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Erratum

The complete tree-level result up to order $1/Q$ for polarized deep-inelastic leptoproduction [Nucl. Phys. B 461 (1996) 197]

P.J. Mulders, R.D. Tangerman

The result given for $\Delta^{[\gamma^i]}$ in Eq. (60) is incomplete. The full result is

$$\Delta^{[\gamma^i]}(z,\boldsymbol{k}'_T) = \frac{k_T^i}{P_h^-} D^\perp(z,\boldsymbol{k}_T'^2) + \frac{\lambda_h \epsilon_T^{ij} k_{Tj}}{P_h^-} D_L^\perp(z,\boldsymbol{k}_T'^2) + \frac{M_h \epsilon_T^{ij} S_{hTj}}{P_h^-} D_T(z,\boldsymbol{k}_T'^2). \tag{1}$$

The function D_T is non-vanishing upon integration over $\boldsymbol{k}_T$. The functions $D_L^\perp$ and D_T also appear in one of the relations that are a consequence of the equations of motion; to be precise Eq. (69) becomes

$$\begin{aligned} g_T^{\alpha\beta} \Delta_{D\beta}^{[\gamma^-]} + i\epsilon_T^{\alpha\beta} \Delta_{D\beta}^{[\gamma^-\gamma_5]} = k_T^\alpha &\left(\frac{D^\perp}{z} + i\,\frac{m}{M_h}\,H_1^\perp\right) \\ &+ i\epsilon_T^{\alpha\beta} k_{T\beta} \left(\frac{G_s^\perp}{z} - \frac{m}{M_h}\,H_{1s}^\perp - i\,\lambda_h\,\frac{D_L^\perp}{z}\right) \\ &+ i\epsilon_T^{\alpha\beta} S_{hT\beta} \left(\frac{M_h}{z}\,G'_T - m\,H_{1T} - i\,M_h\,\frac{D_T}{z}\right). \end{aligned} \tag{2}$$

The corresponding functions for antiquarks are

$$\overline{D}_T(z,\boldsymbol{k}_T'^2) = D_T(-z,\boldsymbol{k}_T'^2) \quad \text{and} \quad \overline{D}_L^\perp(z,\boldsymbol{k}_T'^2) = -D_L^\perp(-z,\boldsymbol{k}_T'^2).$$

The hadronic tensor acquires additional terms, in both the symmetric part (Eq. (77)) and the antisymmetric part (Eq. (78)), respectively,

$$\begin{aligned} 2M\,\mathcal{W}_S^{\mu\nu} = \ldots + 2z \int d^2\boldsymbol{k}_T\, d^2\boldsymbol{p}_T\, \delta^2(\boldsymbol{p}_T + \boldsymbol{q}_T - \boldsymbol{k}_T) \\ \times \left[\frac{2M_h\,\hat{t}^{\{\mu}\epsilon_\perp^{\nu\}\rho}\,S_{h\perp\rho}}{Q}\, f_1 \frac{D_T}{z_h} + \frac{2\,\hat{t}^{\{\mu}\epsilon_\perp^{\nu\}\rho}k_{\perp\rho}}{Q}\,\lambda_h f_1 \frac{D_L^\perp}{z_h}\right], \end{aligned} \tag{3}$$

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$$2M\,\mathcal{W}_A^{\mu\nu} = \ldots + 2z \int d^2\boldsymbol{k}_T\, d^2\boldsymbol{p}_T\, \delta^2(\boldsymbol{p}_T + \boldsymbol{q}_T - \boldsymbol{k}_T) \times \left[-i\frac{2M_h\,\hat{t}^{[\mu}S_{h\perp}^{\nu]}}{Q}\, g_{1s}\frac{D_T}{z_h} - i\frac{2\,\hat{t}^{[\mu}k_\perp^{\nu]}}{Q}\,\lambda_h\, g_{1s}\frac{D_L^\perp}{z_h} \right]. \tag{4}$$

