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Measurement of the centrality dependence of the charged particle pseudorapidity distribution in proton-lead collisions at $\sqrt{s_{NN}}$ = 5.02 TeV with the ATLAS detector

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Proton-lead collisions at the LHC provide an opportunity to probe the physics of the initial state of ultra-relativistic heavy ion collisions. In particular, they can provide insight on the effect of an extended nuclear target on the dynamics of soft and hard scattering processes and subsequent particle production. Charged particle multiplicity and pseudorapidity distributions are among the most basic experimental probes of particle production.

The centrality dependence of the charged particle pseudorapidity distributions, dNch/deta , was measured in p+Pb collisions at a nucleon-nucleon centre-of-mass energy of sqrt(s_NN) = 5.02 TeV using the ATLAS detector. Charged particles were reconstructed over |eta| < 2.7 using the ATLAS pixel detector. The proton-lead collision centrality was characterized by the total transverse energy measured over the pseudorapidity interval 3.2 < eta < 4.9 in the direction of the lead beam. The dNch/deta distributions are found to vary strongly with centrality, with an increasing asymmetry between the proton-going and Pb-going directions as the collisions become more central. Three different calculations of the number of participants, Npart, have been carried out using a standard Glauber model as well as two Glauber-Gribov extensions. Charged particle multiplicities per participant pair are found to vary differently with Npart for these three models, highlighting the importance of the fluctuating nature of nucleon-nucleon collisions in the modeling of the initial state of p+Pb collisions.

On behalf of collaboration:

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