Asteroid deflection mission seeks smashing ideas

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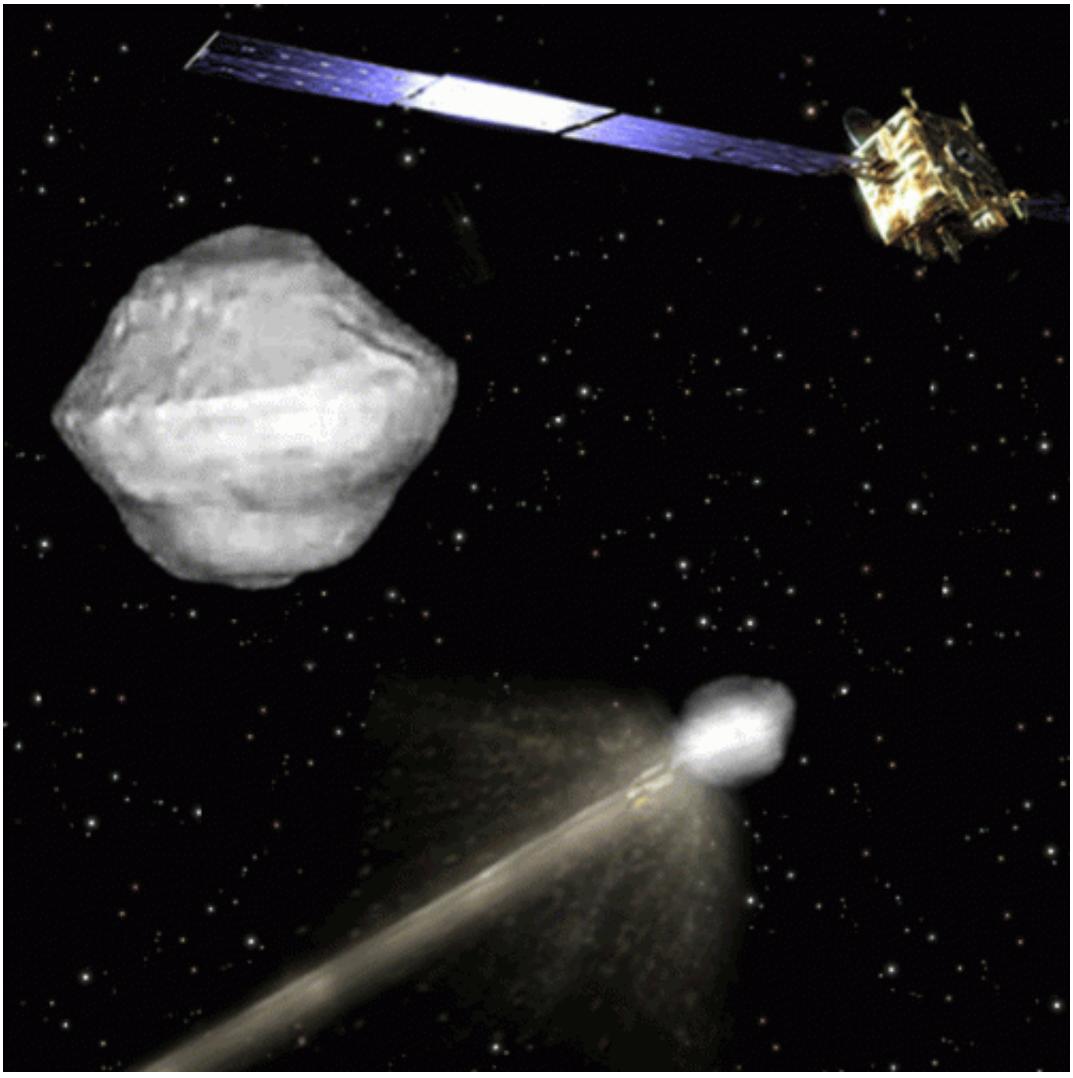


AIDA mission concept.

(Phys.org)—A space rock several hundred metres across is heading towards our planet and the last-ditch attempt to avert a disaster – an untested mission to deflect it – fails. This fictional scene of films and novels could well be a reality one day. But what can space agencies do to ensure it works?

