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Detection of jet shower width and survival bias effect with photon-tagged jet girth and groomed jet radius in pp and PbPb at 5.02 TeV with CMS

Monday 23 September 2024 17:30 (20 minutes)

This talk presents the first measurements of the groomed jet radius R_g and the jet girth g in events with an isolated photon recoiling against a jet in PbPb and pp collisions at the LHC at 5.02 TeV. The observables R_g and g provide a quantitative measure of how narrow or broad a jet is. Events are required to have a photon with transverse momentum $p_T^\gamma > 100$ GeV and at least one jet back-to-back in azimuth with respect to the photon and with transverse momentum p_T^{jet} such that $p_T^{jet}/p_T^\gamma > 0.4$. The measured R_g and g distributions are unfolded to the particle level, which facilitates the comparison between the PbPb and pp results and with theoretical predictions. It is found that jets with $p_T^{jet}/p_T^\gamma > 0.8$, i.e. those that closely balance the photon p_T^γ , are narrower in PbPb than in pp collisions. Relaxing the selection to include jets with $p_T^{jet}/p_T^\gamma > 0.4$ reduces the narrowing of the angular structure of jets in PbPb relative to the pp reference. This demonstrates that selection bias effects associated with jet energy loss play an important role in the interpretation of jet substructure measurements.

Category

Experiment

Collaboration

CMS

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