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Time-reversal Odd Side of a Jet

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We re-examine the jet probes of the nucleon spin and flavor structures. We find for the first time that the time-reversal odd (T-odd) component of a jet, conventionally thought to vanish, can survive due to the non-perturbative fragmentation and hadronization effects. This additional contribution of a jet will lead to novel jet phenomena relevant for unlocking the access to several spin structures of the nucleon, which were thought to be impossible by using jets. As examples, we show how the T-odd constituent can couple to the proton transversity at the Electron Ion Collider (EIC) and can give rise to the anisotropy in the jet production in e^+e^- annihilations. We expect the T-odd contribution of the jet to have broad applications in high energy nuclear physics.

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