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Erratum: All orders results for self-crossing Wilson loops mimicking double parton scattering

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1. Equations (D.14)–(D.17) were computed from an incorrect eq. (D.13), the correct equation is

$$\rho \equiv \frac{\mathcal{A}_6^{\rm NMHV}}{\mathcal{A}_6^{\rm BDS-like}} = \frac{1}{2(1+w^*)}\Big[E(u,v,w)+\tilde{E}(u,v,w)+E(w,u,v)-\tilde{E}(w,u,v)\Big] + \frac{w^*}{2(1+w^*)}\Big[E(v,w,u)+\tilde{E}(v,w,u)+E(w,u,v)-\tilde{E}(w,u,v)\Big]. \tag{D.13}$$

In the original version a complex conjugation and factor of 1/2 were missing. Equations (D.14)–(D.17) below are the corrected versions, based on the corrected (D.13) above. Also, in the original text, equations (D.14)–(D.17) were intended to be for $2\to 4$ kinematics with $v\to 0^+$. However, the $v\to 0^-$ limit of $3\to 3$ kinematics is simpler, having no double discontinuity. The corrected equations (D.14)–(D.17) below are analytically continued to $3\to 3$ kinematics by the method discussed in section 3.1 of the main text, and then the limit $v\to 0^-$ is taken:

$$\rho^{(1)} = -\frac{1}{2}\ln^2|v| + 2\zeta_2 + \pi i\left[\frac{1+w}{1+w^*}+1\right], \tag{D.14}$$

$$\rho^{(2)} = \frac{1}{8}\ln^4|v| - \frac{1}{2}\zeta_2\ln^2|v| + \pi i\left[\frac{1+w}{1+w^*}\left(-\frac{1}{2}\ln^2|\delta|+\ln|\delta|+\zeta_2-1\right) - \frac{1}{2}\ln^2|v| - \ln|v| - \zeta_3+\zeta_2-1\right], \tag{D.15}$$

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$$\begin{aligned}\rho^{(3)} &= -\frac{1}{48}\ln^6|v| - \frac{1}{4}\zeta_4\ln^2|v| + \frac{91}{12}\zeta_6 \\ &+ \pi i\Bigg[\frac{1+w}{1+w^*}\left(\frac{1}{8}\ln^4|\delta| - \frac{1}{2}\ln^3|\delta| + \frac{3}{2}\ln^2|\delta| - (\zeta_3+3)\ln|\delta| + \frac{1}{2}\zeta_4 + \zeta_3 + 3\right) \\ &\quad + \frac{1}{8}\ln^4|v| + \frac{1}{2}\ln^3|v| - \frac{1}{2}(\zeta_3-3)\ln^2|v| + (\zeta_3+3)\ln|v| \\ &\quad + 7\zeta_5 - 3\zeta_2\zeta_3 + \frac{1}{2}\zeta_4 + \zeta_3 + 3\Bigg], \end{aligned} \tag{D.16}$$

$$\begin{aligned}\rho^{(4)} &= \frac{1}{384}\ln^8|v| + \frac{1}{48}\zeta_2\ln^6|v| + \frac{7}{16}\zeta_4\ln^4|v| + \left(\frac{13}{48}\zeta_6 + \frac{1}{2}(\zeta_3)^2\right)\ln^2|v| - \frac{1325}{36}\zeta_8 - 2\zeta_2(\zeta_3)^2 \\ &+ \pi i\Bigg[\frac{1+w}{1+w^*}\Bigg(-\frac{1}{48}\ln^6|\delta| + \frac{1}{8}\ln^5|\delta| - \frac{1}{8}(\zeta_2+5)\ln^4|\delta| + \left(-\frac{1}{6}\zeta_3 + \frac{1}{2}\zeta_2 + \frac{5}{2}\right)\ln^3|\delta| \\ &\quad - \left(\frac{7}{4}\zeta_4 - \frac{1}{2}\zeta_3 + \frac{3}{2}\zeta_2 + \frac{15}{2}\right)\ln^2|\delta| + \left(4\zeta_5 - 3\zeta_2\zeta_3 + \frac{7}{2}\zeta_4 - \zeta_3 + 3\zeta_2 + 15\right)\ln|\delta| \\ &\quad - \frac{13}{24}\zeta_6 - 2(\zeta_3)^2 - 4\zeta_5 + 3\zeta_2\zeta_3 - \frac{7}{2}\zeta_4 + \zeta_3 - 3\zeta_2 - 15\Bigg) \\ &\quad - \frac{1}{48}\ln^6|v| - \frac{1}{8}\ln^5|v| + \left(\frac{3}{8}\zeta_3 - \frac{1}{8}\zeta_2 - \frac{5}{8}\right)\ln^4|v| + \left(\frac{1}{12}\zeta_3 - \frac{1}{2}\zeta_2 - \frac{5}{2}\right)\ln^3|v| \\ &\quad + \left(\frac{25}{8}\zeta_5 + 2\zeta_2\zeta_3 - \frac{7}{4}\zeta_4 + \frac{1}{4}\zeta_3 - \frac{3}{2}\zeta_2 - \frac{15}{2}\right)\ln^2|v| \\ &\quad + \left(-\frac{3}{2}(\zeta_3)^2 - 5\zeta_5 + \zeta_2\zeta_3 - \frac{7}{2}\zeta_4 + \frac{1}{2}\zeta_3 - 3\zeta_2 - 15\right)\ln|v| \\ &\quad - \frac{1381}{32}\zeta_7 + \frac{43}{2}\zeta_2\zeta_5 + 4\zeta_3\zeta_4 - \frac{13}{24}\zeta_6 - \frac{5}{2}(\zeta_3)^2 - 5\zeta_5 + \zeta_2\zeta_3 \\ &\quad - \frac{7}{2}\zeta_4 + \frac{1}{2}\zeta_3 - 3\zeta_2 - 15\Bigg]. \end{aligned} \tag{D.17}$$

2. The discussion immediately following equations (D.14)–(D.17) was based on the original, incorrect version of these equations. The main point originally read:

"We see that there are indeed logarithmically singular $\ln\delta$ terms in the imaginary part and in the double discontinuity $(2\pi i)^2$ term, beginning at two loops. However, there are no $\ln\delta$ terms in the part with the $(1+w^*)/(1+w)$ prefactor; that is, the terms depending on the azimuthal component of the vector $\vec{z}$ in eq. (2.22) are finite."

The correct version is:

"We see that there are indeed logarithmically singular $\ln|\delta|$ terms in the imaginary part beginning at two loops. However, the $\ln|\delta|$ terms appear only in the part with the $(1+w)/(1+w^*)$ prefactor; that is, the terms that are independent of the azimuthal component of the vector $\vec{z}$ in eq. (2.22) are finite."