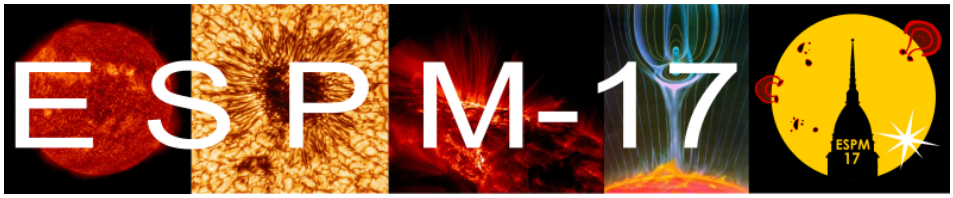

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Electron suprathermalization: from the corona to the solar wind and back

The data transmitted by Parker Solar Probe (PSP) from the young solar wind build on the puzzle of electron properties with many important pieces. Of particular interest are the suprathermal populations responsible for the transport of heat flux in the solar wind. We refer to both suprathermal components, the so-called halo and the strahl or beam component, whose trends suggested by previous analyzes of the heliosphere data are only partially confirmed. The nonmonotonic variation of the halo protperties (density, temperature and suprathermalization by the kappa parameter) suggests a much more complex interplay, not only with the strahl, which can be pitch-angle scattered and suprathermalized by the selfgenerated (e.g., heat-flux) instabilities. Corroboration with the properties of electron core that remains dominant (with a relative density of over 90%), suggests an involvement of the latter, at distances below 0.2 AU. We therefore propose a number of mechanisms for energizing core electrons, for which kinetic-scale wave turbulence also detected by PSP may be responsible. Possible consequences of velocity filtration in the solar corona are also analyzed, for the fact that at the smallest reported distances the slow-wind halo has low densities, below those of the strahl, but is strongly suprathermalized, with a reduced kappa parameter that tends to values found only at large heliocentric distances (after 1 AU). This further motivates an extensive analysis of the physical processes operating in the solar wind to explain the new data from the solar corona.

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