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Scaling behaviour of the p_T spectra for identified hadrons in pp collisions (15' + 5')

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We extend the scaling behaviour observed in the inclusive charged hadron transverse momentum (p_T) distributions to the p_T spectra of pions, kaons and protons produced in proton-proton (pp) collisions with center of mass energies (\sqrt{s}) at 0.9, 2.76 and 7 TeV. This scaling behaviour arises when a linear transformation, $p_T \rightarrow p_T/K$, is applied on the pion, kaon or proton p_T spectra. The scaling parameter K depends on \sqrt{s} and is determined by a new method, the quality factor method, which does not rely on the shape of the scaling function. We argue that the pions, kaons and protons originate from different distributions of clusters which are formed by strings overlapping, and the scaling behaviours of these identified particles p_T spectra could be understood with the colour string percolation model in a quantitative way simultaneously.

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