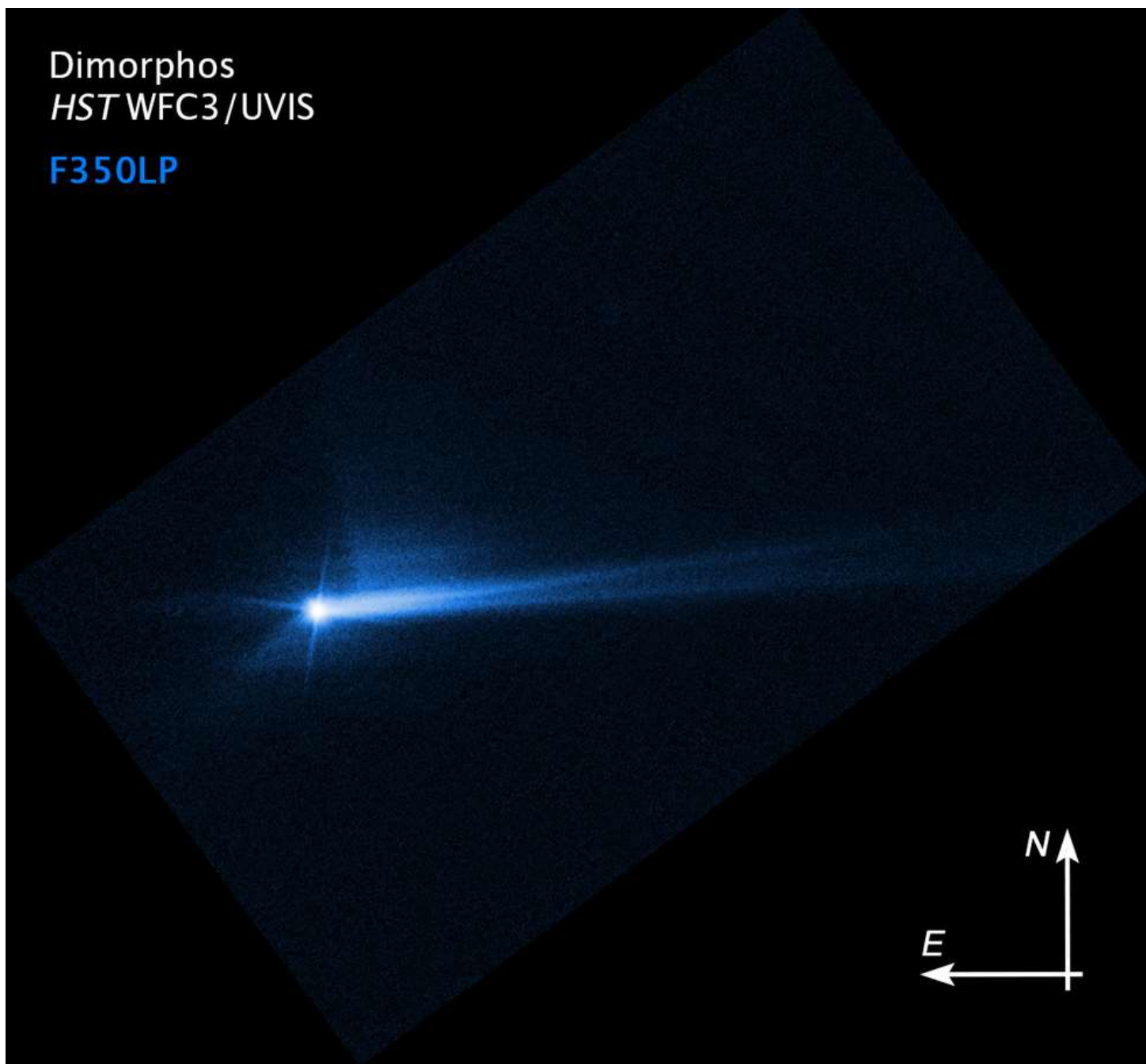


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# NASA Confirms DART Mission Impact Changed Asteroid's Motion in Space



This imagery from NASA's Hubble Space Telescope from Oct. 8, 2022, shows the debris blasted from the surface of Dimorphos 285 hours after the asteroid was intentionally impacted by NASA's DART spacecraft on Sept. 26. The shape of that tail has changed over time. Scientists are continuing to study this material and how it moves in space, in order to better understand the asteroid.

