

The Double Ridge Phenomenon in p–Pb Collisions Measured with ALICE

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The ALICE collaboration has measured two-particle angular correlations in p–Pb collisions at $\sqrt{s_{\text{NN}}} = 5.02$ TeV using data from the p–Pb pilot run in September 2012 at the LHC¹. In these correlations, the number of associated particles (N_{assoc}) per number of trigger particles (N_{trig}) is studied as a function of the azimuthal difference ($\Delta\varphi$) and the difference in pseudorapidity ($\Delta\eta$) and expressed as associated yield per trigger particle:

$$\frac{1}{N_{\text{trig}}} \frac{d^2 N_{\text{assoc}}}{d\Delta\eta d\Delta\varphi}. \quad (1)$$

This correlation is determined at mid-rapidity ($|\eta| < 1.2$) in different bins of trigger particle momentum $p_{\text{T,trig}}$ and associated particle momentum $p_{\text{T,assoc}}$. The event sample is divided into four multiplicity classes depending on the measured multiplicity in two forward detectors ($2.8 < \eta < 5.1$ and $-3.7 < \eta < -1.7$).

The two-particle correlation of low-multiplicity (lowest 40%) events is subtracted from the one in high-multiplicity (highest 20%) events which removes the jet contribution to the correlation to a large extent. The resulting correlation is shown in Fig. 1 for one bin in momentum and multiplicity. A double-ridge structure is observed with a near-side ridge centered at $\Delta\varphi = 0$ and an away-side ridge centered at $\Delta\varphi = \pi$. Both are independent of $\Delta\eta$.

This intriguing phenomenon has been characterized by calculating the ridge yields as well as the Fourier decomposition of the excess structure. The details can be found in Ref. 1. Theoretical explanations which aim at describing this feature involve a hydrodynamic phase² or the color-glass condensate³. While these models succeed in describing the results qualitatively, this phenomenon is a long way from being well understood.

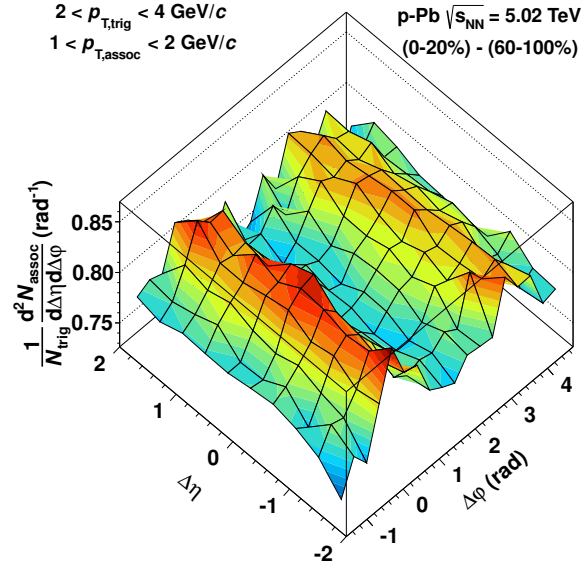


Figure 1: The associated yield per trigger particle in $\Delta\varphi$ and $\Delta\eta$ for pairs of charged particles with $2 < p_{T,\text{trig}} < 4 \text{ GeV}/c$ and $1 < p_{T,\text{assoc}} < 2 \text{ GeV}/c$ in high-multiplicity (0–20%) p–Pb collisions from which the correlation in low-multiplicity (60–100%) p–Pb collisions has been subtracted. Figure from Ref. 1.

References

- [1] ALICE Collaboration, *Phys.Lett.* **B719** 29 (2013).
- [2] P. Bozek, *Phys. Rev. C* **85** (2012) 014911.
- [3] K. Dusling and R. Venugopalan, arXiv:1302.7018 [hep-ph].