

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

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THE SCIENCE RETURN OF THE ESA HERA MISSION: THE EUROPEAN COMPONENT OF THE  
AIDA PROJECT IN COOPERATION WITH NASA DART

**Abstract**

Each space mission to an asteroid, whether its requirements are driven by planetary defense, science or mining objectives, has a science return that is always extremely high. The reason is that our knowledge of these fascinating objects is still very poor, especially for the smallest ones, and the communities interested in them for very different reasons still need essentially the same knowledge.

While Hayabusa2 and OSIRIS-REx currently turn our understanding on its head concerning carbonaceous-type Near-Earth Objects, the Hera mission, currently under study at ESA in the framework of the AIDA project associated to the NASA DART mission to the binary asteroid Didymos, definitely has the potential to do the same. Hera will rendezvous for the first time with a binary asteroid (which corresponds to 15% of the total population), and in particular its secondary, of 160 m in diameter, which will be the smallest asteroid ever visited. Moreover, for the first time, an internal structure and subsurface properties will be directly measured.

How do binary form? What does a 160 m-size rock in space looks like? What are its internal properties? And what will be the size and the morphology of the crater left by DART, which will provide the first impact experiment at full asteroid scale using an impact speed close to the average speed between asteroids? What will be the momentum transferred by DART, which needs the mass of the target to be measured by Hera?

These questions and many others will be addressed by Hera as a natural outcome of its investigations focused on planetary defense. Hera thus offers to the European small body community the possibility to maintain its recognized expertise gained with Rosetta and to participate to the asteroid exploration era with other agencies (NASA, JAXA) as expected for a topic (planetary defense) that can only be done in the framework of an international cooperation. We are ready for this, let's do it.