Regularized Kappa distributions to model the solar wind electrons

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The kinetic exospheric model of the solar wind has been improved by considering regularized Kappa distributions valid even for kappa indices lower than 2. Indeed, with an exponential cutoff introduced to regularize the Kappa function for velocities reaching the light velocity, non-divergent moments of order l can be calculated even for $\kappa < (l + 1)/2$. Low values of kappa are often observed in the solar wind, especially for the electron distributions, but also for ions. We use the new Parker Solar Probe PSP) observations at low distances (down to 15 Rs) to improve the boundary conditions of the model and estimate the characteristics of the plasma in the solar corona and their average radial evolution with the distance. Results of the exospheric model are compared with different solar wind observations of Solar at different radial distances to explore the formation of the suprathermal electrons at low distances using PSP measurements.