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Particle Energization in Turbulent Plasmas

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Plasmas in the heliosphere are normally not in thermodynamic equilibrium as evidenced by ubiquitous extended suprathermal tails in the velocity distribution functions of ions and electrons. Their importance as seed particles for further acceleration at shocks is undisputed as is their importance in mediating a shock, especially the heliospheric termination shock. Nevertheless, the origin of these suprathermal particles is unclear and currently heavily debated; various scenarios for their origin have been proposed. With its highly sophisticated and complementary payload, THOR will contribute to the understanding of how these lowenergy or suprathermal particles are energized in the turbulent plasma close to Earth. The Energetic Particle Experiment (EPE) will provide measurements of these particles, as well as their elemental composition, while measurements of the turbulent wave field will be provided by a combination of multiple instruments on THOR. We will discuss observations of suprathermal particles with SOHO/CELIAS/STOF, STEREO/PLASTIC, STEREO/SEPT, ACE/SWICS, as well as other instruments and relate them to their underlying physical processes.