

Higgs inflation, unitarity, and emergence of scalaron

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The vanilla Higgs inflation introduces a large non-minimal coupling between the Ricci scalar and Higgs that causes the tree-level unitarity violation well below the Planck scale. After reviewing the unitarity issue of the Higgs inflation during and after inflation, we show that the unitarity can be restored by summing over vacuum polarization-type diagrams. The scattering amplitude develops a pole after the resummation, which we identify as the scalar component of the metric, or the scalaron. It suggests that the Higgs inflation is actually a multi-field inflation model, i.e. Higgs and the scalaron, and does not suffer from the unitarity problem.

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