Seventeenth Marcel Grossmann Meeting

Contribution ID: **302** Type: **Talk in a parallel session**

Scale-invariant inflation: theoretical predictions and observational constraints

Tuesday, 9 July 2024 15:30 (30 minutes)

There is solid theoretical and observational motivation behind the idea of scale invariance as a fundamental symmetry of Nature. We consider a recently proposed classically scale-invariant inflationary model, quadratic in curvature and featuring a scalar field nonminimally coupled to gravity. We go beyond earlier analytical studies, which showed that the model predicts inflationary observables in qualitative agreement with data, by solving the full two-field dynamics of the system – this allows us to corroborate previous analytical findings and set robust constraints on the model's parameters using the latest CMB data from Planck and BICEP/Keck. We demonstrate that scale-invariance constrains the two-field trajectory such that the effective dynamics are that of a single field, resulting in vanishing entropy perturbations and protecting the model from destabilization effects. We derive tight upper limits on the non-minimal coupling strength, excluding conformal coupling at high significance. We demonstrate an overall insensitivity to initial conditions. We argue that the model predicts a minimal level of primordial tensor modes set by $r > 0.003$, well within the reach of next-generation CMB experiments. These will therefore provide a litmus test of scale-invariant inflation, and we comment on the possibility of distinguishing the model from Starobinsky and α-attractor inflation.

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