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Quark-gluon correlations in the twist-3 TMD $e(x, \mathbf{k}_\perp)$ using light-front wave functions.

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Higher-twist transverse-momentum dependent parton distributions (TMDs) go beyond the parton model description of a proton as they describe correlations between quarks and gluons. Higher-twist TMDs, however, turn out to be very elusive objects, as they are difficult to extract from experimental data. Twist-3 distributions can be decomposed as a sum of different contributions. In general, these contributions are separated into two different types: lower-twist (i.e. twist-2) contributions and pure twist-3 contributions. Most of the phenomenological parametrizations and models rely on the so called Wandzura-Wilczeck (WW) approximation, that set to zero the pure twist-3 contributions.
The WW approximation, however, remove the richness of the twist-3 distributions. I will show how the quark-gluon correlations (pure twist-3 contributions) entering the chiral-odd distribution $e(x, \mathbf{k}_\perp)$ can be calculated by using the formalism of light-front wave functions (LFWFs).
The parametrization of the LFWFs is chosen by the comparison with the distribution amplitudes of the proton. The parameters of the LFWFs are fitted on the MMHT2014 parametrization for the valence-quark and gluon contributions to the unpolarized parton distribution $f_1(x)$. With these fit parameters, I will show predictions of the pure twist-3 part of $e(x, \mathbf{k}_\perp)$, and I will compare the results for $e(x)$ to a recent extraction, obtained from the analysis of preliminary data of the beam asymmetry for di-hadron semi-inclusive deep inelastic scattering at CLAS 6 GeV.

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