

## EUROPLANET PRESS NOTICE

### AIDA double mission to divert Didymos asteroid's Didymoon

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#### AIDA DOUBLE MISSION TO DIVERT DIDYMOS ASTEROID'S DIDYMOON

An ambitious joint US-European mission, called AIDA, is being planned to divert the orbit of a binary asteroid's small moon, as well as to give us new insights into the structure of asteroids. A pair of spacecraft, the ESA-led Asteroid Impact Mission (AIM) and NASA-led Double Asteroid Redirection Test (DART), will rendezvous with the Didymos asteroid and its small natural satellite, known informally as 'Didymoon'. Following a period of study of both asteroids and detailed mapping of Didymoon by AIM, DART will impact with Didymoon and AIM will assess the mission's effectiveness in diverting the moon's orbit around Didymos. The AIDA mission is being discussed today at the European Planetary Science Congress (EPSC) 2015 in Nantes, France.

Patrick Michel, the lead of the AIM Investigation Team, said, "To protect Earth from potentially hazardous impacts, we need to understand asteroids much better – what they are made of, their structure, origins and how they respond to collisions. AIDA will be the first mission to study an asteroid binary system, as well as the first to test whether we can deflect an asteroid through an impact with a spacecraft. The European part of the mission, AIM, will study the structure of Didymoon and the orbit and rotation of the binary system, providing clues to its origin and evolution. Asteroids represent different stages in the rocky road to planetary formation, so offer fascinating snapshots into the Solar System's history."

AIM is due for launch in October 2020 and rendezvous with the binary system (65803) Didymos in May 2022. Binary systems make up around 15% of the asteroid population. Egg-shaped Didymoon (about 160 metres in diameter) orbits the diamond-shaped Didymos asteroid (about 750 metres in diameter) every 12 hours at an altitude of 1.1 kilometres. Ground-based observations show that Didymos is probably a common 'chondrite', or stony asteroid formed of dust from the primitive solar system. At present, Didymoon's mass and density are unknown.

AIM will measure Didymoon's mass shape, density and dynamic properties and map the asteroid's surface at visible and infrared wavelengths, as well as using radar to probe

beneath the surface. It will deploy a small lander, MASCOT-2 (built by the German aeronautics and space research centre, DLR), in order to transmit and receive radio signals through Didymoon to investigate the internal structure. In October 2022, AIM will move to a safe distance to observed DART's impact with Didymoon and analyse the plume of material ejected. It will then resume its mapping and monitoring mission to study internal material revealed in the crater and any changes to Didymoon's orbit.

Recent missions have shown that asteroids are extraordinarily diverse in their geology, structure and evolution. All asteroids appear to be covered by soil, or 'regolith', but this varies from fine grains to lumpy pebbles. Density measurements show that most asteroids are aggregates of material, rather than solid bodies, but it's not clear whether they are filled with large rocks and pockets of empty space, or gravel. The combination of AIM and DART will give new insights into the relationship between an asteroid's surface and its interior, and new understanding of how asteroids and binary systems form.

AIM will also deploy three cubesat to assist with observations and to test new science and technology capabilities, including intersatellite communications links in deep space.

ESA's Project Scientist for the AIDA/AIM mission, Dr Michael Küppers, said, "As well as fascinating science, AIDA offers a unique opportunity to demonstrate new technologies for ESA. AIM will deploy MASCOT-2, the ESA's first lander since Philae, and will test operations that will give valuable experience for future Mars sample return missions and human exploration."

### **Images**

Infographic of the AIM mission. Credit: ESA/Science Office

[http://www.esa.int/spaceinimages/Images/2015/09/AIM\\_Infographic\\_-\\_general](http://www.esa.int/spaceinimages/Images/2015/09/AIM_Infographic_-_general)

Asteroid Impact Mission (AIM) spacecraft. Credit: ESA/Science Office

[http://www.esa.int/spaceinimages/Images/2015/05/Asteroid\\_Impact\\_Mission\\_spacecraft](http://www.esa.int/spaceinimages/Images/2015/05/Asteroid_Impact_Mission_spacecraft)

AIM arriving at Didymos. Credit: ESA/Science Office

[http://www.esa.int/spaceinimages/Images/2015/02/AIM\\_arriving\\_at\\_Didymos](http://www.esa.int/spaceinimages/Images/2015/02/AIM_arriving_at_Didymos)

AIM watches the DART impact. Credit: ESA/Science Office

[http://www.esa.int/spaceinimages/Images/2015/06/AIM\\_watches\\_impact](http://www.esa.int/spaceinimages/Images/2015/06/AIM_watches_impact)

### **Animation**

A video about the AIDA, AIM and DART missions can be found at:

[http://www.esa.int/spaceinvideos/Videos/2015/04/Asteroid\\_Impact\\_Mission](http://www.esa.int/spaceinvideos/Videos/2015/04/Asteroid_Impact_Mission)

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### **About the European Planetary Science Congress (EPSC)**

The European Planetary Science Congress (EPSC) 2015 is taking place at the La Cité des Congrès, Nantes, France, from Sunday 27 September to Friday 02 October 2015. EPSC is the major European meeting on planetary science and in 2015, the programme includes more than 55 sessions and workshops, with more than 900 scheduled abstracts for oral presentations and posters sessions. To complement the scientific programme, the city of Nantes is hosting a public exhibition, "Voyages Planétaires", from 28 September to 04 October in La Cité des Congrès.

EPSC 2015 is organised by Europlanet, and Copernicus Meetings. The conference is sponsored by CNES, Thales Alenia Space and Airbus Defence and Space. "Voyages Planétaires" is sponsored by Nantes Métropole and Region Pays de la Loire.

Details of the Congress and a full schedule of EPSC 2015 scientific sessions and events can be found at the official website:

<http://www.epsc2015.eu/>

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### **About Europlanet**

Since 2005, the Europlanet project has provided Europe's planetary science community with a platform to exchange ideas and personnel, share research tools, data and facilities, define key science goals for the future and engage stakeholders, policy makers and European Citizens with planetary science. The Europlanet 2020 membership organisation, which consists of over 70 institutions linked by a Memorandum of Understanding, oversees the European Planetary Science Congress (EPSC) Executive Committee. The Europlanet 2020 Research Infrastructure (RI), a €9.95 million project funded under the European Commission's Horizon 2020 programme to integrate and support planetary science activities across Europe, provides financial contributions for students to attend EPSC.

For more information, see the project website [www.europlanet-2020-ri-eu](http://www.europlanet-2020-ri-eu) and outreach website [www.europlanet-eu.org](http://www.europlanet-eu.org)

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