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Elucidating QCD using charm-tagged jet substructure with ALICE

The properties of partonic fragmentation in QCD depend on the flavors of the partons involved in the $1 \rightarrow 2$ splitting processes that drive parton showers. These dependencies arise from the differences in the Casimir factors of quarks and gluons, as well as the mass of heavy quarks. To explore these flavor dependencies, we use heavy-flavor jets as an experimental tool, particularly at low and intermediate transverse momenta where mass effects are significant. In this talk, we present the recent results of charm-tagged jets (reconstructed D^0 -meson) by ALICE at the LHC. These results include the first direct measurement of the dead-cone effect at colliders, using the comparison of Lund planes of charm-tagged jets and inclusive jets and the first measurement of the jet angularity which can be tuned in their sensitivity to mass and Casimir effects. Additionally, the groomed momentum fraction and opening angle of the first splitting are reported, which link to fundamental ingredients of the splitting functions. Comparisons to flavour-untagged jet sample will probe both the flavour dependences due of the mass of the charm quark, as well as the high purity quark nature of the D^0 -tagged jet sample. Further comparisons to different MC generators will access the role of these flavour dependencies in different parton shower prescriptions.

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