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## Metastable Electroweak Vacuum and Chaotic Inflation

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We revisit the compatibility between the chaotic inflation, which provides a natural solution to the initial condition problem, and the metastable electroweak vacuum, which is suggested by the results of LHC and the current mass measurements of top quark and Higgs boson. It is known that the chaotic inflation poses a threat to the stability of the electroweak vacuum because it easily generates large Higgs fluctuations during inflation and triggers the catastrophic vacuum decay. A simple way to avoid this problem is to introduce a small coupling between the Higgs and inflaton, like a non-minimal coupling of Higgs.

First, however, I will show that this coupling threatens the stability of the vacuum after inflation. This is because it oscillates violently with a large amplitude of inflaton, and can produce large Higgs fluctuations.

Then, I will discuss a simple cosmological scenario in which the vacuum is always stabilized during chaotic inflation, preheating and after that. Interestingly, it naturally predicts formation of primordial black holes. I will discuss these PBHs as a dominant component of dark matter.

This is based on 1602.00483 in collaboration with Y. Ema and K. Nakayama; and 1605.04974 with M. Kawasaki and T. T. Yanagida.

### Summary

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