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# Non-thermal velocity distributions in the solar wind

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Velocity distribution functions of plasma particles measured by spacecraft in the solar wind generally show non-thermal features, and especially the presence of enhanced suprathermal tails. Such distributions can well be fitted by different kinds of velocity distribution functions, such as a sum of two (bi-)Maxwellians with different temperatures or with (bi-)Kappa distributions decreasing as a power law of the velocity. The presence of such suprathermal tails is general in many other space plasmas, which suggests a universal mechanism for their formation.
Using a kinetic model allowing us to take into account the effects of non-thermal distributions, we show that the presence of suprathermal populations in space plasmas has important consequences concerning particle acceleration and plasma heating, in particular in the solar corona and the solar wind. The kinetic approach allows us to consider not only electrons and protons, but also heavier ions. We compare with the evolution of the solar wind characteristics using measurements of different spacecraft at increasing radial distances and show how to optimize the boundary conditions to use in the solar corona to recover observations for typical cases.