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**ASTEROID IMPACT AND DEFLECTION ASSESSMENT (AIDA) MISSION:
SCIENCE RETURN AND MITIGATION RELEVANCE**

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ABSTRACT

The Asteroid Impact & Deflection Assessment (AIDA) mission will be the first space experiment to demonstrate asteroid impact hazard mitigation by using a kinetic impactor to deflect an asteroid. AIDA is a joint ESA-NASA cooperative project, which includes the ESA Asteroid Impact Mission (AIM) rendezvous spacecraft and the NASA Double Asteroid Redirection Test (DART) mission. The primary goals of AIDA are (i) to test our ability to impact a small near-Earth asteroid by an hypervelocity projectile and (ii) to measure and characterize the deflection caused by the impact. The AIDA target will be the binary asteroid (65803) Didymos, with the deflection experiment to occur in October, 2022. The DART impact on the secondary member of the binary at ~6 km/s will alter the binary orbit period, which can be measured by Earth-based observatories. The AIM spacecraft will characterise the Didymos binary system by means of remote sensing and in-situ instruments and monitor results of the DART impact.

Both AIM and DART have been approved for a Phase A/B1 study, starting in early 2015 for 15 months. Baseline payloads for AIM include a Visual Imaging System, a lander (based on DLR MASCOT heritage), a thermal infrared imager, a monostatic high frequency radar, a bistatic low frequency radar (using both the lander and spacecraft to transmit and receive the signals, respectively). The mission is also testing technologies for the lander deployment, the operation of a laser space-to-ground communication system and the Cubesat Opportunity Payloads, Intersatellite Networking Sensors Payloads, an opportunity for science and a test of intersatellite links based on CubeSat standards.

AIDA will return fundamental new information on the mechanical response and impact cratering process at real asteroid scales, and consequently on the collisional evolution of asteroids with implications for planetary defense, human spaceflight, and near-Earth object science and resource utilization. AIDA will return unique information on an asteroid's strength, surface physical properties and internal structure.

Current knowledge will be presented on the binary target, its environment, as well as impact simulations using DART impact conditions and the crucial information for mitigation that the mission will allow us to obtain.
