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The BepiColombo SERENA/ELENA sensor. Approaching final delivery: sensor description and recent results

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The neutral sensor ELENA (Emitted Low-Energy Neutral Atoms) for the ESA cornerstone BepiColombo mission to Mercury (in the SERENA instrument package) is a new kind of low energetic neutral atoms instrument, mostly devoted to sputtering emission from planetary surfaces, from E $\sim$20 eV up to E$\sim$5 keV, within 1-D (4.5°x76°). ELENA is a Time-of-Flight (TOF) system, based on oscillating shutter (operated at frequencies up to 50 kHz) and mechanical gratings: the incoming neutral particles directly impinge upon the entrance with a definite timing (START) and arrive to a STOP detector after a flight path. In this way the low-energy neutral particles are directly detected, without using elements of interaction.
The new results of the development of the BepiColombo SERENA/ELENA instrument are presented in the frame of the scientific items (instrument simulations, laboratory testing, etc.). In particular, the actual status of the ELENA TOF sections (shuttering system and MCPs) are reported in the light of recent testing results. The sensor performances are investigated, as well as their capability to accomplish the scientific requirements (new deflector system, shuttering functionality test, MCP efficiency, piezo driver and proximity boards, etc.).