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Cosmological constraint on the mass of Higgs boson in the Standard model

If the mass of Higgs boson exceeds the decoupling value, then the Higgs scalar is not able to produce the inflation, that is the preferable option for the observed properties of our Universe. The inflation is finished at the Hubble rate H related with the constant of field self-coupling lambda by 2*piGHˆ2=lambda.*
Therefore, if the coupling constant is about unit, then the Hubble rate takes a Planckian value, thus, the classical description of gravity becomes invalid and the inflation regime does not occur. Considering the de Sitter spacetime we find that quantum fluctuations of metric are essential at the action equal to 2pi, that leads to the critical value of self-coupling constant lambda=1/6.
Then, the decoupling mass of Higgs particle in the tree approximation for the potential is given by m_min=140 GeV.
The renormalization group analysis within the two-loop approximation results in the lower cosmological bound to the Higgs boson mass m_min=150±3 GeV, wherein the uncertainty is mainly determined by the experimental accuracy in the measuring the t-quark mass as well as by the estimate of higher order contributions in the perturbation theory.

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