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Partons Transverse Momentum and Orbital Angular Momentum Distributions ABHA RAJAN, University of Virginia, AURORE COURTOY, Centro de Investigacion y de Estudios Avanzados del IPN, MICHAEL ENGELHARDT, New Mexico State University, SIMONETTA LIUTI, University of Virginia — We discuss the two definitions of partonic orbital angular momentum given by Ji and by Jaffe and Manohar, respectively. While the former connects to the twist two Generalised Transverse Momentum Distribution F_{14} , the latter has been shown to connect to the twist three Generalised Parton Distribution G_2 . We demonstrate that the two definitions are in fact related and differ essentially in their gauge link structure. Starting from nonlocal, k_T unintegrated, off-forward matrix elements, instead of the standard Operator Product Expansion, we show how G_2 can be written as the sum of twist two, quark mass, and interaction dependent (twist three) terms, thus emphasizing the role of quark intrinsic transverse momentum and off-shellness. The twist two term in particular is given by the k_T^2 moment of F_{14} . We therefore uncover a relation/sum rule connecting the two definitions of orbital angular momentum, F_{14} and G_2 . We explore both the spin and the intrinsic transverse momentum/transverse space correlations as well as the gauge link structure behind the two decomposition frameworks, which are necessary to extract orbital angular momentum from experiment.

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