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## **ELENA instrument science and testing: validation with particle beam**

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Understanding of particle emission processes from the Mercury surface is one of the major objectives of ELENA instrument in the SERENA experiment on board of the BepiColombo mission. In particular the Ion-Sputtering process resulting from charged and energetic particles impacting on the surface can be investigated detecting the low energetic neutral particles escaping from the planet. The possibility to identify the Ion-Sputtering signal together with back-scattered particles and neutrals generated by charge exchange is strictly linked with the new technology capability to measure low energetic neutral atoms. This goal can be addressed thanks to a new&old approach for the neutral atoms measurement: a well known Time of Flight system enhanced with a new kind of Start section able to define the start time of the entrance in the ToF path without interacting with the particles and directly follow to the Stop detector. The Start section is a shutter composed by two membranes with nanometric slits realized in a large area (1cm<sup>2</sup>) and oscillating at several frequencies to open and close the entrance of ToF section. This system is never used before in space mission.

The IFSI-INAF Ion beam facility in Rome is devoted to the ELENA testing. The crucial point of the shuttering system interaction with particle beam is investigated. The first results demonstrate the good functionality of this kind of system: capability of the shutter to Open and Close the entrance respect to an ion beam is tested with a MCP stop detector. In this poster we present the IFSI activity in the frame of ELENA science requirement together with the experimental activity devoted to instrument verification.