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Charged particle multiplicities at $\sqrt{s}=0.9, 2.36$ and 7.0 TeV with the CMS detector at LHC

The charged particle multiplicity, n , is an essential observable in hadron collisions. It is the result of the counting of all charged particles produced by the primary proton-proton interaction. In particular, the events collected by minimum bias triggers contain soft interactions and produce mostly particles with low transverse momenta. The shape of the charged particle multiplicity spectrum is sensitive to the particle production mechanism of these soft interactions which are described by non-perturbative models, inspired by QCD. The correlations between produced hadrons are reflected in the shape of the multiplicity spectrum, while the mean multiplicity increases with the center of mass energy of the collision.

We present the measurement of the charged particle multiplicity distributions, $1/\sigma d\sigma/dn$, in increasing sub-domains of pseudorapidity and transverse momentum acceptance, for non single diffractive interactions. The data are further corrected for the trigger and event selection efficiency and the effects of tracking inefficiency and secondary tracks originating from the decay of long lived particles and products of interaction with the beampipe and the detector material. This measurement is based on minimum bias data collected by the CMS detector at $\sqrt{s} = 0.9, 2.36$ and 7 TeV. The data were collected during the LHC commissioning run in 2009 and at the beginning of 2010.

Primary author: ROUGNY, Romain (Universiteit Antwerpen, Belgium)

Presenter: ROUGNY, Romain (Universiteit Antwerpen, Belgium)

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