

Transverse momentum distributions of hadrons in the Tsallis nonextensive statistics

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The exact analytical formulas for the transverse momentum distributions of the Bose-Einstein, Fermi-Dirac and Maxwell-Boltzmann statistics of particles with a nonzero mass in the framework of the Tsallis normalized and Tsallis unnormalized statistics were consistently derived. We have revealed that the phenomenological classical Tsallis distribution (widely used in high energy physics) is equal to the distribution of the Tsallis unnormalized statistics in the zeroth term approximation. The exact ultrarelativistic transverse momentum distribution of the Tsallis normalized statistics was applied to describe the experimental data on the transverse momentum distributions for the charged pions produced in proton-proton collisions at high energies.

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