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Topic: Measurement of charged hadron spectra for p+Pb collisions at 8 TeV.

Abstract

High energy heavy ion (HI) collisions in collider experiments produce a state called quark gluon plasma (QGP), in which quarks and gluons become deconfined. Charged hadrons of high transverse momentum (pT) are a tool that can be used to study this primordial hot soup of matter and also the partonic structure of nuclei. The Large Hadron Collider (LHC) probes HI collisions and recreate conditions that were present a few billionth of a second after the Big Bang.

These days nucleus can be probed at those scales which were never accessible before using p+Pb collisions. These collisions also play a fundamental role in describing the initial state of highly relativistic Pb+Pb collisions. p+Pb charged hadron spectra of high transverse momentum (pT) can also be used to study the effects of a heavy ion on the dynamics of hard and soft scattering processes and subsequent particle production.

The task was to evaluate the charged hadron spectra for p+Pb collisions at $\sqrt{s} = 8$ TeV recorded with the ATLAS detector at the LHC in Nov-Dec 2016. The analysis was done over different centrality classes and periods and over pseudorapidity range, $|\eta| < 2.5$. Events were selected using right triggers (MinBias and Jet) and prescales and eventually tracks were matched to jets to obtain spectrum for track pT vs jet pT. Track pT spectra for both Jet and MinBias triggers was measured. All the spectra were normalized by luminosities and also by bin area. Muon spectrum, so as to exclude leptons from the hadrons measurement, was also measured. Finally, spectra from MinBias and Jet triggers were merged. Also, track quality requirements were updated to have more good quality tracks. Ratio of matched tracks to all tracks was also studied with pT to compare the spectra of tracks, with and without muons.

Track pT vs ΔR ($\Delta R = \sqrt{\Delta\eta^2 + \Delta\phi^2}$) was studied with radius parameter $\Delta R = 0.4$ with loose and tight cuts on selection of tracks in Inner Detector (ID). All events containing a jet found with anti-kT algorithm with $\Delta R = 0.4$ and with certain energy threshold E_T estimated in the trigger system were accepted.