

The Lunar Surface Electromagnetics Experiment (LuSEE)

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The Lunar Surface Electromagnetics Experiment (LuSEE) suite consists of flight spare electronics from the FIELDS experiment on the recently-launched Parker Solar Probe (PSP) spacecraft, deployable flight spare voltage sensors from the STEREO/WAVES and Van Allen Probes (VAP)/EFW experiments, and a flight fluxgate magnetometer from the NASA/GSFC group. The LuSEE suite will measure the DC electric and magnetic fields, plasma waves, electrostatic signatures of dust impacts, and radio emissions from the Sun, Earth, and outer planets. Surface DC electric potentials will be measured using voltage signals from a pair of STEREO/WAVES electric antennas and an VAP axial antenna, giving a baseline of more than 5 meters. Dust particles passing within the Debye sheath of the lander will produce small voltage impulses measured by LuSEE. Such “image charge” measurements will confirm or refute previous measurements from the Apollo-era surface-landed Lunar Ejecta and Meteorites (LEAM) experiments. LuSEE will measure low frequency radio emission (< 20 MHz) as a path-finder to a future lunar radio array. The lunar surface has been identified as an ideal location for an array to measure the radio signatures of the cosmological 21 cm line associated with the pre-stellar ‘Dark Ages’ where exotic physics, including scattering of baryons by dark matter may be detectable.