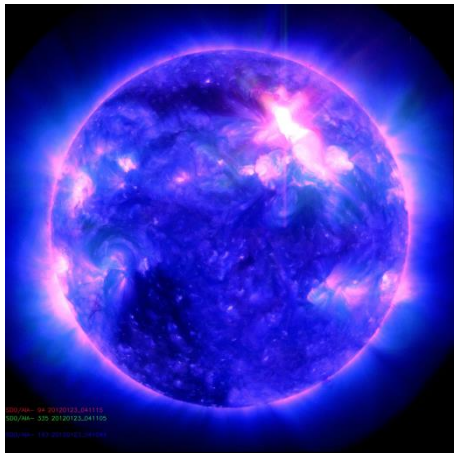
SUNNY SIDE UP: EXPERIMENTAL INVESTIGATIONS OF UV-GENERATED PHOTOELECTRON PLASMAS ABOVE SURFACES IN SPACE



Friday, October 18, 2013
OPS 140
4:00pm – 5:00pm

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Abstract:
Photoelectron emission is the dominant charging process on sunlit surfaces in the inner solar system due to the intense solar UV radiation, resulting in a net positive surface potential with a photoelectron sheath above the surface. The interaction of charged dust grains with these charged surfaces, and with the photoelectron and plasma sheaths, may explain the occurrence of dust lofting, levitation and transport above the lunar surface and on other airless bodies. In order to better understand the plasma processes at work on sunlit surfaces, I performed laboratory experiments to study the physics of photoelectron sheaths above both conducting and insulating surfaces in vacuum. Plasma characteristics were derived from Langmuir probe measurements, and were compared with the results from a 1D PIC- code simulation to gain a greater understanding of the sheath physics.
These measurements indicate that plasma probes above a planetary body can accurately determine potentials and densities above the surfaces, valuable information for understanding the charging environment of spacecraft and other objects.