

THE ELECTROSTATIC POTENTIAL AT THE EARTH'S QUASI-PARALLEL BOW SHOCK

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Abstract

We present multi-spacecraft measurements of a quasi-parallel shock crossing obtained by the Cluster spacecraft. Short Large-Amplitude Magnetic Structures (SLAMS) are commonly observed at the Earth's quasi-parallel bow shock. These structures are thought to play an important role for decelerating and deflecting the incident Solar wind. In order to investigate the importance of SLAMS, we study the electrostatic potential over SLAMS as one possible mechanism for reflecting particles. We find a substantial potential for SLAMS in the Normal Incidence Frame (NIF) ranging from 150 V to 800 V. Comparing these results with data from the ion spectrometer, we find that SLAMS associated with gyrating and reflected particles. Furthermore, our observations indicate that the electrostatic potential plays a role particle reflection and deceleration. Thus, SLAMS may play a vital role for returning particles to the shock front where they can contribute to the downstream thermalisation.

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