**Credits: NASA/ESA/STScI/Hubble**

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Analysis of data obtained over the past two weeks by NASA's Double Asteroid Redirection Test (DART) investigation team shows the spacecraft's kinetic impact with its target asteroid, Dimorphos, successfully altered the asteroid's orbit. This marks humanity's first time purposely changing the motion of a celestial object and the first full-scale demonstration of asteroid deflection technology.

"All of us have a responsibility to protect our home planet. After all, it's the only one we have," said NASA Administrator Bill Nelson. "This mission shows that NASA is trying to be ready for whatever the universe throws at us. NASA has proven we are serious as a defender of the planet. This is a watershed moment for planetary defense and all of humanity, demonstrating commitment from NASA's exceptional team and partners from around the world."

Prior to DART's impact, it took Dimorphos 11 hours and 55 minutes to orbit its larger parent asteroid, Didymos. Since DART's intentional collision with Dimorphos on Sept. 26, astronomers have been using telescopes on Earth to measure how much that time has changed. Now, the investigation team has confirmed the spacecraft's impact altered Dimorphos' orbit around Didymos by 32 minutes, shortening the 11 hour and 55-minute orbit to 11 hours and 23 minutes. This measurement has a margin of uncertainty of approximately plus or minus 2 minutes.

Before its encounter, NASA had defined a minimum successful orbit period change of Dimorphos as change of 73 seconds or more. This early data show DART surpassed this minimum benchmark by more than 25 times.

"This result is one important step toward understanding the full effect of DART's impact with its target asteroid" said Lori Glaze, director of NASA's Planetary Science Division at NASA Headquarters in Washington. "As new data come in each day, astronomers will be able to better assess whether, and how, a mission like DART could be used in the future to help protect Earth from a collision with an asteroid if we ever discover one headed our way."

The investigation team is still acquiring data with ground-based observatories around the world – as well as with radar facilities at NASA Jet Propulsion Laboratory's Goldstone planetary radar in California and the National Science Foundation's Green Bank Observatory in West Virginia. They are updating the period measurement with frequent observations to improve its precision.

Focus now is shifting toward measuring the efficiency of momentum transfer from DART's roughly 14,000-mile (22,530-kilometer) per hour collision with its target. This includes further analysis of the "ejecta" – the many tons of asteroidal rock displaced and launched into space by the impact. The recoil from this blast of debris substantially enhanced DART's push against Dimorphos – a little like a jet of air streaming out of a balloon sends the balloon in the opposite direction.

To successfully understand the effect of the recoil from the ejecta, more information on of the asteroid's physical properties, such as the characteristics of its surface, and how strong or weak it is, is needed. These issues are still being investigated.

"DART has given us some fascinating data about both asteroid properties and the effectiveness of a kinetic impactor as a planetary defense technology," said Nancy Chabot, the DART coordination lead from the Johns Hopkins Applied Physics Laboratory (APL) in Laurel, Maryland. "The DART team is continuing to work on this rich dataset to fully understand this first planetary defense test of asteroid deflection."

For this analysis, astronomers will continue to study imagery of Dimorphos from DART's terminal approach and from the Light Italian CubeSat for Imaging of Asteroids (LICIACube), provided by the Italian Space Agency, to approximate the asteroid's mass and shape. Roughly four years from now, the European Space Agency's Hera project is also planned to conduct detailed surveys of both Dimorphos and Didymos, with a particular focus on the crater left by DART's collision and a precise measurement of Dimorphos' mass.

Johns Hopkins APL built and operated the DART spacecraft and manages the DART mission for NASA's Planetary Defense Coordination Office as a project of the agency's Planetary Missions Program Office. Telescopic facilities contributing to the observations used by the DART team to determine this result include: Goldstone, Green Bank Observatory, Swope Telescope at the Las Campanas Observatory in Chile, the Danish Telescope at the La Silla Observatory in Chile, and the Las Cumbres Observatory global telescope network facilities in Chile and in South Africa.

Neither Dimorphos nor Didymos poses any hazard to Earth before or after DART's controlled collision with Dimorphos.

For more information about the DART mission, visit:

**<https://www.nasa.gov/dart>**

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