Study of the transverse momentum distribution of jet constituents in p-Pb collisions at ALICE

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Abstract: Jet properties are influenced by both perturbative and non-perturbative processes that take place during the jet fragmentation. Transverse momentum distributions in jets provide insight into the gluon radiation patterns in jet fragmentation. In this poster we present spectra of the momentum component perpendicular to the jet axis \(p_T\) of charged jet constituents from the analysis of fully reconstructed jets in p-Pb collisions at \(\sqrt{s_{NN}} = 5.02\) TeV measured by the ALICE experiment.

\[ j_T \text{ spectrum} \]

The fully corrected charged \(j_T\) spectra are presented in jet \(p_T\) bins (Fig. 5). Comparison is made to the PYTHIA 6.4 CDF A tune with and without Angular Ordering (AO). AO provides better agreement with data.

**Jet reconstruction**

Track matching with clusters is implemented to avoid double counting of energy. Jets are reconstructed with anti-\(k_T\) algorithm and resolution parameter \(R = 0.4\), from charged tracks and calorimeter clusters. Acceptance is limited by the calorimetry and fiducial cut to \(|y| < 0.75\) and \(1.455 < p_T < 3.085\).

The analysis is conducted in several jet \(p_T\) bins in the range 20-150 GeV/c. The jet \(p_T\) is corrected for the Underlying Event (UE) contribution. The UE background density \(\rho\) is estimated by evaluating charged track deposits in the full tracking acceptance (Fig. 2) and then scaled up by the average charged/full ratio, to contain bg of full jets.

\[ j_T \text{ analysis method} \]

Charged track constituents are used to calculate the distribution of the momentum component perpendicular to the jet axis \(j_T\) (see Fig. 3).

The background contribution to the \(j_T\) spectrum is subtracted using 90\(^\circ\) rotated cone method. The rotated cone is adapted to the signal jet area (Fig. 6).

The raw spectrum is corrected using a bin-by-bin (in jet bins) correction obtained from full Monte-Carlo simulation.

**Comparison to NMLLA**

We compare our data to a Next-to-Modified Leading Log Approximation (NMLLA) calculation \(^1\) with different quark (q) and gluon (g) contributions (Fig. 6 - see legend), which was found to agree well with the CDF data \(^2\).

**Fig. 1:** ALICE is a dedicated heavy ion experiment at the CERN LHC accelerator. Precision tracking is provided by the Time Projection Chamber (TPC) and enhanced by six layers of the silicon Inner Tracking System (ITS). Charged tracks used in jet reconstruction are measured in pseudo-rapidity \(|\eta| < 0.9\) and with transverse momentum \(p_T > 150\) MeV/c.

Photons and electrons are detected by the sampling lead scintillator calorimeter EMCal, with coverage of 100 degrees in azimuth and \(|\eta| < 0.7\). Clusters with \(E_T > 500\) MeV are used for the jet reconstruction.

**Fig. 2:** Left: \(E_T\) distribution for minimum bias and triggered events. Right: Raw jet spectra before and after the \(\rho\) subtraction.

**Fig. 3:** \(j_T\) spectrum is corrected using a bin-by-bin (in jet bins) correction obtained from full Monte-Carlo simulation.

**Fig. 4:** Uncorrected \(j_T\) distribution (red) and corresponding UE distribution (blue) for various \(p_T\) of the associated tracks.


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