

# Characterizing the charm-quark showering and hadronization via charm-jet studies with ALICE

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The properties of parton shower in QCD depend on the flavor of the parton involved in the  $1 \rightarrow 2$  splitting processes that drive the showers. In particular, they are sensitive to the different Casimir factors of quarks and gluons, as well as to parton mass effects. To explore these dependencies, we use heavy-flavor jets as an experimental tool, with a particular focus on the low transverse momentum region, where mass effects are significant.

The ALICE detector has excellent tracking and particle identification performance, enabling the tagging of jets with fully reconstructed heavy-flavor hadrons. These capabilities are essential for jet substructure studies as they allow us to identify and trace a specific quark flavor through the splitting tree.

I will present the recent results of charm-tagged jets, reconstructed from  $D^0$ -mesons or  $\Lambda_c$ -baryons, and their substructure, obtained by ALICE at the LHC. These results include the first direct measurement of the dead-cone effect at colliders, measured exploiting iterative declustering techniques, the radial distribution of  $D^0$ -mesons with respect to the jet axis, and the first measurement of the jet angularity, an observable that can be tuned to be sensitive to mass and Casimir effects. Additionally, I will show the groomed shared momentum fraction of the first perturbative parton splitting, as well as the opening angle of the first perturbative emission of the charm quark, measured from  $D^0$ -tagged jets. These jet substructure observables are linked to fundamental ingredients of the splitting functions. Comparisons to an inclusive jet sample will probe the parton-shower flavor dependencies related to the large mass of the charm quark, as well as the high-purity quark nature of the charm-tagged jet sample. Furthermore, I will present comparisons of results between charm-tagged meson and charm-tagged baryon jets, shedding light on the processes of charm hadronization.

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