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Phase structure and Higgs boson mass in a Higgs-Yukawa model with a dimension-6 operator

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We investigate the impact of a $\lambda_6\pi^6$ term included in a
chiral invariant lattice Higgs-Yukawa model. Such a term could emerge from BSM physics at some larger energy scale.
We map out the phase structure of the Higgs-Yukawa model with positive
λ_6 and negative quartic self coupling. To this
end, we evaluate the constraint effective potential in lattice perturbation theory and determine the magnetization of the model
via numerical simulations which allow us to reach also non-perturbative values of the couplings. As a result, we find a complex phase structure with first and second order phase transitions identified through the magnetization.
Further we analyze the effect of such a ϕ^6 term on the Higgs boson
mass to see, whether the standard model lower mass bound
can be altered.

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