



The Asteroid Framing Cameras on ESA's Hera mission

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As the first asteroid deflection test, NASA's successfully hit asteroid Dimorphos (secondary of the Didymos system) with the DART kinetic impactor in September 2022. To fully characterize the physical properties of the objects, and measure precisely the effects of this impact in the context of planetary defense, ESA is launching the Hera mission in October 2024, with scheduled arrival at Didymos in 2026.

Among the core payload of the mission, the Asteroid Framing Cameras are two identical panchromatic imaging systems that will support navigation and scientific activities, by acquiring images from various distances and observing geometries during the course of the mission.

Built by Jena-Optronik (Germany), the cameras will provide data that support a wide range of investigations: hazard detection, system dynamics, mapping, shape reconstruction, morphology, albedo. These observations are critical to understand the current state of the Didymos system. By providing a detailed characterization of the asteroids surfaces, shapes, and the dynamical state of the system, the AFCs will contribute necessary data to fully assess the outcome of the DART impact, concluding this first planetary defense test.

Each instrument is equipped with a 5.5 x 5.5-degree field of view, and a pixel resolution of 93.7 microradians, and meet the requirements defined by the mission science team. We expect to deliver global mapping of the asteroids at spatial scales of 2–3 m/pixel in the Early Characterization Phase, 1–2 m/pixel in the Detailed Characterization Phase, and 0.5–2 m/pixel in the Close Operation Phase. Dedicated flybys will bring the resolution down to < 10 cm/pixel on specific areas of interest such as the DART impact site and the JUVENTAS cubesat landing site.

At EPSC, we will present the technical specifications of the camera, as well as the status of the calibration. We will then summarize the planned operations in cruise and at the asteroids. Finally, we will provide examples of the scientific investigations and products that will make use of the data returned by the cameras (e.g. shape model, morphological characterization).