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Electron energy partition across interplanetary shocks near 1 AU[1]

LYNN WILSON III, NASA Goddard Space Flight Center — Analysis of 15,314 electron velocity distribution functions (VDFs) within ±2 hours of 52 interplanetary (IP) shocks observed by the Wind spacecraft near 1 AU are presented. The electron VDFs are fit to the sum of three model functions for the cold dense core, hot tenuous halo, and field-aligned beam/strahl component. The halo and beam/strahl are always modeled as bi-kappa VDFs but the core is found to be best modeled by a bi-self-similar, not bi-Maxwellian, for nearly all cases and a bi-kappa for a small fraction of the events. The self-similar distribution deviation from a Maxwellian is a measure of inelasticity in particle scattering from waves and/or turbulence. The range of values defined by the lower and upper quartiles for the kappa exponents are $\kappa_{ec} \sim$ 5.40–10.2 for the core, $\kappa_{eh} \sim$ 3.58–5.34 for the halo, and $\kappa_{eb} \sim$ 3.40–5.16 for the beam/strahl. The lower-to-upper quartile range of symmetric bi-self-similar core exponents are $s_{ec} \sim$ 2.00–2.04, and asymmetric bi-self-similar core exponents are $p_{ec} \sim$ 2.20–4.00 for the parallel exponent, and $q_{ec} \sim$ 2.00–2.46 for the perpendicular exponent. The rest of the p

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