SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (4)

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AIDA: ASTEROID IMPACT & DEFLECTION ASSESSMENT

Abstract

The Asteroid Impact Deflection Assessment (AIDA) mission will be the first demonstration of a mitigation technique to protect the Earth from a potential asteroid impact, by performing a spacecraft kinetic impact on an asteroid to deflect it from its trajectory. AIDA is an international collaboration between NASA and ESA, consisting of two independent but mutually supporting missions, one of which is the asteroid kinetic impactor and the other is the characterization spacecraft. These two missions are, respectively, the NASA Double Asteroid Redirection Test (DART) and the ESA Asteroid Impact Mission (AIM). 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 change its orbit and alter the binary orbit period, which can be measured by Earth-based observatories. DART will determine the impact location on the target asteroid, the local surface topography and the geologic context. The AIM spacecraft will rendezvous with Didymos in advance of the DART impact to characterize the asteroid target, and AIM will monitor results of the DART impact in situ, to measure precisely the deflection resulting from the kinetic impact experiment. AIM will demonstrate a number of technologies including deep-space optical communication and inter-satellite networking in deep-space, with CubeSats deployed in the vicinity of the Didymos system and a lander deployed on the surface of the Didymos secondary. AIDA will return fundamental new information on the mechanical response and impact cratering processes at real asteroid scales, and consequently on the collisional evolution of asteroids. This unique information on the asteroid's strength, surface physical properties and internal structure has important implications for planetary defense, human spaceflight, near-Earth object science and resource utilization. AIDA/DART is in Phase A studies at NASA, and AIDA/AIM is in Phase A/B1 studies at ESA in 2015.