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No Dark Matter Axion During Minimal Higgs Inflation

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In this talk, I discuss minimal versions of Higgs inflation (HI) in the presence of a massless QCD axion. While the inflationary energy scale of metric HI is too high to be compatible with isocurvature bounds, it was argued that Palatini HI could evade these constraints. I show, however, that an energy-dependent decay constant enhances isocurvature perturbations, implying that axions can at most constitute a tiny fraction $\sim 10^{-8}$ of dark matter. This conclusion can be avoided in Einstein-Cartan gravity by an additional coupling of the axion to torsion, albeit for a very specific choice of parameters. Analogous constraints as well as the possibility to alleviate them are relevant for all inflationary models with a non-minimal coupling to gravity.

Based on:

C. Rigouzzo, S. Zell, *No Dark Matter Axion During Minimal Higgs Inflation*, arXiv:2503.XXXXX.

Primary authors: Ms RIGOUZZO, Claire; Dr ZELL, Sebastian (Ludwig Maximilian University of Munich)

Presenter: Dr ZELL, Sebastian (Ludwig Maximilian University of Munich)

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