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# Phenomenological study of the angle between jet axes in heavy-ion collisions

This work presents a phenomenological study on the angle between the Standard and the Winner-Take-All (WTA) jet axes ($\Delta R$) in high-energy nuclear collisions. Our theoretical results calculated by the LBT model show that the $\Delta R$ distribution in Pb+Pb at $\sqrt{s} = 5.02$ TeV is narrower than that in p+p, which agrees well with the recent ALICE measurements. The narrowing of $\Delta R$ seems to violate the $p_T$-broadening nature of the jet quenching effect, usually explained by the influence of "selection bias". However, the physical details still need to be fully understood. Utilizing a matching-jet method to track the jet evolution in the QGP to remove the selection bias in the Monte Carlo simulations, we observe that the $\Delta R$ distribution becomes broader due to the jet-medium interactions. At the same time, by rescaling the quark/gluon-jet fractions in Pb+Pb collisions to be the same as that in p+p, we find that the fraction change may not significantly influence the modification pattern of jet $\Delta R$. On the other hand, the selected jet sample in A+A collisions has a significantly narrower initial $\Delta R$ distribution than the p+p baseline, and such a biased comparison between p+p and A+A conceals the actual jet-broadening effect in the experimental measurements. The investigations presented in this work will deepen our understanding of the relationship between the actual intra-jet modifications in the QGP and the experimental observations.

## Category

Theory

## Collaboration

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