Erratum

Massive spin-1 field chiral Lagrangian from an extended Nambu–Jona-Lasinio model of QCD

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We present here the corrected abnormal intrinsic parity couplings of vector and axial-vector mesons to pions and photons up to $\mathcal{O}(p^3)$ in the ENJL model as defined in [1]. As explained there, one needs to subtract a non-chirally covariant polynomial in external sources in order to obtain the anomalous chiral currents that couple to vectors and axial-vectors from the Wess-Zumino action in (4.1) of [1]. We found some errata in the procedure of subtracting some of these non-chirally covariant polynomials. In [2], it was presented a more compact way of subtracting these polynomials. We use it here. The corrected result for the abnormal intrinsic parity couplings in the ENJL model defined in [1] is

$$
\begin{aligned}
\theta_V &= \frac{N_c}{16\pi^2} \frac{\sqrt{2}}{24 f_V} \left(2(1 + g_A + g_A^2 + g_A^3) \right. \\
&\quad \left. + 3(1 - g_A)(1 + g_A)^2 \right), \\
h_V &= \frac{N_c}{16\pi^2} \frac{\sqrt{2}}{8 f_V} (1 + g_A), \quad \sigma_V = \frac{N_c}{16\pi^2} \frac{1 + 2g_A}{6 f_V^2}, \\
h_A &= \frac{N_c}{16\pi^2} \frac{\sqrt{2}}{24 f_A} g_A (1 + g_A), \quad \sigma_A = \frac{N_c}{16\pi^2} \frac{g_A^2}{6 f_A^2}, \\
H &= -\frac{N_c}{16\pi^2} \frac{g_A}{4 f_A f_V}, \\
Z^{(1)} &= \frac{N_c}{16\pi^2} \frac{g_A (1 - g_A)(4 + 3g_A)}{18 f_A f_V}, \\
Z^{(2)} &= -\frac{N_c}{16\pi^2} \frac{g_A (1 + g_A)^2}{12 f_A f_V}.
\end{aligned}
\tag{1}
$$

The usual Hidden Gauge Symmetry model defined in [3] implies the choice of a value for g_A. So that, HGS model results can differ from ENJL results if one uses another value for g_A. In fact, as we see below, it might be that the HGS model choices are incompatible with the ENJL results. For instance,

$$
\frac{h_V}{\sigma_V} = \frac{f_V}{\sqrt{2}}
\tag{2}
$$

is only true in the ENJL model for $g_A = 1$, and the ratio

$$
\frac{\theta_V}{h_V} = 2
\tag{3}
$$

which is no fulfilled for any value of g_A.

References

1. J. Prades, Z. Phys. C **63** (1994) 491
2. J. Bijnens, J. Prades, Phys. Lett. B **320** (1994) 130
3. M. Bando, T. Kugo, K. Yamawaki, Phys. Rep. **164** (1988) 217; T. Fujiwara, et al. Prog. Theor. Phys. **73** (1985) 926