



## **Evolution of the pick-up ion distribution with solar distance in terms of kappa-functions.**

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It is observationally recognized that pick-up protons besides an inner-shell core-population when advected to larger solar distances develop suprathermal tails with a power law character. This type of distribution functions can elegantly be described by kappa functions with a specific kappa index. Here we start out from an appropriate phasespace transport equation for pick-up ions taking into account injection, convection, cooling, and velocity diffusion. Then going to velocity moments one can change over to a pressure transport equation and can describe the ion distribution by a kappa function with a distance-dependent kappa index. This leads us to an ordinary differential equation for the distance-dependent kappa index which can be solved. The solutions show that in all discussed cases of velocity diffusion one obtains a smooth transition from large to small kappa indices clearly describing the transition from Maxwellian to quasi-equilibrium distributions with extended power-tails.