

Special Issue

Theoretical Aspects of Kappa Distributions

Message from the Guest Editor

Classical particle systems reside at thermal equilibrium with their velocity distribution function, stabilized into a Maxwell distribution. On the other hand, collisionless and correlated particle systems, e.g., space plasmas, are characterized by a non-Maxwellian behavior, typically described by the so-called kappa distributions. Empirical kappa distributions have become increasingly widespread across space and plasma physics. However, a breakthrough in the field came with the connection of kappa distributions with the solid background of non-extensive statistical mechanics. Understanding the statistical background and origin of kappa distributions was a cornerstone of further theoretical developments, e.g., among many others: the physical meaning of thermal parameters, e.g., temperature and kappa index; the N-particle description of kappa distributions; the generalization to phase-space kappa distribution of a Hamiltonian with non-zero potential; the entropy associated with kappa distributions. In this Special Issue, we welcome papers reporting on the progress of the theory of kappa distributions.

Guest Editor

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