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Erratum

Erratum to: Chiral perturbation theory for nucleon generalized parton distributions

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1 Erratum

The result for $E_n^{(2,\pi)}(t)$ in (50) contains mistakes in the terms that multiply the low-energy constants c_2 and c_3. The corrected version of this equation reads

$$
\begin{aligned}
E_n^{(2,\pi)}(t) &= \frac{3m^2 g_A^2}{(4\pi F)^2} \log\frac{m^2}{\mu^2} \sum_{\substack{j=0\\ \text{even}}}^{n-2} \tilde{a}_{n,n-j-2} \\
&\quad + \frac{6}{(4\pi F)^2} \sum_{\substack{j=0\\ \text{even}}}^{n-2} \tilde{a}_{n,n-j-2} \int_{-1}^{1} d\eta\, \eta^j (1-\eta^2) \\
&\quad \times \Bigg\{ \frac{g_A^2}{32}\left[2t\left(\log\frac{m^2(\eta)}{\mu^2}+1\right) - \frac{(t-2m^2)^2}{m^2(\eta)} \right] \\
&\quad + M\Bigg[\left(c_1 m^2 + \frac{1}{4}c_3\left(t-2m^2\right)\right)\left(\log\frac{m^2(\eta)}{\mu^2}+1\right) \\
&\quad - \frac{1}{4}c_2\, m^2(\eta)\, \log\frac{m^2(\eta)}{\mu^2} \Bigg]\Bigg\} \\
&= -\frac{3m^2 g_A^2}{2\,(4\pi F)^2} \log\frac{m^2}{\mu^2} \sum_{\substack{j=2\\ \text{even}}}^{n} 2^{-j}\, j\, A_{n,n-j}^{\pi\,(0)} \\
&\quad - \frac{6}{(4\pi F)^2} \sum_{\substack{j=2\\ \text{even}}}^{n} 2^{-j} A_{n,n-j}^{\pi\,(0)} \int_{-1}^{1} d\eta\, (1-\eta^j) \\
&\quad \times \Bigg\{ \frac{g_A^2}{32}\left[2t\left(\log\frac{m^2(\eta)}{\mu^2}+1\right) - \frac{(t-2m^2)^2}{m^2(\eta)} \right] \\
&\quad + M\Bigg[\left(c_1 m^2 + \frac{1}{4}c_3\left(t-2m^2\right)\right)\left(\log\frac{m^2(\eta)}{\mu^2}+1\right) \\
&\quad - \frac{1}{4}c_2\, m^2(\eta)\, \log\frac{m^2(\eta)}{\mu^2} \Bigg]\Bigg\},
\end{aligned}
$$

where the terms that have changed are marked in red. The corresponding corrections in equations (52) and (54) read

$$
\begin{aligned}
E_n^{(2,\pi)}(0) &= -\frac{3m^2 g_A^2}{2\,(4\pi F)^2} \log\frac{m^2}{\mu^2} \sum_{\substack{j=2\\ \text{even}}}^{n} 2^{-j}\, j\, A_{n,n-j}^{\pi\,(0)} \\
&\quad + \frac{12 m^2}{(4\pi F)^2} \Bigg\{ \frac{g_A^2}{8} - M\Bigg[\left(c_1 - \frac{1}{2}c_3\right)\left(\log\frac{m^2}{\mu^2}+1\right) \\
&\quad - \frac{1}{4}c_2\, \log\frac{m^2}{\mu^2} \Bigg]\Bigg\} \sum_{\substack{j=2\\ \text{even}}}^{n} 2^{-j} \frac{j}{j+1} A_{n,n-j}^{\pi\,(0)}
\end{aligned}
$$

and

$$
\begin{aligned}
\partial_t E_n^{(2,\pi)}(0) &= -\frac{3 g_A^2}{4\,(4\pi F)^2} \left[\log\frac{m^2}{\mu^2}+3\right] \sum_{\substack{j=2\\ \text{even}}}^{n} \frac{2^{-j}\, j}{j+1} A_{n,n-j}^{\pi\,(0)} \\
&\quad + \frac{2}{(4\pi F)^2} \sum_{\substack{j=2\\ \text{even}}}^{n} 2^{-j} \frac{j\,(j+4)}{(j+1)(j+3)} A_{n,n-j}^{\pi\,(0)} \Bigg\{ \frac{g_A^2}{8} \\
&\quad + M\Bigg[c_1 - \frac{1}{2}c_3 - \left(\frac{1}{4}c_2 + \frac{3(j+3)}{2(j+4)}\, c_3\right)\left(\log\frac{m^2}{\mu^2}+1\right)\Bigg]\Bigg\}
\end{aligned}
$$

respectively. With the parameter estimates $c_1 \approx -0.9\ \text{GeV}^{-1}$, $c_2 \approx 3.3\ \text{GeV}^{-1}$, $c_3 \approx -4.7\ \text{GeV}^{-1}$ given below (52), one obtains corrected numerical values

$$
E_2^{(1,\pi)}(0) + E_2^{(2,\pi)}(0) \approx (0.12 + 0.10)\, A_{2,0}^{\pi\,(0)},
$$

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$$\partial_t E_2^{(1,\pi)}(0) + \partial_t E_2^{(2,\pi)}(0) \approx -(2.5 + 3.4)\ \mathrm{GeV}^{-2}\ A_{2,0}^{\pi\,(0)}\,.$$

After the above corrections, we agree with the results obtained in [1]. We thank M. Polyakov for pointing us to the difference between the calculation in that paper and the published version of our work.

Reference

1. H. Alharazin, D. Djukanovic, J. Gegelia, M. Polyakov,. arXiv:2006.05890 [hep-ph]