Valentina Danieli

Anharmonic Effects on the Squeezing of Axion Perturbations

Supervisors:

Takeshi Kobayashi

Sabino Matarrese

Collaborators:

Nicola Bartolo

Matteo Viel

Introduction

✓ The history of the Universe undergoes a period of exponential expansion, **inflation**.

✓ Quantum fluctuations provide the seeds for structure formation.

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Quantum to classical transition

✓ Inflation itself provides an explanation due to **squeezing**.
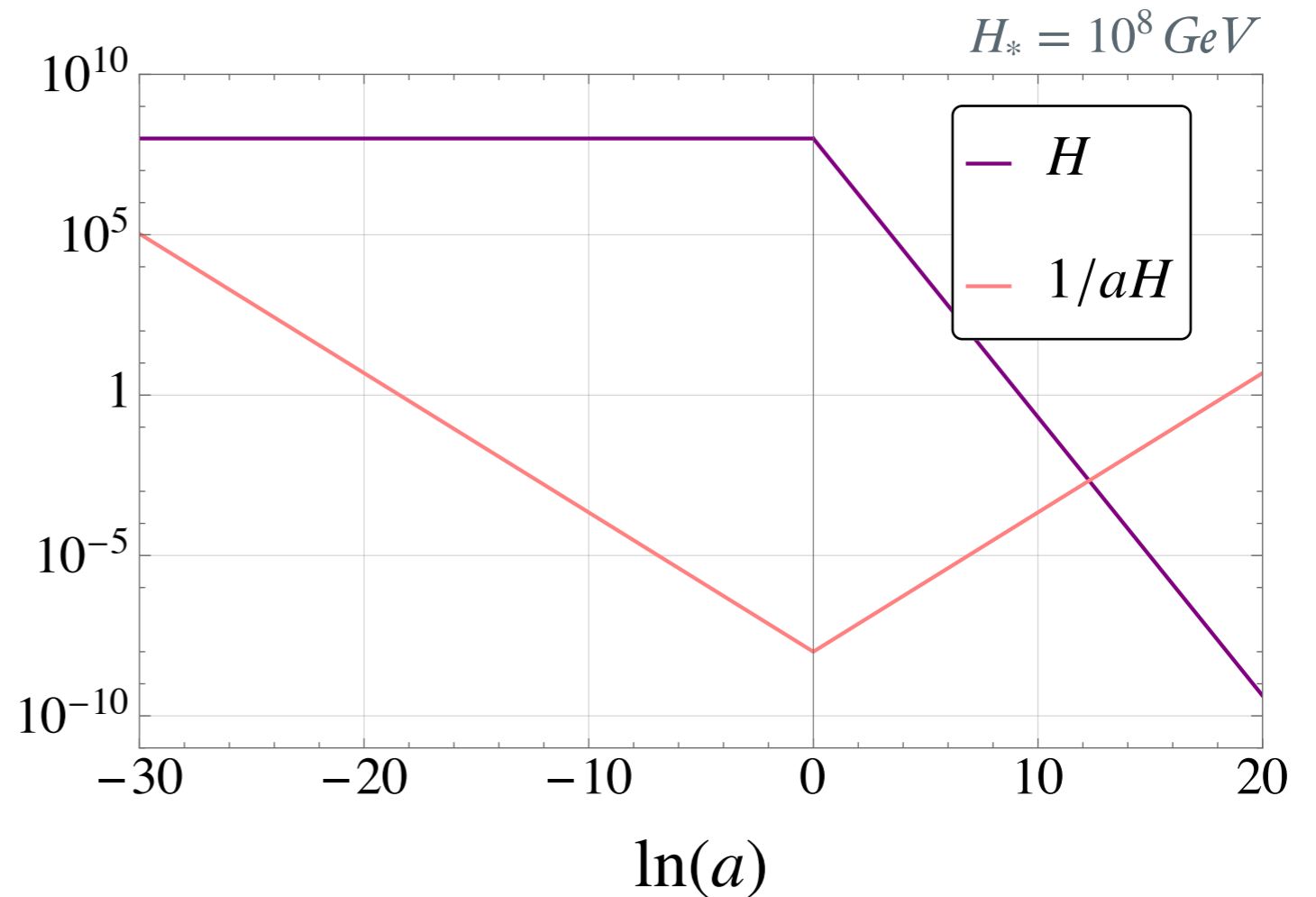
✓ Further source of classicalization: **reheating**.

