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Jet fragmentation and substructure correlations in pp and Pb–Pb at $\sqrt{s_{\text{NN}}} = 5.02$ TeV with ALICE

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Jet substructure observables are an effective probe of the QCD matter created in heavy ion collisions, studying various jet and medium interaction scales. Measurements of these observables have been typically limited to single dimensions, leaving unanswered questions about the interplay of momentum and angular components in the evolution of jets. Here we present two new multi-dimensional jet substructure measurements from the ALICE collaboration. The first is a measurement of Soft Drop groomed jets, reporting the first fully corrected correlation between z_g and R_g in pp and Pb–Pb collisions. The measurement is compared to a selection of models to explore the role of various jet quenching mechanisms and selection biases due to energy loss. We also report a differential measurement of jet fragmentation in small systems, specifically examining the transverse momentum (j_T) distributions of jet constituents for several z ranges in pp collisions. By comparing these z -dependent j_T distributions with theoretical predictions, we test our current understanding of jet fragmentation and hadronisation processes, exploring parton shower and hadronisation effects in vacuum and their possible modifications in small systems. These studies provide a comprehensive view of both the medium-induced modification of the jets and the jet evolution process and highlight the importance of multi-dimensional analyses in understanding QCD.

Category

Experiment

Collaboration

ALICE

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