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Jet substructure at the LHC and EIC

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We study the angle between i) the standard jet axis, ii) the axis of a jet which has been groomed using soft drop, with reduced sensitivity to soft radiation, iii) the jet axis obtained with the winner-take-all recombination scheme, which is insensitive to soft radiation at leading power. We calculate the distributions for these angles at next-to-leading logarithmic accuracy, including non-global logarithms. The angle between the standard and groomed jet axis directly probes soft wide-angle radiation, leading to a novel factorization formula. This angle is also very sensitive to nonperturbative physics, which is directly connected to nonperturbative contribution to the rapidity anomalous dimension for transverse momentum distributions. Comparing our predictions to Pythia we find good agreement, and we foresee applications to jet substructure in proton-proton and heavy ion collisions. In addition, the new observables are ideally suited for low energy jets at the future Electron-Ion Collider as hadronization corrections are well understood.

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