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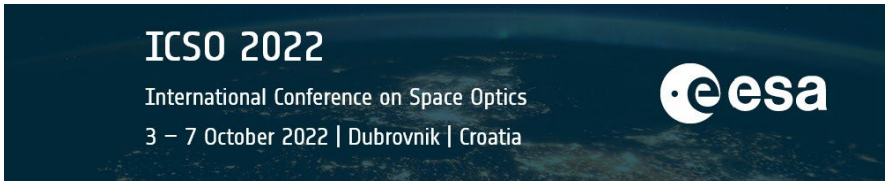

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HERA mission LIDAR CDR design

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The probe of HERA mission has a semi-autonomous navigation system that will perform fly-byes to the moon of the binary asteroid, called Didymos-B. The navigation is based on information given by the cameras and by the Planetary Altimeter (PALT). PALT is a Time-of-Flight (TOF) LIDAR that emits laser pulses of 2 ns, with 100 μJ of energy, at 1535 nm. PALT has a 70 mm Cassegrain telescope with an APD. PALT can take distance measurements from 500 m to 14 km with an accuracy of 0.5m. Aside from assisting navigation, the instrument will take scientific measurements that will contribute to the characterization of the asteroid topography.

In this paper we present the Critical Design Review (CDR), which includes the optical, mechanical, and thermal designs, before manufacture. Regarding the optical system, the two mirrors are made of Zerodur, the secondary mirror is supported by a tripod structure made of carbon fibres, and the lenses are radiation resistant. The mechanical design has an innovative system that comprises a stainless-steel spring blades solution, which has the aim of protecting the optics bench plate and allows the survivability of the optics during launch. The thermal design solution was achieved by isolating the sub-systems with thermal washers and by implementing an optimized isostatic bipod mount structure in the primary mirror, making possible to reduce the stress on the optical component, while keeping the performance of the instrument.