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**ASTEROID IMPACT MISSION: MINIMUM SYSTEM DESIGN TO SUPPORT
PLANETARY DEFENSE DEMONSTRATION**

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ABSTRACT

AIM is a small mission of opportunity to observe for the first time an asteroid deflection experiment from close distance and characterize a binary asteroid. It is part of an international cooperation between NASA and ESA, called AIDA (Asteroid Impact & Deflection Assessment), consisting of two independent mission elements: the NASA Double Asteroid Redirection Test (DART) mission and the AIM rendezvous mission. The primary goals of AIDA are to test our ability to perform a spacecraft hypervelocity impact on a potentially hazardous near-Earth asteroid and

to measure and characterize the deflection caused by the impact. AIDA's target is the binary asteroid (65803) Didymos, with the deflection experiment to occur in October 2022 when Didymos will experience a unique close encounter with the Earth at less than 0.1 AU. The DART impact on the secondary member of the binary asteroid will alter the secondary's orbital period, which will be measured by AIM as well as ground-based optical and radar observatories.

Following the results of the ESA Council at Ministerial level in December 2016, and in particular the support received by a number of European countries, a miniaturized version of the spacecraft is undergoing detailed design work with European industries. The main mission objective is to provide resolved images of the binary asteroid before and after the impact, with a special attention to the characterization of the geophysical properties, such as the mass, shape, topology, dynamical state, crater and plume evolution. In order to achieve its objectives, only a navigation camera is required that also serves as the science imager. The single-payload mission foresees only four months of close-proximity operations using ground-based landmark navigation at distances larger than 10 km, allowing for simplified operations. Finally the simplified platform is designed to be launched as a secondary payload, further reducing the overall mission cost.

The paper will present the current AIM project status and way forward in the frame of the AIDA international collaboration.
