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Abstract. abstract

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[1] See [?] and [?] for reviews of metric and Palatini Higgs inflation, respectively.

[2] Note that even if there were no such coupling at tree level, it would be generated by quantum corrections [?].

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[3] See [?] for a review of various inflationary models and their compatibility with measurements.

[4] Also in the metric theory of gravity, there are proposals to increase Λ without introducing new degrees of freedom [? ?]. They rely on higher-dimensional operators. The perturbative cutoff in the theory studied in [?] was further discussed in [? ?].

[5] For earlier studies of preheating in metric Higgs inflation see [? ?].

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[6] See also [? ? ? ?] for early studies of quantum effects in Higgs inflation.

[7] Other aspects of quantum effects in Palatini Higgs inflation have been considered in [? ? ?].

Table 1: caption

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[8] Also in the metric scenario, Eq. (**??**) can be integrated exactly, giving χ as a function of h [?].

column 1 column 1

$$\epsilon = \frac{M_P^2}{2}\left(\frac{\mathrm{d}U/\mathrm{d}\chi}{U}\right)^2, \qquad \eta = M_P^2 \frac{\mathrm{d}^2U/\mathrm{d}^2\chi}{U}, \tag{2.1}$$

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[9] Because of its smaller preheating temperature, Palatini Higgs inflation is favorable for QCD axion models in which the Peccei-Quinn symmetry is broken before the end of inflation [?].

[10] We obtain this result by evaluating the value of y_t at the energy scale $M_P/\sqrt{10^7}$, starting from its low-energy value $y_t^{\rm low} = 0.92354$; see the discussion below Eq. (??).

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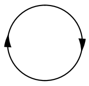

$$column1 \mathrm{Tr}\ln\left(column1 \not\partial column1\right)$$

$$column1 \frac{y_t^4}{64\pi^2}\left(\frac{2}{\bar{\epsilon}} column1 \ln\frac{y_t^2 F^2}{2\mu^2} column1 \frac{3}{2}\right) column1\, column1 \tag{3.1}$$

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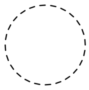

$$column1 \frac{1}{2}\mathrm{Tr}\ln\left[\Box column1 \left(\frac{\lambda}{4} column1\right) column1\right]$$

$$column1 \frac{9\lambda^2}{64\pi^2}\left(\frac{2}{\bar{\epsilon}} column1 \ln\frac{\lambda(F^4)''}{4\mu^2} column1 \frac{3}{2}\right)\left(column1' 2 column1 \frac{1}{3} column1\right) column1\, column1 \tag{3.2}$$

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[11] We assume that new heavy particles, if they exist at all, have no impact on inflation beyond changing the β-functions. We also ignore all quadratic divergences associated with these particles (see [? ? ?]).

[12] One can obtain this result by expressing the one-loop contribution to the vertex function in terms of the physical coupling, which is defined in the momentum dependent subtraction scheme at the scale μ and thus accounts for decoupling of heavy degrees of freedom for $\mu \ll m$.

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[13] In our approach, we exclude higher-dimensional operators that do not respect the approximate shift symmetry $\chi \to \chi$+const of the potential $U(\chi)$. Adding those can easily make inflation impossible (or change inflationary predictions) [? ?]. In contrast, quantum corrections that are generated by the theory itself are small [?].

[14] We thank Fedor Bezrukov for kindly providing us with a script to do so. The script computes the running of the Standard Model couplings in the $\overline{\mathrm{MS}}$-scheme. It uses two-loop matching of physical and $\overline{\mathrm{MS}}$ parameters [?] and three-loop RG evolution of coupling constants [?] (see also [? ? ?]). As an input, we use $\alpha_s(M_Z) = 0.1181$ and $m_h = 125.1\,\mathrm{GeV}$. The influence of ξ on the running is negligible [?], and we do not consider it.

[15] In fact, one should impose the slightly stricter criterion of avoiding eternal inflation because otherwise the classical treatment is not valid. Since it will turn out in the numerical analysis that $\mathrm{d}U/\mathrm{d}\chi$ never comes

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close to 0, this distinction is inessential.

[16]This bound only refers to inflation on the plateau. Other scenarios, such as hilltop inflation, can allow for smaller values of ξ; see [? ?].

[17]A lower bound on ξ has already been discussed in a different setup in [?]. There, no connection was made to low-energy data of the Standard Model, i.e., λ_0, b and q were treated as free parameters. Moreover, only positive values of λ_0 were considered. This led to $\xi_{\min} \approx 6 \cdot 10^6$ [?].

[18]It is an interesting numerical coincidence that $\delta\lambda$, the magnitude of which is essentially given by a loop factor, and values of λ that can support inflation are of the same order of magnitude.

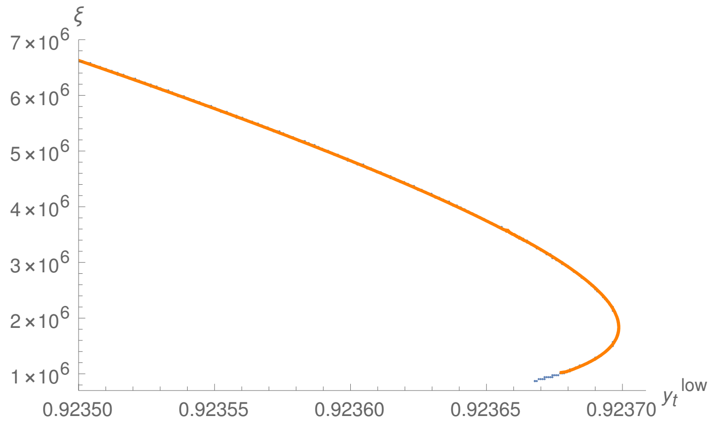

Figure 1: caption

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[19] CMS and ATLAS have measured $m_t^{\text{pole}} = 170.5 \pm 0.8\,\text{GeV}$ [?] and $m_t^{\text{pole}} = 171.1 \pm 1.2\,\text{GeV}$ [?], respectively.

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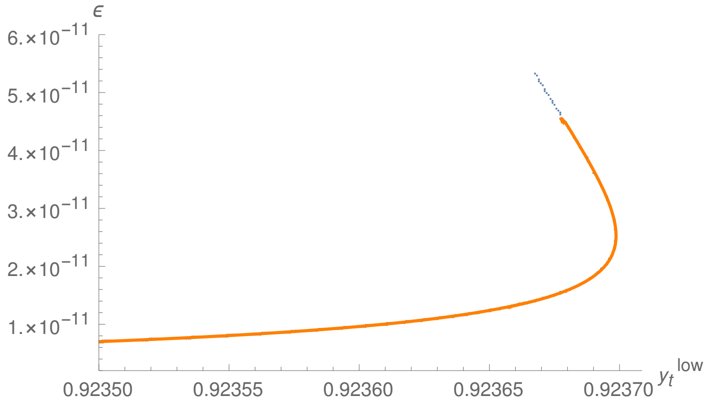

Figure 2: caption Fig. 1 caption

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[20]We use Mathematica [?] for the numerical analysis.