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Seeding primordial black holes in multifield inflation

The inflationary origin of primordial black holes (PBHs) relies on a large enhancement of the power spectrum of the curvature fluctuation ζ at wavelengths much shorter than those of the CMB anisotropies. Quantum gravity inspired models are characterized by moduli spaces with highly curved geometries and a large number of scalar fields that could vigorously interact with ζ (as in the cosmological collider picture). Here we show that isocurvature fluctuations can mix with ζ inducing large enhancements of its amplitude. This occurs whenever the inflationary trajectory experiences rapid turns in the field space of the model leading to amplifications that are exponentially sensitive to the total angle swept by the turn, which induce characteristic observable signatures on the power spectrum. We derive accurate analytical predictions and show that the large enhancements required for PBHs demand noncanonical kinetic terms in the action of the multifield system.

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