

Space Physics Seminar

Thursday, April 30, 2015

Structure and Dynamics of Mercury's Magnetosphere Inferred from MESSENGER Observations and Highlights from the MESSENGER mission

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Abstract:

Ranging (MESSENGER) spacecraft into orbit around Mercury on 18 March 2011, the probe has returned the most comprehensive dataset of the innermost planet of our solar system to date. This presentation will show results from the orbital phase of the MESSENGER mission in two parts. The first part will focus on observations of the structure and dynamics of Mercury's magnetosphere inferred from observations by the Magnetometer and Fast Imaging Plasma Spectrometer. Because Mercury's dynamo magnetic field is weak – the dipole moment is 190 nT RM³, where RM=2440 km is Mercury's radius – the magnetopause stands, on average, only 1.45 RM off the subsolar surface. Consequently, Mercury's magnetosphere is much smaller than that of the Earth, and evidence for rapid reconnection through frequent loading and unloading of the magnetic tail on ~2 min. time scales, commensurate with this magnetosphere's Dungey cycle, is plentiful. Similar to the terrestrial magnetosphere, plasmas entering the nightside magnetosphere via reconnection and diffusion processes are transported toward the equatorial plane forming the plasma sheet and thence to the dayside by convection. However, owing to weak corotation and gradient-curvature drifts and highly variable convection electric fields and external magnetic fields, which exhibit magnitudes comparable to the dipole field even close to the planet, particle motion is much more chaotic and precipitation to the surface exhibits a strong north-south asymmetry resulting from the substantial, ~480 km, northward offset of the planetary field. The second part of the presentation will feature highlights across various disciplines of the MESSENGER mission, including geological mapping of the planet, determination of surface and exosphere composition, and detection of water ice and ancient crustal magnetic fields. Reflecting on the remarkable accomplishment of this NASA Discovery mission, we wait together as MESSENGER rides into the sunset and is scheduled to impact Mercury on 30 April 2015 after all onboard fuel reserves are exhausted.

3:00 pm

Refreshments
CAS Room 502

3:30 pm

Seminar
CAS Room 502

Next Week

- *There are no more seminars for the Spring Semester.*
- *Good luck on finals and see you next fall!*



<http://www.bu.edu/csp/edoutreach/seminar/>



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