# Power-law Inflation with a Nondynamical Scalar Field

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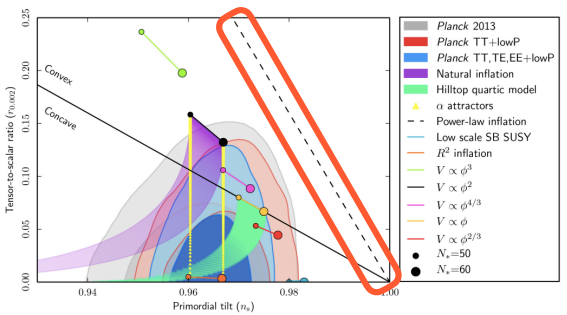
**Power-law inflation:** $a(t) \propto t^p,\ p = const. > 1$.
inconsistent with the Planck data

**Cuscuton field:**
a scalar field which is nondynamical when its gradient is time-like




Sited from "Planck 2015 results. XX. Constraints on inflation"

⇒ We consider **a power-law inflation with a cuscuton field**

$$S = \int d^4x\sqrt{-g}\left[\frac{M_{pl}^2}{2}R + \underbrace{\mu^2\sqrt{-\partial_\mu\phi\partial^\mu\phi} - V(\phi)}_{\text{cuscuton}} - \underbrace{\frac{1}{2}\partial_\mu\chi\partial^\mu\chi - U(\chi)}_{\text{inflaton}}\right]$$

$$V(\phi) = \frac{1}{2}m^2\phi^2 \qquad U(\chi) = U_0\exp\left(u\frac{\chi}{M_{pl}}\right), \quad \partial_\mu\phi\text{: time-like}$$

⟶ We can choose $n_s$ & $r$ independently

**This model can satisfy the Planck data**

**This result will be general in any inflationary scenario**