

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (Part 2) (4B)

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THE OBJECTIVES AND THE PAYLOAD OF THE HERA MISSION TO THE BINARY ASTEROID
DIDYMOS.

Abstract

Hera is a small mission of opportunity whose primary objective is to observe the outcome of a kinetic impactor test and thus, to provide extremely valuable information for possible future mitigation of the impact of a hazardous asteroid. It is part of the Asteroid Impact Deflection Assessment (AIDA), in which the second component is the NASA Double Asteroid Redirection Test (DART) mission, which aims to send an artificial projectile to perform an asteroid deflection test. The mission target is the binary asteroid (65803) Didymos. DART will impact the secondary, nicknamed Didymoon, to demonstrate a change in its orbit around the primary.

The main objectives of the Hera mission are:

- Measure the mass of Didymoon to allow to estimate the efficiency of the momentum transfer from DART to Didymoon
- Investigate the crater created by DART, to improve our understanding of impact physics and to observe unweathered material, recently exposed to the surface.
- Determine the physical properties of Didymoon, to allow scaling of the impact to different types of asteroids
- Compare Didymos and Didymoon to constrain binary formation scenarios.

Hera is equipped with the following payload:

1. The Asteroid Framing Cameras are the flight spares of the Dawn framing cameras that investigated Vesta and Ceres. As on Dawn, they will fulfill the dual function of scientific imagers and navigation cameras.
2. The Planetary ALTimeter (PALT) will measure the distance to the target and, from close distance, derive shape information complementary to the shape information in framing camera images.
3. A thermal infrared imager will provide information about the thermal properties of the Didymos system.
4. APEX is a 6 unit cubesat that will carry the ASPECT Fabry-Perot imager to derive mineralogical compositional information about the asteroids, a Secondary Ion Mass Analyzer for molecular composition, and a magnetometer to constrain the interior structure.

5. Juventas is a 6 unit cubesat that will carry a monostatic low-frequency radar, and accelerometers and gravimeters to derive interior and surface properties of the asteroids.
6. The radioscience experiment will measure the gravity field of Didymos, utilizing both the main Hera spacecraft and the two cubesats.

We will describe the goals of the Hera mission and how they will be achieved with the different payload elements.