

Origin of structure

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MASTER FORMULA
$$\zeta = \frac{dN}{d\phi}\delta\phi + \frac{1}{2}\frac{d^2N}{d\phi^2}(\delta\phi)^2 + \cdots$$

 $\delta\phi$ generated at horizon exit (from vac fluc except warm inflation)



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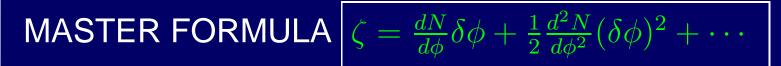
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3. TWO-COMPONENT S.R.I.: inflaton has two components

4. END-OF-INFLATION: field affecting end of hybrid inflation

inflation model determines ζ

Curvaton-type scenarios



more ϕ candidates

- ϕ affects an event after inflation
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- ϕ affects an event after inflation
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- Inflation model IRRELEVANT for curvaton-type scenarios (except for $\epsilon(t) \equiv \dot{H}/H^2$)



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SPECTRAL INDEX RUNNING (before 2010?) $n' \gtrsim 10^{-2}$ s.r.i. ruled out for most potentials NON-GAUSSIANITY (ongoing, but $|f_{\rm NL}| < 1$ impossible?) $|f_{\rm NL}| > 10^{-2}$ s.r.i. ruled out

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 $|f_{\rm NL}| > 10^{-2}$ s.r.i. ruled out

 $|f_{\rm NL}| < 1$ curvaton-type and k-inf/ghost strongly disfavoured

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Observation of predicted $f_{\rm NL}(k_1, k_2, k_3) \sim 10^{-2}$ would confirm s.r.i.

(a complicated function, found by Maldacena)

Suggestions for next year's research



K-INF/GHOST INF

Cheung et. al. 0709.0293 hep-ph gives a generic lagrangian. Work out lower bound on $f_{\rm NL}$ within some stated restriction on the parameter space.



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NON-SUPERSYMMETRIC S.R.I. MODELS (PNGB) Cohn/Stewart HEP-PH 0001333; N. Arkani-Hamed et. al. hep-th/0302034; Kaplan/Weiner hep-ph/0302014 Old and forgotten models: Work out n and n' as function of parameters.

Are these models already disfavoured by data?

Summary



Origin of structure: a rich and complicated research area

LHC will suggest future directions —but we can ignore those suggestions

Astro observations (PLANCK etc) will rule out some existing proposals, perhaps most of them.

Conceivably, could confirm a proposal.