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T-odd Leading-Twist Quark TMDs at Small x: Sub-Eikonal Evolution of the Sivers Function

Tuesday, 28 March 2023 17:30 (20 minutes)

We study the small-x asymptotics of the flavor non-singlet T-odd leading-twist quark transverse momentum dependent parton distributions (TMDs). While the leading eikonal small-x asymptotics of the quark Sivers function is given by the spin-dependent odderon, we are interested in revisiting the sub-eikonal correction considered by us earlier. We first simplify the expression for the TMD at small Bjorken x and then construct small-x evolution equations for the resulting operators in the large-N_c limit, with N_c the number of quark colors. The evolution equations resum all powers of the double-logarithmic parameter $\alpha_s \, \ln^2(1/x)$, where α_s is the strong coupling constant, which is assumed to be small. Solving these evolution equations numerically, we arrive at the following leading small-x asymptotics at large N_c:

\begin{align}
f_{1 \: T}^{\perp \: NS} (x \ll 1 ,k_T^2) & = C_O (x, k_T^2) \, \frac{1}{x} + C_1 (x, k_T^2) \, \left(\frac{1}{x} \right)^{3.4 \, \sqrt{\frac{\alpha_s \, N_c}{4 \pi}}} , \notag
\end{align}

The functions $C_O(x, k_T^2)$ and $C_1(x, k_T^2)$ can be readily obtained in our formalism: they are mildly x-dependent and do not strongly affect the

power-of-x asymptotics shown above. The function C_O, along with the $1/x$ factor, arises from the odderon exchange. For the sub-eikonal contribution to the quark Sivers function (the term with C_1), our result shown above supersedes the one obtained in our previous work due to the new contributions identified recently.

Submitted on behalf of a Collaboration?

No

Participate in poster competition?

No

Primary authors: SANTIAGO, M Gabriel (Center for Nuclear Femtography);   Prof. KOVCHEGOV, Yuri

Presenter: SANTIAGO, M Gabriel (Center for Nuclear Femtography)

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