



The BepiColombo Laser Altimeter Rangefinder Electronics

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The BepiColombo Laser Altimeter (BELA) is part of the European Space Agency's BepiColombo mission to explore Mercury. BELA will measure topographic variations, global shape parameters, tidal deformation of the surface, and the surface roughness of the planet.

The laser altimeter consists of two main parts, the transmitter and the receiver. The transmitter generates and sends short optical pulses at 10 Hz from the spacecraft to the planet. The laser pulses are generated by a 1064 nm Nd:YAG laser. The receiver detects the backscattered light from the surface of the planet.

One of the main elements of the laser altimeter is the rangefinder. It measures the flight time of the optical signal from the spacecraft to the planet and back to the spacecraft and analyzes the return pulses. From the shape of the return pulse the surface characteristics (roughness, slope) are obtained and from the pulse energy the albedo can be determined. The characterization of the return pulse is performed by several predefined mathematical pulse shape families to fit the pulse sample data. The key parameters of the pulse shape families are stored and transmitted to Earth for further analysis.

A prototype rangefinder for BELA is currently under test at the University of Bern. We report on this testing and show expected performance parameters for the rangefinder system.