Energetic and Suprathermal Particle Composition Measurements from Solar Orbiter

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Particles that have energies of a few times the solar wind plasma energy up to 100s of keV/q are called suprathermal particles. Recent studies have revealed that these particles play a significant role as seed particles for further acceleration to higher energies. This may occur either close to the Sun in solar energetic particle (SEP) events, but also locally at 1 AU in energetic storm particle events, or even outside 1 AU as ions accelerated in Corotating Interaction Regions. The constituents of this suprathermal ion reservoir are therefore expected to vary in time and space. The composition and spectra of these ions provide us the telltale of their origin and acceleration mechanism. It is therefore important to make high time resolution measurements of the composition and spectra of this particle population in the inner heliosphere to better characterize its origins and role as a seed population in particle acceleration processes. Because of the vastly different mass-per-charge ratios of the various possible origins of suprathermal ions, we expect to see distinct difference and radial dependencies in their abundances in low-energy accelerated particles in the inner heliosphere. Here we describe the measurements that we will be making on Solar Orbiter that will make significant contributions to the understanding of the particle population in this largely unexplored energy range.