrared (IR) astronomy during a two and one-half-to-five year mission beginning in 2003. SIRTF completes NASA's family of Great Observatories, which also includes the Hubble Space Telescope, the Chandra X-Ray Observatory and the Compton Gamma Ray Observatory. The SIRTF program, a cornerstone of NASA's Origins Program, is managed by JPL for NASA's Office of Space Science in Washington DC.

The spaceborne SIRTF observatory comprises a 0.85-meter diameter telescope and three scientific instruments capable of performing imaging and spectroscopy in the 3-180 micron wavelength regime. Incorporating the latest in large-format infrared detector array technology, SIRTF will provide more than a 100-fold increased in scientific capability over previous IR missions. Cornell University, University of Arizona, and the Harvard-Smithsonian Center for Astrophysics have provided the instruments for SIRTF.

An important feature of the SIRTF mission is the adoption of a solar orbit. To reach this orbit, the spacecraft will be launched on a Delta 7920 launch vehicle with slightly greater than terrestrial escape velocity. The resulting orbit will have SIRTF trailing the Earth in its orbit around the Sun. This orbit makes better use of launch capability than do many possible alternate orbits that would keep SIRTF in orbit around the Earth. It permits excellent, uninterrupted viewing of a large portion of the sky without the need for Earth-avoidance maneuvers. In addition, the absence of heat input from the Earth provides a stable thermal environment and allows the exterior of the telescope to reach a low temperature via radiative cooling.

A one meter-diameter transmitting antenna fixed to the bottom of the spacecraft will be used twice each day to transmit 12 hours of stored science data to stations of NASA's Deep Space Network. In this manner, an adequate average data rate of 85 kbps -- corresponding to one image from SIRTF's largest array every 10 seconds -- can be maintained over the lifetime of the mission.

SIRTF's scientific potential is rooted in four basic physical principles that define the importance of infrared investigations for studying astrophysical problems:

-- Infrared observations reveal cool states of matter: Solid bodies in space -- ranging in size from sub-micron-sized interstellar dust grains to giant planets -- have temperatures spanning the range from 3K to 1500K (above which nearly all solids evaporate). Most of the energy radiated by objects in this temperature range lies in the infrared part of the spectrum. Infrared observations are therefore of particular importance in studying low-temperature environments such as dusty interstellar clouds where stars are forming and the icy surfaces of planetary satellites and asteroids.

-- Infrared observations explore the hidden universe: Cosmic dust particles effectively obscure parts of the visible universe and block the view of many critical astronomical environments. This dust becomes transparent in the infrared, where observers can probe optically invisible regions such as the center of the Milky Way (and other galaxies) and dense clouds where stars and planets may be forming. For many objects -- including dust-embedded stars, active galactic nuclei, and even entire galaxies -- the visible radiation absorbed by the dust and re-radiated in the infrared accounts for virtually the entire luminosity.

-- Infrared observations access unique spectral features: Emission and absorption bands of virtually all molecules and solids lie in the infrared, where they can be used to probe conditions in cool celestial environments. Many atoms and ions have spectral features in the infrared that can be used for diagnostic studies of stellar atmospheres and interstellar gas, exploring regions that are too cool or too dust-enshrouded to be reached with optical observations.

-- Infrared observations reach back to the early life of the cosmos: The cosmic redshift which results from the general expansion of the universe inexorably shifts energy to longer wavelengths in an amount proportional to an object's distance. Because of the finite speed of light, objects at high redshift are observed as they were when the universe and those objects were much younger. As a result of the expansion of the universe, much of the optical and ultraviolet radiation emitted from stars, galaxies, and quasars since the beginning of time now lies in the infrared. How and when the first objects in the universe formed will be learned in large part from infrared observations.

Apart from a few windows at short wavelengths, all of the infrared radiation emitted by the above objects is absorbed by Earth's atmosphere. Worse, the infrared emission of the atmosphere itself blinds astronomers peering through those windows. Hence the need for a cooled space-based infrared observatory with high sensitivity -- SIRTF.

NASA's Origins Program follows the chain of events that began with the birth of the universe at the Big Bang. It seeks to understand the entire process of cosmic evolution from the formation of chemical elements, galaxies, stars and planets, through the mixing of chemicals and energy that cradles life on Earth, to the earliest self-replicating organisms and the profusion of life. In short, Origins hopes to answer the fundamental questions: Where did we come from? Are we alone?

Lockheed Martin Space Systems Company is one of the major operating units of Lockheed Martin Corporation. Space Systems designs, develops, tests, manufactures, and operates a variety of advanced technology systems for military, civil and commercial customers. Chief products include a full-range of space launch systems, including heavy-lift capability, ground systems, remote sensing and communications satellites for commercial and government customers, advanced space observatories and interplanetary spacecraft, fleet ballistic missiles and missile defense systems.

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CONTACT: For S.F. Bay Area media interviews, Jeff Richmond, +1-408-742-7532, or jeff.richmond@lmco.com; or Buddy Nelson, +1-510-797-0349, or buddynelson@mac.com, both for Lockheed Martin Space Systems.

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