Erratum: Collinear factorization in wide-angle hadron pair production in e^+e^- annihilation [Phys. Rev. D 100, 094014 (2019)]

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In our original publication, we presented analytical expressions for the short distance partonic cross sections for dihadron production in e^+e^- reaction in collinear factorization relevant for the large transverse momentum region of the exchange photon in the frame where the detected hadrons are back-to-back. After a new examination of the results, we found a mistake arising from the hadronic tensor decomposition. The full hadronic tensor is (e.g., [1])

$$W^{\mu\nu}(q,p_A,p_B) = \left(-g^{\mu\nu} + \frac{q^\mu q^\nu}{Q^2} - Z^\mu Z^\nu\right)W_T + Z^\mu Z^\nu W_L - (X^\mu Z^\nu + Z^\mu X^\nu)W_\Delta + \left(-g^{\mu\nu} + \frac{q^\mu q^\nu}{Q^2} - 2X^\mu X^\nu - Z^\mu Z^\nu\right)W_{\Delta\Delta}. \tag{1}$$

In deriving the projection tensors, the paper dropped the contributions from W_Δ and $W_{\Delta\Delta}$, which gives incorrect results. After implementing the necessary corrections, we have found that numerically the corrections are at most 3–4% at the very large q_{T} and vanishes at small q_{T}. Therefore, the phenomenological conclusions and the associated discussion in our manuscript are not significantly impacted by the mistake.

The relevant corrections are as follows:

(i) Equation (12): This expression needs to be replaced by the above expression Eq. (1)

(ii) In Eq. (14) the projector $P_T^{\mu\nu}$ is now given by

$$P_T^{\mu\nu} = -\frac{1}{2}(g^{\mu\nu} + Z^\mu Z^\nu) \tag{2}$$

(iii) Equation (B2a) reads

$$\frac{\mathrm{d}\hat{\sigma}_{q\bar{q}}}{\mathrm{d}\hat{z}_A \mathrm{d}\hat{z}_B \mathrm{d}q_{\mathrm{T}}} = \frac{\mathrm{d}\hat{\sigma}_{\bar{q}q}}{\mathrm{d}\hat{z}_A \mathrm{d}\hat{z}_B \mathrm{d}q_{\mathrm{T}}} = F\frac{32(Q^2+q_{\mathrm{T}}^2)^2(\hat{z}_A^2+\hat{z}_B^2)}{(Q^2\hat{z}_A - Q^2 + \hat{z}_A q_{\mathrm{T}}^2)(Q^2\hat{z}_B - Q^2 + \hat{z}_B q_{\mathrm{T}}^2)} \tag{3}$$

(iv) Equation (B2b) reads

$$\begin{aligned}\frac{\mathrm{d}\hat{\sigma}_{qg}}{\mathrm{d}\hat{z}_A \mathrm{d}\hat{z}_B \mathrm{d}q_{\mathrm{T}}} &= \frac{\mathrm{d}\hat{\sigma}_{\bar{q}g}}{\mathrm{d}\hat{z}_A \mathrm{d}\hat{z}_B \mathrm{d}q_{\mathrm{T}}} \\ &= F(-64Q^4\hat{z}_A^2 - 64Q^4\hat{z}_A\hat{z}_B + 128Q^4\hat{z}_A - 32Q^4\hat{z}_B^2 + 128Q^4\hat{z}_B - 128Q^4 - 32q_{\mathrm{T}}^4(2\hat{z}_A^2 + 2\hat{z}_A\hat{z}_B + \hat{z}_B^2) \\ &\quad - 32q_{\mathrm{T}}^2(4Q^2\hat{z}_A^2 + 4Q^2\hat{z}_A\hat{z}_B - 4Q^2\hat{z}_A + 2Q^2\hat{z}_B^2 - 4Q^2\hat{z}_B)/(Q^2(\hat{z}_A - 1) + \hat{z}_A q_{\mathrm{T}}^2)((Q^2+q_{\mathrm{T}}^2)(\hat{z}_A + \hat{z}_B) - Q^2)\end{aligned} \tag{4}$$

(v) Equation (B2c) reads

$$\frac{\mathrm{d}\hat{\sigma}_{g\bar{q}}}{\mathrm{d}\hat{z}_A \mathrm{d}\hat{z}_B \mathrm{d}q_\mathrm{T}} = \frac{\mathrm{d}\hat{\sigma}_{gq}}{\mathrm{d}\hat{z}_A \mathrm{d}\hat{z}_B \mathrm{d}q_\mathrm{T}}$$
$$= F(-32Q^4\hat{z}_A^2 - 64Q^4\hat{z}_A\hat{z}_B + 128Q^4\hat{z}_A - 64Q^4\hat{z}_B^2 + 128Q^4\hat{z}_B - 128Q^4$$
$$- 32q_\mathrm{T}^4(\hat{z}_A^2 + 2\hat{z}_A\hat{z}_B + 2\hat{z}_B^2) - 32q_\mathrm{T}^2(2Q^2\hat{z}_A^2 + 4Q^2\hat{z}_A\hat{z}_B - 4Q^2\hat{z}_A + 4Q^2\hat{z}_B^2 - 4Q^2\hat{z}_B))/$$
$$(Q^2(\hat{z}_B - 1) + \hat{z}_B q_\mathrm{T}^2)((Q^2 + q_\mathrm{T}^2)(\hat{z}_A + \hat{z}_B) - Q^2) \tag{5}$$

where

$$F = \delta_+(k_C^2)\frac{\alpha_\mathrm{em}^2 e_q^2 \alpha_s \hat{z}_A \hat{z}_B q_\mathrm{T}(Q^2 + q_\mathrm{T}^2)^2}{6Q^6} \tag{6}$$

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[1] J. C. Collins, *Foundations of Perturbative QCD* (Cambridge University Press, Cambridge, England, 2011).