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# JUVENTAS: EXPLORATION OF A BINARY ASTEROID SYSTEM WITH A CUBESAT

**Abstract**

Juventas is a 6U CubeSat, as part of ESA's planetary defense mission, HERA to the Didymos binary asteroid system. Juventas focuses on the geophysical analysis of Didymoon, its subsurface structure, density and porosity distribution as well as its surface properties. Furthermore, its dynamical state will be investigated which will give insights into the dynamics of the binary system and the formation of Didymoon.

Juventas contains a low frequency radar to investigate details of the interior structure of Didymoon. The spacecraft will also conduct radio science experiments via inter-satellite link between Juventas and the HERA spacecraft as a means of gravity field measurements. After Juventas observations of radar and radio science are complete, the spacecraft will attempt to land on the surface on Didymoon. Juventas will perform direct measurement of the local gravity vector on the surface of Didymoon, which has never been done on an asteroid. In addition, it will infer mechanical properties of near-surface mate-rial from CubeSat landing and bouncing. The surface gravity field will be analysed with remote radio and low frequency Radar sensing. The complementarity of the payload will allow a comprehensive geophysical investigation of Didymoon in support to the HERA investigation on the exploration and characterization of the Didymos asteroid binary system and the effects of the DART impact on Didymoon.