Performing the integration over $\boldsymbol{q}_T$, the hadronic tensor in Eq. (81) also acquires additional terms containing D_T. They are of the same form as already existing terms. To include them simply make the replacement $D_{1T}^{\perp(1)} \longrightarrow D_T/z_h + D_{1T}^{\perp(1)} = \tilde{D}_T/z_h$, and correspondingly the same replacement in the $1/Q$ terms in the expressions for $d\sigma_{OO}$ in Eq. (83), $d\sigma_{LL}$ in Eq. (87) and in the expression for $\mathcal{P}_{hy}\,N_h$ in Eq. (102).

The functions D_T and $D_L^\perp$ appear as a consequence of the non-applicability of time reversal invariance for fragmentation. They are 'interaction-dependent' functions. Eq. (C.24) in the appendix becomes

$$\begin{aligned} & g_T^{\alpha\beta}\,\Delta_{A\,\beta}^{[\gamma^-]} + i\epsilon_T^{\alpha\beta}\,\Delta_{A\,\beta}^{[\gamma^-\gamma_5]} \\ &= k_T^\alpha\left(\frac{\tilde{D}^\perp}{z} + i\,\frac{m}{M_h}\,\tilde{H}_1^\perp\right) - \frac{\left(k_T^\alpha k_T^i + \frac{1}{2}\,k_T^2\,g_T^{\alpha i}\right)\epsilon_{T\,ij}S_{hT}^j}{M_h}\,\tilde{D}_{1T}^\perp \\ &\quad + i\epsilon_T^{\alpha\beta}k_{T\beta}\left(\frac{\tilde{G}_s^\perp}{z} - i\,\lambda_h\,\frac{\tilde{D}_L^\perp}{z}\right) + i\epsilon_T^{\alpha\beta}S_{hT\,\beta}\left(\frac{M_h}{z}\,\tilde{G}_T' - i\,M_h\,\frac{\tilde{D}_T}{z}\right) \end{aligned} \tag{5}$$

and $D_T = \tilde{D}_T - z\,D_{1T}^{\perp(1)}$ and $D_L^\perp = \tilde{D}_L^\perp$.

The relation for G_T in Eq. (C.41) should read

$$\begin{aligned} G_T(z) &= -z\int_z^1 dy\,\frac{G_1(y)}{y^2} + \frac{m}{M_h}\left[zH_1(z) + z\int_z^1 dy\,\frac{H_1(y)}{y}\right] \\ &\quad + \left[\tilde{G}_T(z) + z\int_z^1 dy\,\frac{\tilde{G}_T(y)}{y^2}\right] \\ &= G_1(z) - z^3\,\frac{d}{dz}\left[\frac{G_{1T}^{(1)}(z)}{z}\right]. \end{aligned} \tag{6}$$

This does not lead to the sum rule in Eq. (C.43), which should be discarded. Similarly the relation for H_L in Eq. (C.42) should read

$$\begin{aligned} H_L(z) &= -2\int_z^1 dy\frac{H_1(y)}{y} + \frac{m}{M_h}\left[zG_1(z) + 2\int_z^1 dy\,G_1(y)\right] + \tilde{H}_L(z) + 2\int_z^1 dy\frac{\tilde{H}_L(y)}{y} \\ &= H_1(z) + z^3\frac{d}{dz}\left[\frac{H_{1L}^{\perp(1)}(z)}{z}\right]. \end{aligned} \tag{7}$$

This does not lead to the sum rule in Eq. (C.44), which should be discarded.

Finally, there exists the following useful relation between the fragmentation functions D_T and $D_{1T}^{\perp(1)}$:

$$\frac{D_T(z)}{z} = z^2 \frac{d}{dz} \left[\frac{D_{1T}^{\perp(1)}(z)}{z} \right]. \tag{8}$$

We are indebted to R. Jakob (NIKHEF), who pointed out the omission of the functions D_T and $D_L^{\perp}$.