

# The 9th International Symposium on Heavy Flavor Production in Hadron and Nuclear Collisions



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

This paper presents a phenomenological study on the angle between the Standard and Winner-Take-All (WTA) jet axes ( $\Delta R_{\text{axis}}^{\text{WTA-Std}}$ ) in high-energy nuclear collisions. The  $p+p$  baseline is provided by the Pythia8 event generator. The in-medium jet propagation is simulated by the linear Boltzmann transport (LBT) model, which considers both the elastic and inelastic jet-medium interactions. Our theoretical results calculated by the `Lbt` model show that the  $\Delta R_{\text{axis}}^{\text{WTA-Std}}$  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  $\Delta R_{\text{axis}}^{\text{WTA-Std}}$ , which seems to violate the nature of intra-jet broadening due to jet quenching, may be attributed to 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  $\Delta R_{\text{axis}}^{\text{WTA-Std}}$  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  $\Delta R_{\text{axis}}^{\text{WTA-Std}}$ . On the other hand, the selected jet sample in A+A collisions has a significantly narrower initial  $\Delta R_{\text{axis}}^{\text{WTA-Std}}$  distribution than the  $p+p$  baseline, and such a biased comparison between  $p+p$  and A+A conceals the actual intra-jet broadening effect in the experimental measurements. The investigations presented in this paper will deepen our understanding of the relationship between the actual intra-jet modifications in the QGP and the experimental observations.

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