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Electroweak boson-tagged jet event asymmetries at the Large Hadron Collider

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Tagged jet measurements provide a promising experimental channel to quantify the similarities and differences in the mechanisms of jet production in proton-proton and nucleus-nucleus collisions. We present the first calculation of the transverse momentum asymmetry of Z^0/γ^* -tagged jet events in $\sqrt{s} = 2.76$ TeV reactions at the LHC. Our results combine the $\mathcal{O}(G_F\alpha_s^2)$ perturbative cross sections with the radiative and collisional processes that modify parton showers in the presence of dense QCD matter. We find that a strong asymmetry is generated in central lead-lead reactions that has little sensitivity to the fluctuations of the underlying soft hadronic background. We present theoretical model predictions for its shape and magnitude. We also demonstrate the connection of our results to photon-tagged jet events and inclusive electroweak boson production.

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