

The BepiColombo Laser Altimeter (BELA)

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The BepiColombo Laser Altimeter (BELA) has been selected for flight aboard the MPO (Mercury Planetary Orbiter) of ESA's BepiColombo mission to Mercury, scheduled for launch in the spring of 2012. The instrument is intended to provide a global topographic map grid with a COM height accuracy of 1 m which will complement gravity measurements for studies of crustal thickness and structure. By joint operation, the BepiColombo gravity, camera, and ranging experiments will determine Mercury's obliquity, librations, and tidal deformation. These parameters have strong implications for the planet's deep interior, specifically, the state of the core. The dense ranging profiles obtained by BELA will reveal details on the character of the surface, as morphology, roughness, and reflectivity. This first European planetary laser altimeter will be developed by a consortium led by the Physikalische Institut (Universität Bern, Switzerland) and the Institut für Planetenforschung (Deutsches Zentrum für Luft- und Raumfahrt, Berlin, Germany). Following the classical altimeter principle, the transmitter is based on a longitudinally pumped ND:YAG laser with 50 mJ pulses at 5 ns pulse duration, operating at 10 Hz (baseline). The returning pulse will be received by a 25-cm lightweight telescope. Digital filtering is used for pulse detection and pulse shape measurements. Operation is possible during night and day, but probably limited to 1200 km range.

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