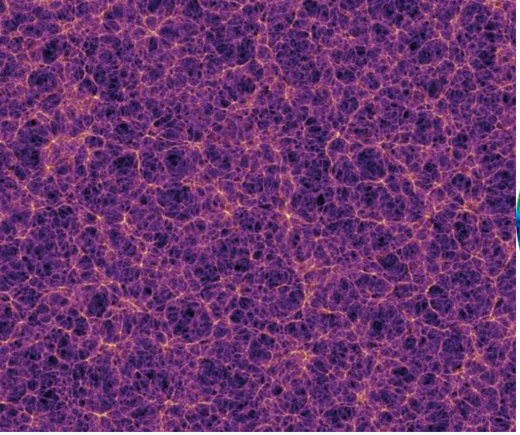 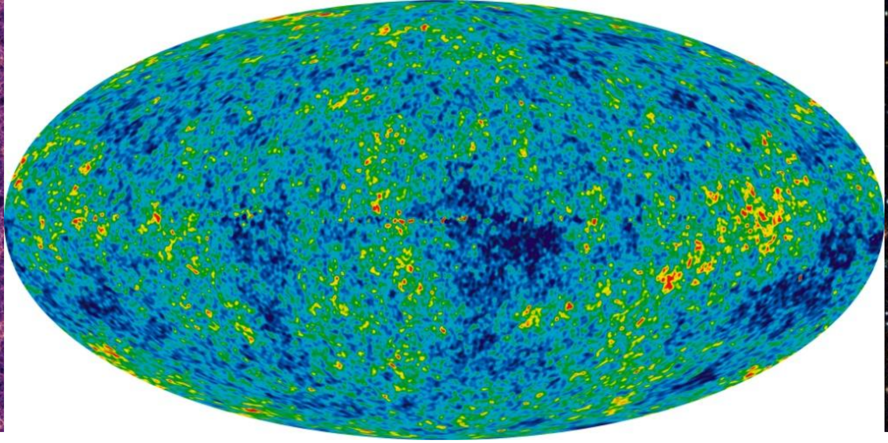 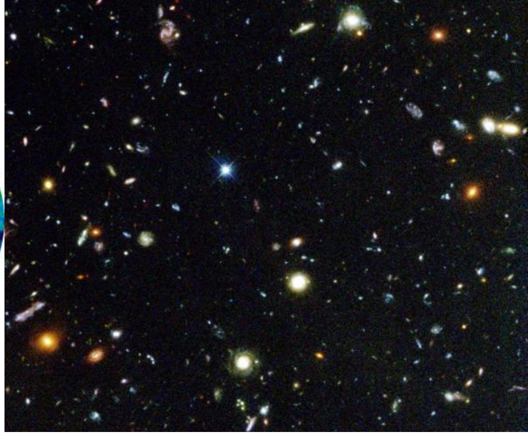

Adiabaticity and Non-Gaussianity

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Model

- Two-field inflation with potentials of the form:

$$W(\phi, \chi) = F[U(\phi) + V(\chi)]$$

- Use the δN formalism to calculate observables such as:

$$\frac{6}{5} f_{\rm NL} = \frac{\sum_{IJ} N_{,I} N_{,J} N_{,IJ}}{(\sum_K N_{,K}^2)^2}$$

- Follow evolution until the fluctuations become adiabatic as required for subsequent conservation and as indicated by observation

Results

- After passing through a short phase of effectively single field inflation we find:

$$f_{\rm NL} \sim \mathcal{O}(\varepsilon_*) \qquad \tau_{\rm NL} \sim \mathcal{O}(\varepsilon_*) \qquad g_{\rm NL} \sim \mathcal{O}(\varepsilon_*)$$

- More generally, we can define:

$$F^{(n)}_{{\rm NL},i} = \frac{\sum_{A_1,A_2,A_3,\ldots} N_{,A_1A_2\ldots} N_{,A_1A_3\ldots} \cdots N_{,A_2} N_{,A_3}}{\left(\sum_K N^2_{,K}\right)^{n-1}}$$

- We find that upon entering an adiabatic mode

$$F^{(n)}_{{\rm NL},i} \sim \mathcal{O}(\varepsilon_*) \qquad \forall\, n, i$$

Details

- The *m*th derivative of *N* takes the form:

$$\frac{\partial^m N}{\partial \phi_*^m} = \sum_{k=0}^{m-1} \mathcal{O}\left(\varepsilon_*^{(2k-m)/2}\right)$$

- Leading term is suppressed during single field

$$\frac{\partial^m N}{\partial \phi_*^m} \sim \mathcal{O}\left(\varepsilon_*^{-m/2}\right) \mathrm{Exp}\left[-2\int H\eta^{ss}\,\mathrm{d}t\right] + \mathcal{O}\left(\varepsilon_*^{(2-m)/2}\right)$$

- All non-linearity parameters are suppressed

$$F_{\mathrm{NL},i}^{(n)} \sim \mathcal{O}\left(1\right) \mathrm{Exp}\left[-2\int H\eta^{ss}\,\mathrm{d}t\right] + \mathcal{O}\left(\varepsilon_*\right)$$