



The Mercury Imaging X-ray Spectrometer (MIXS) on BepiColombo as a Probe of Mercury's Magnetosphere

Dean L. Talboys (1), Emma J. Bunce (1), George W. Fraser (1), Adrian Martindale (1), and Yasuhito Narita (2)

(1) University of Leicester, Department of Physics and Astronomy, Leicester, United Kingdom (dlt3@star.le.ac.uk), (2)

Institut für Geophysik und extraterrestrische Physik, Technische Universität Braunschweig, Mendelssohnstrasse 3, D-38106 Braunschweig, Germany.

Planetary X-ray fluorescence spectroscopy is a valuable tool for probing the elemental composition of airless planetary surfaces and was first successfully deployed at the Moon with Apollo 15 and 16, later at Asteroids and more recently at Mercury with the MESSENGER spacecraft. X-ray fluorescence from planetary bodies in close proximity to the Sun is primarily induced by excitation from solar coronal X-rays, although X-ray emission is also possible from interaction of charge particles with the surface. For example, electrons accelerated in the magnetosphere, carried by field-aligned currents, follow field lines and impact on the surface resulting in bremsstrahlung X-ray emission. Following on from the surprising Mariner 10 discovery that Mercury has an intrinsic magnetic field, recent results from MESSENGER have highlighted the dynamic nature of the Hermean magnetosphere. Therefore, particle-induced X-ray emission could be used as a diagnostic of various magnetospheric phenomena in much the same way that UV observations of the aurora are used at planetary bodies with atmospheres (e.g., at the Earth). The University of Leicester is leading the development of the Mercury Imaging X-ray Spectrometer (MIXS) on BepiColombo. MIXS will be capable of imaging the morphology of the particle-induced X-ray emission, particularly on the nightside where solar-induced X-rays are eliminated. We will discuss particle-induced X-ray fluorescence from Mercury and how observations by MIXS provide a diagnostic probe of the magnetosphere. There is considerable scope for collaboration with other instruments on both the ESA Mercury Planetary Orbiter and the JAXA Mercury Magnetospheric Orbiter (e.g., the MERMAG magnetometers) to provide an integrated, simultaneous view of magnetospheric processes from two spacecraft.