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Measurements of groomed heavy-flavour jet substructure with ALICE

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Recently, a variety of jet shape and substructure measurements in pp and Pb-Pb collisions have provided new insights into the processes of jet fragmentation and the mechanisms of jet interaction with the quark-gluon plasma. Grooming techniques, such as Soft Drop, allow us to access the hard splittings inside a jet by removing soft radiation emitted at large angles. These techniques provide a cleaner handle with which to explore the mechanisms of parton fragmentation both in the vacuum and in the presence of a hot QCD medium.

Thanks to the excellent tracking and particle identification of its detector, the ALICE collaboration is now capable of extending the study of jet substructure to the heavy-flavour sector by studying charm-tagged jets. Such measurements allow for the exploration of the mechanisms of parton fragmentation using a quark-enriched jet sample down to very low jet momenta and can therefore be used to identify differences between quark and gluon fragmentation as well as provide a reference for studying the flavour dependence of quark energy loss in Pb-Pb collisions.

In this talk, we show the first measurements of the groomed jet substructure variables, z_g and R_g , using the Soft Drop algorithm for charged jets tagged by fully reconstructed D^0 mesons. Having access to the jet splittings involving fully reconstructed D^0 mesons also allows for the first direct measurement of the dead cone effect at colliders, by comparing the Lund plane of charm-tagged jets to that of inclusive jets. These results will be presented for pp collisions at $\sqrt{s} = 13$ TeV and the prospects for similar measurements in Pb-Pb collisions will also be discussed.

Collaboration (if applicable)

ALICE

Track

Jets and High Momentum Hadrons

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