



Title	Bare Higgs mass at Planck scale
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# Erratum: Bare Higgs mass at Planck scale [Phys. Rev. D **87**, 053009 (2013)]

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It has been pointed out [1] that the formula for the two-loop bare Higgs mass (15) in the previous version does not agree with the result in Ref. [2]. They obtained it from the residue at  $d = 3$  in the dimensional reduction using the background Feynman gauge, whereas we have computed Eq. (15) in the Landau gauge in four dimensions. The quantity under consideration is an on-shell quantity, namely the two-point function with zero external momentum in the massless theory. Therefore, it is a gauge-invariant quantity, and hence two results should agree with each other.

We have reexamined our calculation and found errors that are suggested in Ref. [1]. After correcting them, our result agrees with that in Refs. [2]. Now Eq. (15) should read

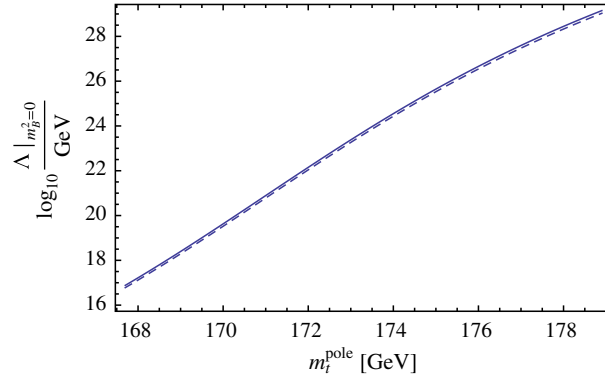


FIG. 3 (color online). This figure should replace the right panel of the original version. The solid line, corresponding to the scale where  $m_B^2$  becomes zero, is slightly shifted.

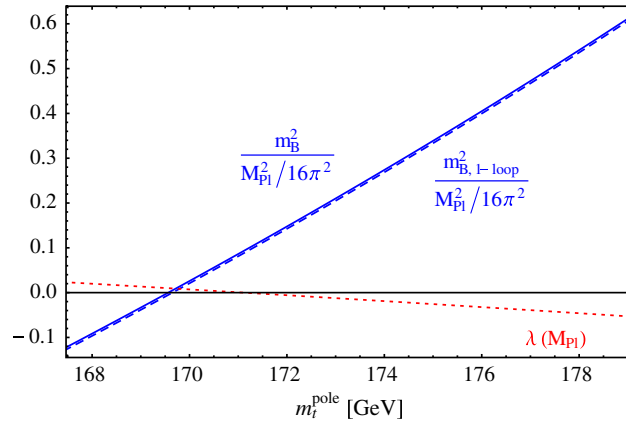


FIG. 4 (color online). The solid line, corresponding to the one-plus-two-loop bare mass  $m_B^2$  in units of  $M_{\text{Pl}}^2/16\pi^2$  for  $\Lambda = M_{\text{Pl}}$ , is slightly shifted.

TABLE I. Contributions to  $g^4$  terms.

		$5g_{YB}^4 + 9g_{2B}^4$				
	+		+			$-\frac{51}{8}g_{2B}^4$
	+					$\frac{1}{8}g_{YB}^4 + \frac{3}{8}g_{2B}^4$
						$\frac{5}{16}g_{YB}^4 + \frac{15}{16}g_{2B}^4 + \frac{15}{8}g_{YB}^2g_{2B}^2$
Sum						$\frac{87}{16}g_{YB}^4 + \frac{63}{16}g_{2B}^4 + \frac{15}{8}g_{YB}^2g_{2B}^2$

$$m_{B,2\text{-loop}}^2 = -\left\{ 9y_{tB}^4 + y_{tB}^2 \left( -\frac{7}{12}g_{YB}^2 + \frac{9}{4}g_{2B}^2 - 16g_{3B}^2 \right) - \frac{87}{16}g_{YB}^4 - \frac{63}{16}g_{2B}^4 - \frac{15}{8}g_{YB}^2g_{2B}^2 + \lambda_B(-18y_{tB}^2 + 3g_{YB}^2 + 9g_{2B}^2) - 12\lambda_B^2 \right\} I_2. \quad (1)$$

The error does not influence the outcome; that is, the two-loop bare mass is still negligible compared to the one-loop one.

Figure 3 (right) and Fig. 4 should be replaced as indicated, respectively, although the modifications are physically irrelevant. Correction to Fig. 3 (left) is hardly seeable and is not shown here. See also Table I for the contribution of each gauge-invariant set of diagrams to the  $g^4$  terms.

#### ACKNOWLEDGEMENT

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- [1] D. R. T. Jones, *Phys. Rev. D* **88**, 098301 (2013).
- [2] M. S. Al-sarhi, I. Jack and D. R. T. Jones, *Z. Phys. C* **55**, 283 (1992).