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Probing the Dead Cone Effect in b-Jet Substructure Using the Lund Jet Plane and Graph Neural Network Track Origin Tagging in ttbar Events with the ATLAS Detector

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This study measures the Lund jet plane and the dead cone effect in b-jets from single-leptonic and di-leptonic $t\bar{t}$ events. Using the Cambridge/Aachen algorithm for jet reclustering, we look for suppressed emissions at small angles indicative of the dead cone effect. We employ a novel graph neural network based jet flavour tagger (GN2) that labels over 80% of b-hadron decay tracks via its auxiliary task output. This enhances jet reclustering and sensitivity in the dead cone region. Track p_T fragmentation analysis validates these findings in momentum space. Ongoing work focuses on refining unfolding procedures and evaluating systematic uncertainties to ensure robust conclusions.

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