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Testing activities of the sensor BepiColombo/SERENA-ELENA at the MEFISTO facility

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The sensor ELENA (Emitted Low-Energy Neutral Atoms), part of the SERENA package on board BepiColombo, is a novel instrument for detecting low energy neutral atoms. It is aimed to detect neutral atoms in the range 20 eV to 5 keV. With its nadir pointing 1-D field-of-view, perpendicular to the S/C orbital plane, ELENA will monitor the emission of low energy neutral atoms from the whole surface of the planet thanks to the spacecraft motion. Several scientific objectives will be achieved by this sensor, as:

a) surface emission rate via ion-sputtering;

b) backscattering of solar wind onto the surface;

c) global particle loss-rate;

d) remote sensing of the surface properties;

e) ENA imaging applications for comparative solar-planetary relationship.

ELENA is a Time-of-Flight (ToF) sensor, based on an ultra-sonic oscillating shutter (Start section) which is operated at frequencies above 20 kHz and up to 100 kHz, and Micro-Channel Plate (MCP) detector (Stop section). The Mefisto Neutral beam facility of the Physical Institute, University of Bern (CH) is used for ELENA testing. The neutral beam has a adjustable energy from 10 eV to 1000 eV with a flux up to 10^4 (cts/s/cm^2/pA) and the FWHM beam height ranges from 18 to 26 mm. The energy-related efficiency of ELENA MCP's is measured. The energy-related efficiency of ELENA MCP's is measured. The crucial point of the shuttering system interaction with particle beam is also investigated. The first test results are presented here.