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Transverse Momentum and Tsallis Distribution] Transverse Momentum Distributions in proton - proton Collisions at LHC Energies and Tsallis Thermodynamics

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Abstract content
 (Max 300 words)
Formatting &
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A detailed study of the transverse momentum distributions of charged particles produced in $p - p$ collisions at LHC energies is presented. This is done using a thermodynamically consistent form of the Tsallis distribution. All variables used are thermodynamical and in particular, the temperature, T , follows from the standard thermodynamic definition as being the derivative of the energy with respect to the (Tsallis) entropy. The momentum distribution of the final state particles can be described very well by the Tsallis distribution. The values of the parameters are determined from measurements by the ALICE, ATLAS and CMS collaborations and are discussed in detail. In particular, the Tsallis parameter, q , is found with consistent values for all the transverse momentum distributions despite large differences in kinematic regions and increases slightly with beam energy, reaching a value of 1.15 at 7 TeV. It is concluded that the hadronic system created in high-energy $p - p$ collisions at mid-rapidity behaves consistently with Tsallis thermodynamics.

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