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Di-jet acoplanarity as a function of flattenicity in pp collisions at $\sqrt{s} = 13$ TeV

Content

One of the most important discoveries at the LHC is the presence of effects associated with quark–gluon plasma (QGP) formation in proton–proton (pp) collisions. The origin of these observations remains unknown. Since event selection in many studies relies on multiplicity-based estimators known to introduce selection biases, alternative approaches must be explored to elucidate the origin of these phenomena.

This talk presents a comparison between event classifiers used in LHC experiments, aiming to assess their mutual compatibility. Results for pp collisions at $\sqrt{s} = 13$ TeV simulated with PYTHIA 8 indicate the presence of biases introduced by classifiers, which can obscure any evidence of the formation of QGP in small systems. However, these biases are significantly reduced or absent in events triggered with flattenicity. This finding motivates the application of flattenicity in di-jet acoplanarity analysis used to search for jet quenching effects. While the multiplicity-based estimators produce an azimuthal broadening in high-multiplicity compared to minimum-bias pp collisions, even in PYTHIA 8 that does not incorporate jet quenching, the results as a function of flattenicity are fully consistent with minimum-bias pp collisions, suggesting that this novel tool could be exploited by experiments at the LHC to refine the jet quenching searches in small systems.

Summary

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