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Erratum: Definition and evolution of transverse momentum dependent distribution of twist-three

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It has come to our attention that the original paper [1] contains several misprints.

- The definition (4.6) is given with the opposite sing of λ. It should read

$$s^\mu = \lambda \frac{p^+ \bar{n}^\mu - p^- n^\mu}{M} + s_T^\mu \,.$$

- In the sentence before (5.10) the formula has an incorrect sign. The correct form is

$$R = \exp(+2\mathcal{D} \ln \delta + B) \,.$$

  Consequently, the sing of $\partial_\mu \mathcal{D}$ in the formulas (5.10), (5.12) must be turned to the opposite. For example, the first equation in (5.10) become

$$\widetilde{\Phi}^{(0)[\Gamma](r4)}_{\mu,21}(z_1, z_2, b) = -\ln\left(\frac{\delta^+}{q^+}\right) \partial_\mu \mathcal{D}(b) \widetilde{\Phi}^{[\Gamma]}_{11}(z_1, z_2, b) + \text{fin.terms} \,. \tag{1}$$

- The right-hand-sides of formulas (5.15), (5.18), (5.19), and (5.20) should be multiplied by a factor $(-i)$. For example, the first equation in (5.15) become

$$[\mathcal{R}_{21} \otimes \widetilde{\Phi}_{11}]^{[\Gamma]}_\mu(z_1, z_2, z_3, b) = -i\partial_\mu \mathcal{D}(b) \int_0^1 d\alpha \frac{\partial}{\partial z_1} \Phi^{[\Gamma]}_{11}(z_1, z^\alpha_{23}, b) + \mathcal{O}(a_s^2) \,. \tag{2}$$

These modifications do not alter the conclusions of the original publication.

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Finally, we would like to mention that the definition of zeroth moments of transverse momentum distributions in the list (6.11)–(6.26) also incorporates the distributions with opposite parity. The latter appears due to the finite pure imaginary contribution of the integral at $x_2 = 0$. The zeroth moment of a distribution must be understood as

$$\mathbf{F}^{(0)}_{\oplus}(x, b; \mu, \zeta) = \int_{-1}^{1} \frac{dx_2}{(x_2)_+} \mathbf{F}_{\oplus}(-x - x_2, x_2, x, b; \mu, \zeta) + s\pi \mathbf{F}_{\ominus}(-x, 0, x, b; \mu, \zeta)\,, \tag{3}$$

$$\mathbf{F}^{(0)}_{\ominus}(x, b; \mu, \zeta) = \int_{-1}^{1} \frac{dx_2}{(x_2)_+} \mathbf{F}_{\ominus}(-x - x_2, x_2, x, b; \mu, \zeta) - s\pi \mathbf{F}_{\oplus}(-x, 0, x, b; \mu, \zeta)\,, \tag{4}$$

where $\mathbf{F}$ is any distribution of twist-three, and "plus" prescription is defined with the subtraction at zero. The explicit decomposition for the zeroth moment (3), (4) was not plainly given in the original text, but implicitly incorporated in eq. (5.1) with the $+is0$ prescription. Using either forms for the zeroth moment does not affect the conclusions and the relations derived in section 6.

References

[1] S. Rodini and A. Vladimirov, *Definition and evolution of transverse momentum dependent distribution of twist-three*, *JHEP* **08** (2022) 031 [arXiv:2204.03856] [INSPIRE].

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