

# Possible Implication of a Single Nonextensive $p_T$ Distribution for Hadron Production in High-Energy $pp$ Collisions

*Saturday 17 January 2015 17:45 (25 minutes)*

Multiparticle production processes in  $pp$  collisions at the central rapidity region are usually considered to be divided into independent “soft” and “hard” components. The first is described by exponential (thermal-like) transverse momentum spectra in the low- $p_T$  region with a scale parameter  $T$  associated with the temperature of the hadronizing system. The second is governed by a power-like distributions of transverse momenta with power index  $n$  at high- $p_T$  associated with the hard scattering between partons. We show that the hard-scattering integral can be approximated as a nonextensive distribution of a quasi-power-law containing a scale parameter  $T$  and a power index  $n = 1/(q-1)$ , where  $q$  is the nonextensivity parameter. We demonstrate that the whole region of transverse momenta presently measurable at LHC experiments at central rapidity (in which the observed cross sections varies by 14 orders of magnitude down to the low  $p_T$  region) can be adequately described by a single nonextensive distribution. These results suggest the dominance of the hard-scattering hadron-production process and the approximate validity of a “no-hair” statistical-mechanical description of the  $p_T$  spectra for the whole  $p_T$  region at central rapidity for  $pp$  collisions at high-energies.

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**Session Classification:** Properties of nuclear matter