NASA's Stardust Burns for Comet, Less Than a Year Away

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NASA Stardust logo. Image credit: NASA/JPL

Just three days shy of one year before its planned flyby of comet Tempel 1, NASA's Stardust spacecraft has successfully performed a maneuver to adjust the time of its encounter by eight hours and 20 minutes. The delay maximizes the probability of the spacecraft capturing high-resolution images of the desired surface features of the 2.99-kilometer-wide (1.86 mile) potato-shaped mass of ice and dust.

With the spacecraft on the opposite side of the solar system and beyond the orbit of Mars, the trajectory correction maneuver began at 5:21 p.m. EST (2:21 p.m. PST) on Feb. 17. Stardust's rockets fired for 22 minutes and 53 seconds, changing the spacecraft's speed by 24 meters per second (54 miles per hour).

Stardust's maneuver placed the spacecraft on a course to fly by the

comet just before 8:42 p.m. PST (11:42 p.m. EST) on Feb. 14, 2011 - Valentine's Day. Time of closest approach to Tempel 1 is important because the comet rotates, allowing different regions of the comet to be illuminated by the sun's rays at different times. Mission scientists want to maximize the probability that areas of interest previously imaged by NASA's Deep Impact mission in 2005 will also be bathed in the sun's rays and visible to Stardust's camera when it passes by.

"We could not have asked for a better result from a burn with even a brand-new spacecraft," said Tim Larson, project manager for the Stardust-NExT at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "This bird has already logged one comet flyby, one Earth return of the first samples ever collected from deep space, over 4,000 days of flight and approximately 5.4 billion kilometers (3.4 billion miles) since launch."

Launched on Feb. 7, 1999, Stardust became the first spacecraft in history to collect samples from a comet and return them to Earth for study. While its sample return capsule parachuted to Earth in January 2006, mission controllers were placing the still viable spacecraft on a trajectory that would allow NASA the opportunity to re-use the already-proven flight system if a target of opportunity presented itself. In January 2007, NASA re-christened the mission "Stardust-NExT" (New Exploration of Tempel), and the Stardust team began a four-and-a-half year journey to comet Tempel 1. This will be humanity's second exploration of the comet - and the first time a comet has been "re-visited."

"Stardust-NExT will provide scientists the first opportunity to see the surface changes on a comet between successive visits into the inner solar system," said Joe Veverka, principal investigator of Stardust-NExT from Cornell University, Ithaca, N.Y. "We have theories galore on how each close pass to the sun causes changes to a comet. Stardust-NExT should

give some teeth to some of these theories, and take a bite out of others."

Along with the high-resolution images of the comet's surface, Stardust-NExT will also measure the composition, size distribution, and flux of dust emitted into the coma, and provide important new information on how Jupiter family comets evolve and how they formed 4.6 billion years ago.

Stardust-NExT is a low-cost mission that will expand the investigation of comet Tempel 1 initiated by NASA's Deep Impact spacecraft. JPL, a division of the California Institute of Technology in Pasadena, manages Stardust-NExT for the NASA Science Mission Directorate, Washington, D.C. Joe Veverka of Cornell University is the mission's principal investigator. Lockheed Martin Space Systems, Denver Colo., built the spacecraft and manages day-to-day mission operations.

More information: For more information about Stardust-NExT, please visit: stardustnext.jpl.nasa.gov

Provided by JPL/NASA

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