

DIFFUSIVE SCATTERING AND WAVE-PARTICLE COUPLING IN FRONT OF THE EARTH'S QUASI-PARALLEL BOW SHOCK

A. Kis², M. Scholer¹, B. Klecker¹, E. A. Lucek³, I. Dandouras⁴, I.
Lemperger², V. Wetztergom²

¹*Max-Planck-Institut für extraterrestrische Physik, Garching, Germany*

²*Research Centre for Astronomy and Earth Sciences, Sopron, Hungary*

³*The Blackett Laboratory, Imperial College, London, UK*

⁴*CESR, Toulouse, France*

We study several upstream ion events using Cluster simultaneous multi-spacecraft data at times of large inter-spacecraft separation distance. We analyze the pitch-angle scattering of energized ions by upstream waves and demonstrate that under favourable interplanetary conditions the scattering can become stronger than usual thus making the first-order Fermi acceleration at the bow shock more efficient. On the other hand, the upstream waves that scatter the energetic ions are thought to be generated locally by the energetic ions themselves. Therefore the characteristics of the upstream waves and of the energetic ions are intimately connected. In our study we compare the predictions of the quasi-linear theory of wave excitation at each event with the observations in two ion energy ranges (i.e, 10-18 keV and 18-32 keV) and as a function of distance from the bow shock.