

Laboratory experiment of the solar wind interaction with a magnetic dipole field on the lunar surface

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We perform laboratory experiments on the Colorado Solar Wind Experiment device to study the dynamics of the solar wind interaction with lunar magnetic anomalies. A large cross-section plasma flow with ion energies between 100 and 800 eV is incident on an insulating surface embedded in a magnetic dipole field. This dipole field is created with a permanent magnet behind the surface. 2D potential profiles are measured above the surface. With a dipole moment perpendicular to the surface, the preliminary results show large positive potentials on the surface in the dipole lobe regions, where the electrons are magnetically shielded while the unmagnetized ions go to the surface. However, the magnitudes of these positive potentials are smaller than the ion energies (in eV) when they are larger than 200 eV. Large electric fields created in these lobe regions due to charge separation are likely to play a role in accelerating the electrons toward the surface or deflecting the incoming ions. Surface potential profiles are also measured with the magnet at a series of distances behind the surface.