Contribution ID: **1289** Type: **Poster**

Energy Balance at Interplanetary Shocks: In-situ Measurement of the Fraction in Supra-thermal and Energetic Ions with ACE and Wind

Monday, July 12, 2021 7:18 PM (12 minutes)

Energetic particles generated by interplanetary shocks can drain a non-negligible fraction of the upstream ram pressure. We have selected a sample of shocks observed in-situ at 1 AU by the ACE and Wind spacecraft from the CfA Interplanetary Shock Database, which provides high-resolution data on solar wind plasma, shock parameters, and the local magnetic field. Time-series of the non-Maxwellian (supra-thermal and higher-energy) particle energy spectra were acquired for each event, averaged for one hour before and after the shock time, and integrated over velocity space to ascertain their partial pressure. Using the Rankine-Hugoniot MHD jump conditions, we find that the fraction of the total upstream energy flux density transferred to non-Maxwellian particles can reach about 15-35%. Notably, our sample shows that neither the Alfven Mach number nor the angle between the shock normal and upstream magnetic field are correlated with the energy drained by the particles. The findings are also insensitive to the offset of the time interval used for the partial pressure estimate. We obtain similar results, although with larger error bars, using shock parameters from the IPShocks database.

Keywords

particle acceleration; interplanetary shocks

Collaboration

other Collaboration

Subcategory

Experimental Results

Primary authors: DAVID, Liam (Student, University of Arizona); FRASCHETTI, Federico (CfA | Harvard & Smithsonian / University of Arizona)

Co-authors: Prof. GIACALONE, Joe (University of Arizona, Department of Planetary Sciences); WIMMER-SCHWEINGRUBER, Robert; BERGER, Lars; LARIO, David

Presenter: DAVID, Liam (Student, University of Arizona)

Session Classification: Discussion

Track Classification: Scientific Field: SH | Solar & Heliospheric