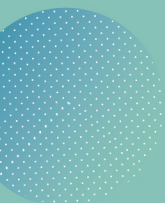




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Transverse momentum moments

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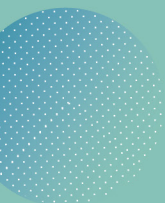
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Abstract

In this paper, we establish robust relations between Transverse Momentum Dependent distributions (TMDs) and collinear distributions. We define weighted integrals of TMDs that we call Transverse Momentum Moments (TMMs) and prove that TMMs are equal to collinear distributions evaluated in some minimal subtraction scheme. The conversion to the $\overline{\text{MS}}$ -scheme can be done by a calculable factor, which we derive up to three loops for some cases via calculable scheme-coefficients and we derive expressions for them up to three loops.

We prove that TMMs obey the same evolution equations as the corresponding collinear quantities.

We discuss in detail the zeroth, the first, and the second TMMs and provide phenomenological results for them based on the current extractions of TMDs. The results of this paper open new avenues for theoretical and phenomenological investigation of the three-dimensional and collinear hadron structures.