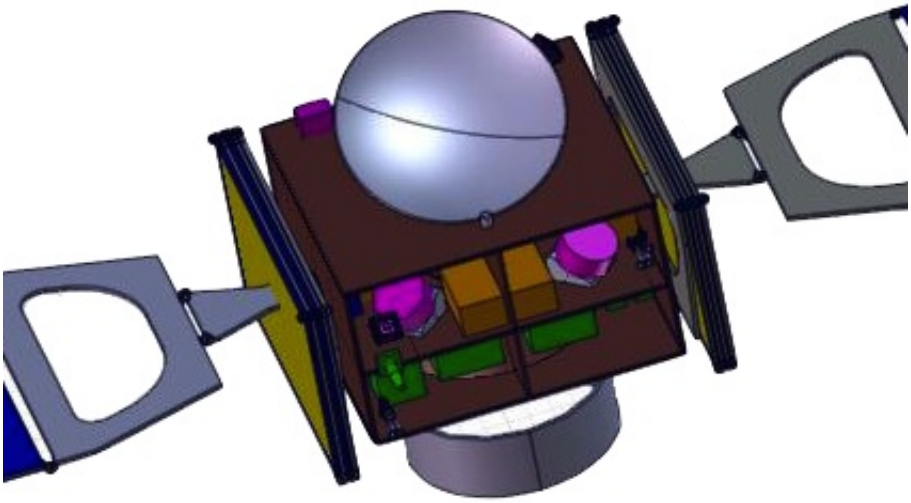
ESA is appealing for research ideas to help guide the development of a US–European asteroid deflection mission now under study.

Concepts are being sought for both ground- and space-based investigations, seeking improved understanding of the physics of very high-speed collisions involving both man-made and natural objects in space.

AIDA: double mission to a double asteroid

ESA's call will help to guide future studies linked to the Asteroid Impact and Deflection mission – AIDA.

This innovative but low-budget transatlantic partnership involves the joint operations of two small spacecraft sent to intercept a binary asteroid.



Asteroid Impact Monitor design.

The first Double Asteroid Redirection Test (DART) spacecraft, designed by the US Johns Hopkins Applied Physics Laboratory will collide with the smaller of the two asteroids.

Meanwhile, ESA's Asteroid Impact Monitor (AIM) craft will survey these bodies in detail, before and after the collision.

The impact should change the pace at which the objects spin around each other, observable from Earth. But AIM's close-up view will 'ground-truth' such observations.

"The advantage is that the spacecraft are simple and independent," says Andy Cheng of Johns Hopkins, leading the AIDA project on the US side. "They can both complete their primary investigation without the

other one."

But by working in tandem, the quality and quantity of results will increase greatly, explains Andrés Gálvez, ESA AIDA study manager: "Both missions become better when put together – getting much more out of the overall investment.

"And the vast amounts of data coming from the joint mission should help to validate various theories, such as our impact modelling."

Last week the 325 m Apophis asteroid passed close to Earth, and in mid-February the recently discovered 2012 DA14 space rock will pass closer than many satellites.

ESA is seeking to assess the impact hazard from Near-Earth Objects (NEOs) through its Space Situational Awareness (SSA) programme.

"AIDA offers a promising platform for the test and demonstration of different deflection methods," adds Detlef Koschny, managing SSA's NEO effort. "It is therefore important to ask the users early on what they'd like to do with a mission like this."

The science of hypervelocity

For some time, ESA and its international partners have been studying missions to investigate asteroid deflection techniques.

The most popular concept involves a 'hypervelocity impact' – a collision at multiple kilometres per second, at such high speed that materials do not just shatter car-crash-style but are vaporised, turning even metal and solid rock into the hot soup of charged particles called plasma.

Such impact testing would help assess if asteroid deflection could be

accomplished.

Increased knowledge of hypervelocity impacts would also have wider uses. Planetary scientists would gain fresh insight into our Solar System's violent early history, including clues to the origin of life and the magnitude of extinction events.

And in practical terms, growing levels of orbital debris increases the risk of highly destructive hypervelocity impacts with critical satellite infrastructure or humans working in orbit. Studying this kind of impact will help to quantify the hazard and inspire protection techniques.

The AIDA Call for Experiment Ideas is being released on 1 February at www.esa.int/neo . For further information, see www.esa.int/Our_Activities/Tec … _D_AIDA_Call_For_Exp

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