

Mercury's Exosphere explored by BepiColombo mission

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The Mercury's Sodium Atmosphere Interferometer (MSASI) on BepiColombo is under development. MSASI is a high-dispersion visible spectrometer working in the spectral range around sodium D2 emission (589nm) and devoted to the characterization of the Mercury's exosphere. A tandem Fabry-Perot etalon is used to achieve a compact design. A one degree-of-freedom scanning mirror is employed to allow obtaining full-disk image of the planet and selected region of interest, e.g. Polar Regions, Caloris Basin, and magnetosphere.

Discoveries of Na, K and Ca from the ground-based observations clearly arise that the regolith of Mercury releases a fraction of its content to the atmosphere. Some processes are proposed up to now as release mechanisms, e.g. (1) Chemical sputtering, (2) Thermal desorption, (3) Photon-stimulated desorption, (4) Ion sputtering, and (5) Micro-meteoroid impact/vaporization. These processes are associated with different energies of ejection from regolith and behaviors in different regions of Mercury's surface. Therefore different types of population are born from the surface, depending on the process. Here we use 3D Monte Carlo simulation to describe the images taken by MSASI. The distribution of the neutral atmosphere is strongly affected by solar radiation. The shape and size of the exosphere could change depending on True anomaly angle (TAA).

In this paper, we will show the feasibility of identifying a process, which is responsible for sodium exosphere of Mercury. We also report the current status of our hardware development.