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Twist-3 TMD factorization using Gaussian ansatz in the LFQDM.

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Transverse momentum-dependent parton distributions (TMDs) factorization is a peculiar theoretical framework in QCD which aids in understanding the high-energy scattering processes. Techniques such as collinear factorization, Qiu-Sterman, soft-collinear effective theory, lattice QCD and Gaussian approximation have been employed for factorization in bag model, light-front constituent quark model, spectator model and in basis light-front quantization approach. We have achieved the twist-3 TMD factorization using Gaussian ansatz in the light-front quark-diquark model. Specifically, we have utilized our results of the twist-3 T-even TMDs to obtain parton distribution functions along with the average square transverse momentum at the model scale. We have numerically compared the TMD results with a Gaussian ansatz and found that they are in good agreement. With few exceptions, we have found that even though the $x - p_\perp^2$ factorization is not explicit, the numerically generated TMDs from Gaussian ansatz show close agreement with the exact results.

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