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Turbulent Acceleration of Electron Kappa Distribution

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The charged particle acceleration is one of the outstanding problems in contemporary space and astrophysical plasma physics. In space, energetic electrons are often observed to be in the state of nonthermal distribution, typically in the form of the kappa distribution. Since the pioneering work by Tsallis, the kappa distribution has attracted much attention as an equilibrium state of non-extensive thermostatistics. However, the question of how such a state can be attained dynamically has been left unaddressed. Recently, the author and his colleagues demonstrated on the basis of weak turbulence theory and particle-in-cell (PIC) simulation that such a state can indeed be formed as a result of interaction between initially gaussian beam electrons and thermal population, mediated by self-consistently excited Langmuir turbulence. This talk will review the up-to-date findings on this important topic.