ENERGETIC SOLAR PARTICLES-FORMATION VIA STATISTICAL APPROACH

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Solar environment is responsible for some of the most intense energization processes in the heliosphere, which occur in conjunction with(a)flares, when a large amount of energy is released impulsively in the form of energetic ions, protons, rare elements and electromagnetic radiation, and (b)coronal mass injections (CMEs), which result in a formation of supersonically propagating magnetic cloud/plasmoid and long term energization of ions with coronal abundances. These particles are observed remotely via their electromagnetic coupling to plasma and in situ by Earth-orbiting satellites. Formation of electron and ion populations with elongated tails in their distribution functions requires either long-range or non-Markovian coupling between waves and particles. General statistical approach will be outlined to elucidate the formation of non-Gaussian distributions, resulting in a non Gibbs-Boltzmann entropy and a modified Fokker-Planck process, with application to (a) relativistic, post-CME solar electrons and (b) energetic ions due to low-Mach propagating shocks.