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**Lunar mini-magnetospheres as electron scale plasma laboratories**

RA BAMFORD, B KELLETT, R BINGHAM, STFC RAL, Didcot, UK, EP ALVES, F CRUZ, LO SILVA, IST Lisbon, Portugal — Space offers few opportunities to make measurements under consistent conditions such as can be provided in the laboratory. Visible from Earth, the spectacular Reiner Gamma Formation, is the quintessential example of a lunar swirl - anomalous white wispy markings on the moons surface - that represents an integrated record of differential solar proton bombardment. The surface magnetic fields are 500 nT at most and the overall size of the magnetic anomalies (100s of km) is of the order or less than the ion gyro-radius, and yet mini-magnetospheres, with miniature collisionless shocks, have been observed by spacecraft. The fixed location and footprint of magnetic fields provides almost laboratory like conditions. The data collected by a number of lunar survey missions since the 1960s reflect this making them ideal objects to study at the fundamental electron scale. Theory and particle in cell simulations of these mini magnetosphere structures provide confirmation of the need to involve electron-scale dynamics.

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