

Models for proton-proton scattering at LHC: asymptotic limits, black-disk limit and geometrical scaling

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We discuss recent LHC measurements for the total, elastic and inelastic cross-sections, by TOTEM, CMS, ATLAS and ALICE collaborations in the light of present phenomenological predictions. We present result of various models, including an empirical model for elastic pp scattering at LHC, which indicates that the asymptotic black-disk limit $R=(\text{elastic cross section})/(\text{total cross section}) = 1/2$ is far from being reached, and discuss the implications on classical geometrical scaling behaviour. We propose a geometrical scaling law for the position of the dip in the differential elastic cross-section. The new scaling law allows to make predictions valid both for intermediate and asymptotic energies.

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