

Stochastic inflation and primordial black holes: a numerical approach

Cosmology from Home 2021

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Based on 2012.06551, in collaboration with D. Figueroa,
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Primordial Black Holes (PBHs)

Dark matter candidate

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From strong perturbations from inflation

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Dark matter candidate

From strong perturbations from inflation

Studying perturbations: stochastic inflation

Stochastic inflation

Coarse-grain inflaton field at PBH scale

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Coarse-grain inflaton field at PBH scale

Coarse-grained equations of motion:

$$\bar{\pi}' + \left(3 + \frac{H'}{H}\right)\bar{\pi} + \frac{1}{H^2}V'(\bar{\phi}) = \xi_{\pi}, \quad \bar{\phi}' = \bar{\pi} + \xi_{\phi}$$

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Noise from (linear) perturbations: $\xi \sim \delta\phi_{\vec{k}}$,

$$|\delta\phi_{\vec{k}}| \approx \frac{H}{\sqrt{2}k^{3/2}} \leftarrow \text{de Sitter}$$

$$\delta\phi_{\vec{k}}'' + \left(3 + \frac{H'}{H}\right)\delta\phi_{\vec{k}}' + \omega_{\vec{k}}^2(\bar{\phi})\delta\phi_{\vec{k}} = 0 \leftarrow \text{Backreaction}$$

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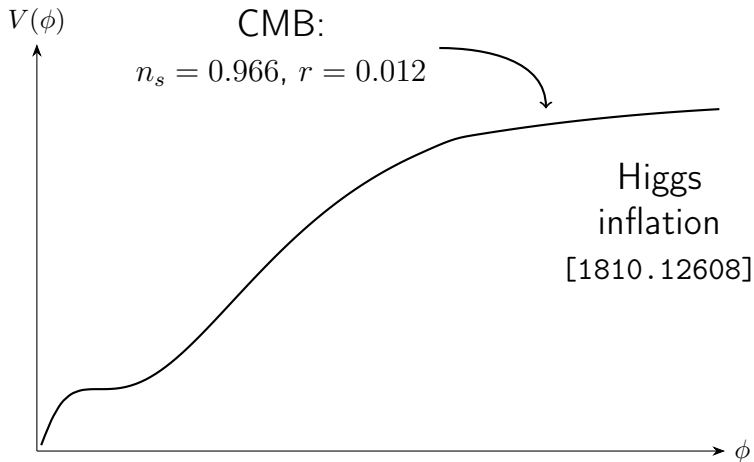
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Comoving curvature perturbation \mathcal{R} from ΔN formalism

Model



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