

Erratum: The light-fermion contribution to the exact Higgs-gluon form factor in QCD

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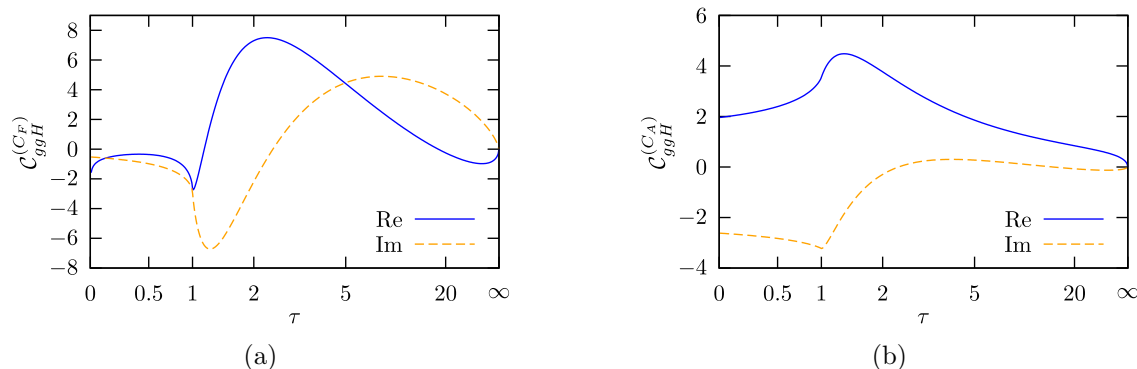


Figure 1. Contributions to $\tilde{C}_{ggH}^{(2)}$ separated by their color factors. The quark mass is renormalized in the on-shell scheme and the renormalization scale is set to $\mu^2 = M_H^2$.

As pointed out in ref. [1], the H_g -term of eq. (3.7b) in the original paper is missing a renormalization scale-dependent prefactor and should read

$$I_g^{(2)} = -\frac{1}{2}I_g^{(1)}(\epsilon) \left(I_g^{(1)}(\epsilon) + \frac{\beta_0}{\epsilon} \right) + \frac{e^{-\epsilon\gamma_E}\Gamma(1-2\epsilon)}{\Gamma(1-\epsilon)} \left(\frac{\beta_0}{\epsilon} + K \right) I_g^{(1)}(2\epsilon) + \left(-\frac{\mu^2}{M_H^2} \right)^{2\epsilon} \frac{e^{\epsilon\gamma_E}}{\Gamma(1-\epsilon)} \frac{H_g}{2\epsilon}. \tag{1}$$

This leads to additional contributions to eq. (3.9) of the original publication, which are proportional to $\ln(-\mu^2/M_H^2) = L_\mu + 2H_1 + H_0$. The corrected results read

$$\mathcal{C}_{ggH,\text{corr.}}^{(CF)} = \mathcal{C}_{ggH}^{(CF)} - \frac{1}{4} \ln \left(-\frac{\mu^2}{M_H^2} \right) \frac{C_{ggH}^{(0)}}{T_F}, \tag{2}$$

$$\mathcal{C}_{ggH,\text{corr.}}^{(CA)} = \mathcal{C}_{ggH}^{(CA)} + \left(\frac{\pi^2}{144} + \frac{29}{54} \right) \ln \left(-\frac{\mu^2}{M_H^2} \right) \frac{C_{ggH}^{(0)}}{T_F}, \tag{3}$$

$$\tilde{C}_{ggH,\text{corr.}}^{(2,2)} = \tilde{C}_{ggH}^{(2,2)} - \frac{5}{27} \ln \left(-\frac{\mu^2}{M_H^2} \right) T_F^2 C_{ggH}^{(0)}, \tag{4}$$

where $C_{ggH}^{(0)}$, $\mathcal{C}_{ggH}^{(CF)}$, $\mathcal{C}_{ggH}^{(CA)}$ and $\tilde{C}_{ggH}^{(2,2)}$ are given by eq. (3.5), eq. (B.4), eq. (B.5) and eq. (B.9) in the original paper, respectively. Corrected plots for figure 3 of the original publication are shown in figure 1 (Note that figure 4 remains unchanged due to the scale choice $\mu^2 = -M_H^2$). An updated version of the file `ggh-aah-nl.m` containing the results in electronic form is attached to this erratum as supplementary material.

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References

- [1] M.L. Czakon and M. Niggetiedt, *Exact quark-mass dependence of the Higgs-gluon form factor at three loops in QCD*, *JHEP* **05** (2020) 149 [[arXiv:2001.03008](#)] [[INSPIRE](#)].