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Phenomenological approach to multiple particle production (1)

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We describe the rapidity density distribution and the transverse momentum ($p_{\{t\}}$) distribution in multiple particle production, assuming a simple mechanism. It is an assumed mechanism that the newly produced particles are emitted isotropically from several emitting centers which are distributed on the rapidity axis in CMS. The energy distribution of the emitted particles is an exponential type in the rest frame of respective emitting centers. The distribution of the emitting centers is uniform between $-y_{\{0\}}$ and $y_{\{0\}}$ ($y_{\{0\}} = \ln(\sqrt{s}/M) - \ln a_{\{2\}}$, $a_{\{2\}}$ an adjustable parameter).

We can obtain the rapidity density distribution analytically, which can be transformed easily to the pseudo-rapidity density distribution and x-distribution.

The rapidity density distribution and the $p_{\{T\}}$ distribution by the present formulation describes well those of the experiments at various energies by adjusting values of the parameters (five in total).

We show how well the experimental data at $\sqrt{s} = 22.4, 546, \text{ and } 1800 \text{ GeV}$ are described by the present formulation.

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