

## Exploring QCD dynamics with charm-tagged jet substructure studies with ALICE

*Wednesday 8 January 2025 14:00 (30 minutes)*

Jet substructure provides precise tests of Quantum Chromodynamics (QCD) and offers a distinct way to study hadronization mechanisms, compared to measurements of hadrons alone. QCD predicts that jet radiation patterns depend on the mass and color charge of the initiating parton. Parton showers, in particular, are sensitive to the Casimir factors of quarks and gluons, as well as the parton mass, leading to the dead-cone effect.

This talk presents the recent substructure results of charm-tagged jets, tagged by the presence of a fully reconstructed D0-mesons, obtained by ALICE at the LHC. These results include the first direct measurement of the dead-cone effect, measured by exploiting iterative declustering techniques, the radial distribution of D0-mesons with respect to the jet axis, and the first measurement of the charm-tagged jet angularity, an observable that can be tuned to be sensitive to mass and Casimir effects. Additionally, I will present the first measurement of charm-tagged jet energy-energy correlators (EECs), defined as the energy-weighted cross section of particle pairs within jets. Comparisons to inclusive jets (gluon-dominated) and various MC event generators reveal sensitivity to both flavor-dependent effects in the parton shower and hadronization mechanisms. Moreover, comparisons with next-to-leading order calculations emphasize the need for improved theoretical modeling of heavy-quark jets and provide critical insights into the parton-to-hadron transition in QCD.

**Author:** DHANKHER, Preeti (University of California Berkeley (US))

**Presenter:** DHANKHER, Preeti (University of California Berkeley (US))

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