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Suprathermal populations and small scale fluctuations in the solar wind

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In the last decade, studies of solar wind plasma have shown that suprathermal populations (up to a few keV) are closely linked to wave turbulence and fluctuations at small (or kinetic) scales. We aim to identify those types of wave fluctuations observed at these scales scales, for which existing theories predict a major implication in particle acceleration and formation of suprathermal tails in the velocity distributions of plasma particles. On the other hand, it is currently believed that fluctuation power (magnetic, density, velocity) measured at ion scales and lower are generated by the turbulent cascade but also wave instabilities. Therefore, we also intend to discuss a number of recent results describing the kinetic instabilities driven by the anisotropy of velocity distributions (e.g., temperature anisotropy, field-aligned drifts), and how are these instabilities influenced by the suprathermal populations. These results help to understand the energy exchanges between particles and electromagnetic fields, not only in the solar wind but also in the coronal plasma ejections, with consequences for the space weather and terrestrial magnetosphere.