Inflation from a supersymmetric axion model

Kazunori Nakayama
KEK, Institute for Particle and Nuclear Studies

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M.Kawasaki, N.Kitajima, KN, arXiv:1008.5013

SUSY axion

- Hierarchy Problem ⟶ Supersymmetry
- Strong CP Problem ⟶ Axion

Supersymmetric axion model

- Superpotential of SUSY hadronic axion model

$$W = kS(\Psi\bar{\Psi} - f_a^2) + \lambda\Psi Q\bar{Q}$$

PQ charges :

$$\Psi(+1),\ \bar{\Psi}(-1),\ Q(-1/2), \bar{Q}(-1/2)$$

$$\Psi, \bar{\Psi}\ :\ \mathrm{PQ\ scalar}$$

This is same as hybrid inflation form!

Hybrid inflation from SUSY axion

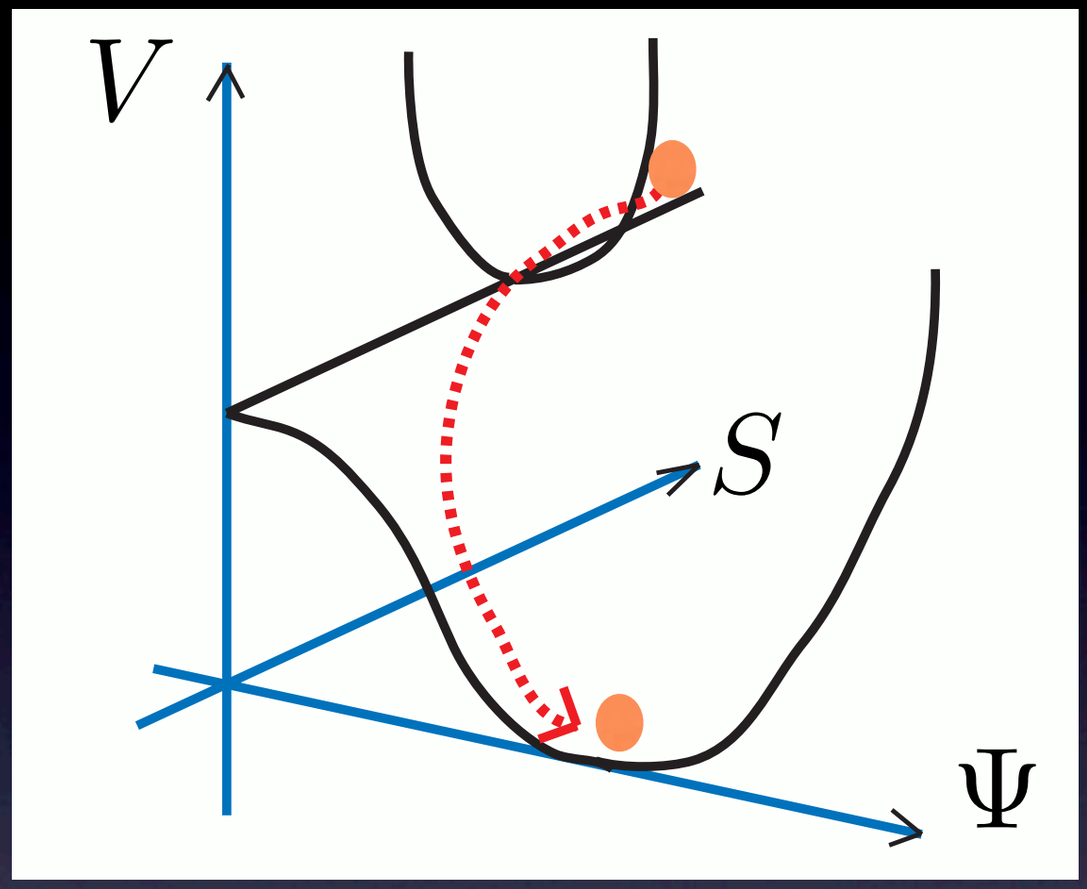
$$W = \kappa S(\Psi\bar{\Psi} - f_a^2)$$

S : inflaton

$\Psi, \bar{\Psi}$: waterfall field

Inflation ends $\longrightarrow \langle\Psi\rangle \sim \langle\bar{\Psi}\rangle \sim f_a$

$\longrightarrow$ Spontaneously break PQ sym.
(solve strong CP)



- WMAP normalization : $f_a \sim 10^{15}\mathrm{GeV}$
- Axion dark matter after dilution by saxion decay
- No gravitino problem after dilution by saxion decay

Solve theoretical &cosmological problems in a simple model!