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Ending inflation with a bang: Higgs vacuum decay in R2 gravity

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According to the current experimental data, the SM Higgs vacuum appears to be metastable due to the development of a second, lower ground state in the Higgs potential. Consequently, vacuum decay would induce the nucleation of true vacuum bubbles with catastrophic consequences for our false vacuum Universe. Since such an event would render our Universe incompatible with measurements, we are motivated to study possible stabilising mechanisms in the early universe. In our current investigation, we study the experimentally motivated metastability of the electroweak vacuum in the context of the observationally favoured model of Starobinsky inflation. Following the motivation and techniques from our first study (2011.03763), we wish to obtain similar constraints the Higgs-curvature coupling ξ, while treating Starobinsky inflation more rigorously. us, we are embedding the SM on the modified gravity scenario R + R2 , that introduces Starobinsky inflation naturally, with significant repercussions for the effective Higgs potential in the form of additional negative terms that destabilize the vacuum. Another important aspect lies in the definition for the end of inflation as bubble nucleation is prominent during its very last moments. Our results dictate stronger lower ξ-bounds that are very sensitive to the final moments of inflation.

Orateur: MANTZIRIS, Andreas (Imperial College London)

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