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Planar Property and Long-range Azimuthal Correlation in Electron-positron Annihilation

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The □+□– annihilation of unpolarized beams is free from initial hadron states or initial anisotropy around the azimuthal angle, hence ideal for studying the correlations of dynamical origin via final state jets. We investigate the planar properties of the multi-jet events employing the relevant event-shape observables at next-to-next-to-leading order (O(□3□)) in perturbative QCD; particularly, the azimuthal angle correlations on the long pseudo-rapidity (polar angle) range (Ridge correlation) between the inclusive jet momenta are calculated. We illustrate the significant planar properties and the strong correlations which are natural results of the energy-momentum conservation of the perturbative QCD radiation dynamics. Our study provides benchmarks of hard strong interaction background for the investigations on the collective and/or thermal effects via the Ridge-like correlation observables for complex scattering processes.

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