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Testing the flavour dependence of QCD parton showers using heavy-flavour jet substructure with ALICE

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The parton-flavour-dependent properties of the $1 \rightarrow 2$ splitting processes underpinning parton showers can be uniquely explored using heavy-flavour jets. In this talk, we report a series of charm-tagged jet substructure measurements, using jets tagged with a reconstructed D^0 meson. Using the newly collected Run 3 data, these measurements span a large range of jet transverse momenta, allowing us to systematically probe the contribution of mass effects at low jet transverse momenta where the dead-cone angle of the charm quark is significant as well as the contribution of Casimir colour factor effects at high transverse momenta as the charm-tagged jet sample is quark-enriched. These include measurements of the shared momentum fraction and opening angle of the first splitting in Soft-Drop-groomed jets, which are closely linked to fundamental ingredients of the splitting functions, as well as the number of perturbative splittings across the charm-quark shower. We also report the differences between the jet axes returned by different recombination and grooming schemes, which can be used to constrain the impact of perturbative and non-perturbative contributions to the shower properties. Lastly, we report N-subjettiness observables, specifically the ratio of 2-subjettiness to 1-subjettiness, which can be used to constrain the contribution of gluon splittings to charm quarks at different jet transverse momenta.

Category

Experiment

Collaboration

ALICE

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