

Department of Physics & Astronomy

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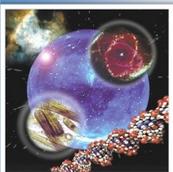
Time: 3:00 p.m. - 4:00 p.m.

BB 3.04.18

The Chemical Composition of Mercury's Exosphere

Mercury does not have a dense atmosphere whose altitude dependence is described by a single scale height. The Ultraviolet Spectrometer (UVS) instrument on Mariner 10 discovered a tenuous exosphere with gaseous species H, He, and O. Since the Mariner 10 flybys, ground-based telescopes have been used to observe the exosphere of Mercury in the Na and K spectroscopic D lines. Calcium has been observed primarily in the polar and anti-sunward exosphere. Radar-bright regions have been discovered at the poles, attributed to volatile deposits (water or sulfur) in permanently shadowed craters. Recently, Mg was discovered during MESSENGER's second flyby of Mercury. Many more species are predicted to exist in Mercury's exosphere, and they are a diagnostic of the surface composition.

ESA's BepiColombo mission to the planetary Mercury includes a comprehensive set of advanced instruments. Strofio, one of the instruments on the SERENA neutral and ionizing particle suite on the Mercury Planet Orbit (MPO), is a high mass resolution, time-of-flight system for low energy neutral particles. Strofio takes advantage of the direct coupling between the neutral atoms in the exosphere and their source regions in the outer layers of the regolith to answer fundamental questions about Mercury, its highly variable exosphere and its small but dynamic magnetosphere. In each case Strofio is either the only proposed BepiColombo investigation that can make these discoveries or it is the investigation that can re-turn the highest quality, most definitive result. The MPO spacecraft's low-altitude (400×1500 km) polar orbit provides Strofio a unique opportunity to measure the in situ composition of the very tenuous and highly variable Mercurian exosphere.



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