Hera planned mission and payload operations at close proximity of the Didymos binary asteroid system after DART impact

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ABSTRACT

HERA is a candidate ESA mission that will be launched to the Didymos binary asteroid system in 2023. It will perform a detailed post-impact survey of the smaller of the two bodies, Didymoon, following the kinetic impact by the NASA’s Double Asteroid Redirection Test (DART) spacecraft planned in 2022. DART and HERA were conceived together as parts of the international ‘Asteroid Impact Deflection Assessment’ (AIDA) mission.

HERA aims to characterize the physical and dynamical properties of Didymoon including its mass and shape as well as the properties of the impact crater and surface morphology in general. It will carry optical navigation cameras – the Asteroid Framing Cameras (AFCs) –, a LIDAR, and a hyperspectral imager that will be used for proximity operations as part of the autonomous vision-based GNC system as well as for scientific purposes. The trajectories for the proximity operations are defined considering operational restrictions, spacecraft safety and, possibly, scientific objectives. Asteroid close-proximity operations will also provide optimal environment to test GNC solutions applicable to active debris removal and in-orbit servicing.

While in the vicinity of Didymoon, HERA will deploy Europe’s first deep-space CubeSats, in order to gather additional data on Didymoon and its surroundings while testing new inter-satellite link technology for future mission architectures. These CubeSats will be placed in the proximity of Didymoon and can take greater risks than their mothership, thus delivering additional, complementary observations.

In this presentation, current HERA mission and proximity operations strategy will be discussed, with special focus on planned payload operations with the AFCs.