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Partons Transverse Momentum and Orbital Angular Momentum Distributions SIMONETTA LIUTI, ABHA RAJAN, University of Virginia, AURORE COURTOY, Instituto de Física, Universidad Nacional Autónoma de México, MICHAEL ENGELHARDT, New Mexico State University — We discuss the two definitions of partonic orbital angular momentum given by Ji and by Jaffe and Manohar, respectively. It is by now established that the two definitions are described by the same generalized transverse momentum distribution, F_{14} , while they differ through their gauge link structure. They can also be both described in terms of a twist three generalized parton distribution, G_2 which can be measured in DVCS type experiments. Here, starting from nonlocal, k_T unintegrated, off-forward matrix elements, instead of the standard OPE, 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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