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Erratum: Complete one-loop matching for a singlet scalar in the Standard Model EFT

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There are terms missing from the one-loop matching calculation of [1].

One, the expressions for c_H and $c_{H\Box}$ should be modified, such that (3.1), (3.2), and (A.19) respectively in [1] read

$$\begin{aligned}
 16\pi^2\delta c_H = & -\frac{\kappa^3}{12} + \frac{-48A^2\kappa\lambda + 36A^2\lambda^2 + 22A^2\kappa^2 - 2A^2\kappa\lambda_\phi - A\kappa^2\mu}{4M^2} \\
 & + \frac{39A^4\kappa - 3A^4\lambda_\phi + 36A^3\mu\lambda - 30A^3\kappa\mu + 2A^3\mu\lambda_\phi - 36A^4\lambda + 3A^2\mu^2\kappa}{6M^4} \\
 & + \frac{-8A^6 - 18A^5\mu + 12A^4\mu^2 - 2A^3\mu^3}{12M^6} + \left[\frac{36A^2\kappa\lambda - 36A^2\lambda^2 - 12A^2\kappa^2 + A^2\kappa\lambda_\phi}{4M^2} \right. \\
 & \left. + \frac{-18A^4\kappa - 36A^3\mu\lambda + 12A^3\kappa\mu - A^3\mu\lambda_\phi}{12M^4} + \frac{2A^5\mu}{4M^6} \right] \log \frac{M^2}{\mu^2}, \quad (1)
 \end{aligned}$$

$$\begin{aligned}
 16\pi^2\delta c_{H\Box} = & -\frac{\kappa^2}{24} + \frac{-27A^2\lambda + 34A^2\kappa - 6A^2\lambda_\phi - 5A\kappa\mu}{12M^2} + \frac{26A^4 - 32A^3\mu + 11A^2\mu^2}{24M^4} \\
 & + \left[\frac{A^2\lambda - 4A^2\kappa + A^2\lambda_\phi}{2M^2} + \frac{-2A^4}{2M^4} \right] \log \frac{M^2}{\mu^2}, \quad (2)
 \end{aligned}$$

$$\begin{aligned}
 16\pi^2 c_{H\Box} = & \frac{1}{72} \left(162\lambda - 93g^2 - 31g'^2 - 54\kappa + \frac{18A\mu}{M^2} + (90g^2 + 30g'^2 - 36\lambda) \log \frac{M^2}{\mu^2} \right) \frac{A^2}{M^2} \\
 & + 16\pi^2 (\delta c_{H\Box} + \delta c_{H\Box}|_{\text{shift}}). \quad (3)
 \end{aligned}$$

Cf. expressions (3.9) and (3.11) in [2] for the same calculation.

Two, an additional Warsaw basis operator

$$\mathcal{O}_{Hud} = (\tilde{H}^\dagger i D_\mu H)(\bar{u}\gamma^\mu d), \quad (4)$$

is generated at one-loop, and should be included in table 1 of [1]. Its Wilson coefficient

$$16\pi^2 c_{Hud} = \left(-\frac{5}{4} + \frac{1}{2} \log \frac{M^2}{\mu^2} \right) \frac{A^2}{M^2} y_u^\dagger y_d, \quad (5)$$

should be added to the list in appendix A of [1].

Acknowledgments

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