✓ de Sitter (DS) inflation followed by a Radiation Domination (RD) phase

✓ Axions produced via misalignment mechanism with $f > max(T_{rh}, H_I)$

✓ Axion is a spectator field

✓ Instantaneous reheating

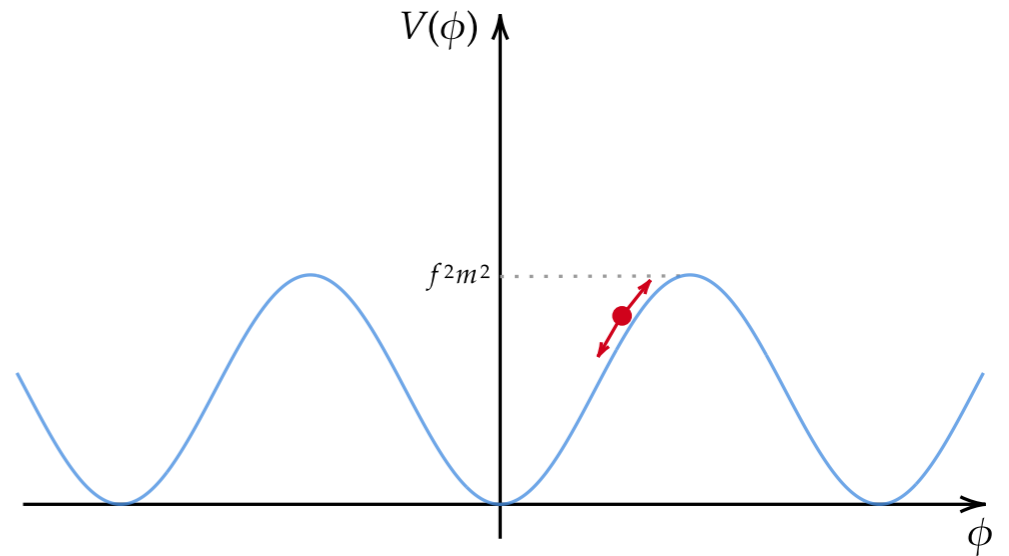$$H = \begin{cases} H_* & a < 0 \\ H_* a^{-2} & a > 0 \end{cases}$$

What about the axion potential?

$$V(\phi) = f^2 m_\phi^2 \left[1 - \cos\left(\frac{\phi}{f}\right) \right]$$
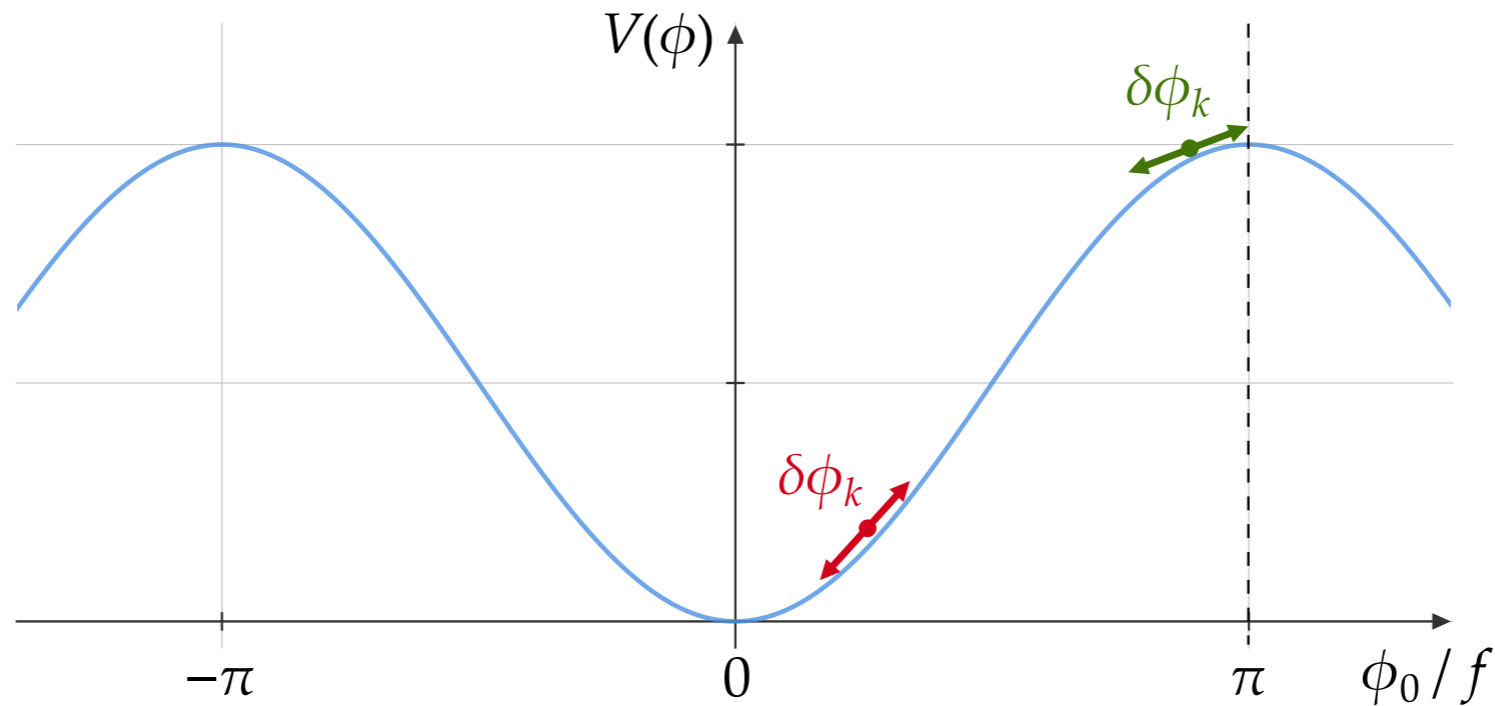
$$\ddot{\phi}_0 + 3H\dot{\phi}_0 + fm_\phi^2 \sin\left(\frac{\phi_0}{f}\right) = 0$$

$$\delta\ddot{\phi} + 3H\delta\dot{\phi} + \left[\frac{k^2}{a^2} + m_\phi^2 \cos\left(\frac{\phi_0}{f}\right) \right] \delta\phi = 0$$
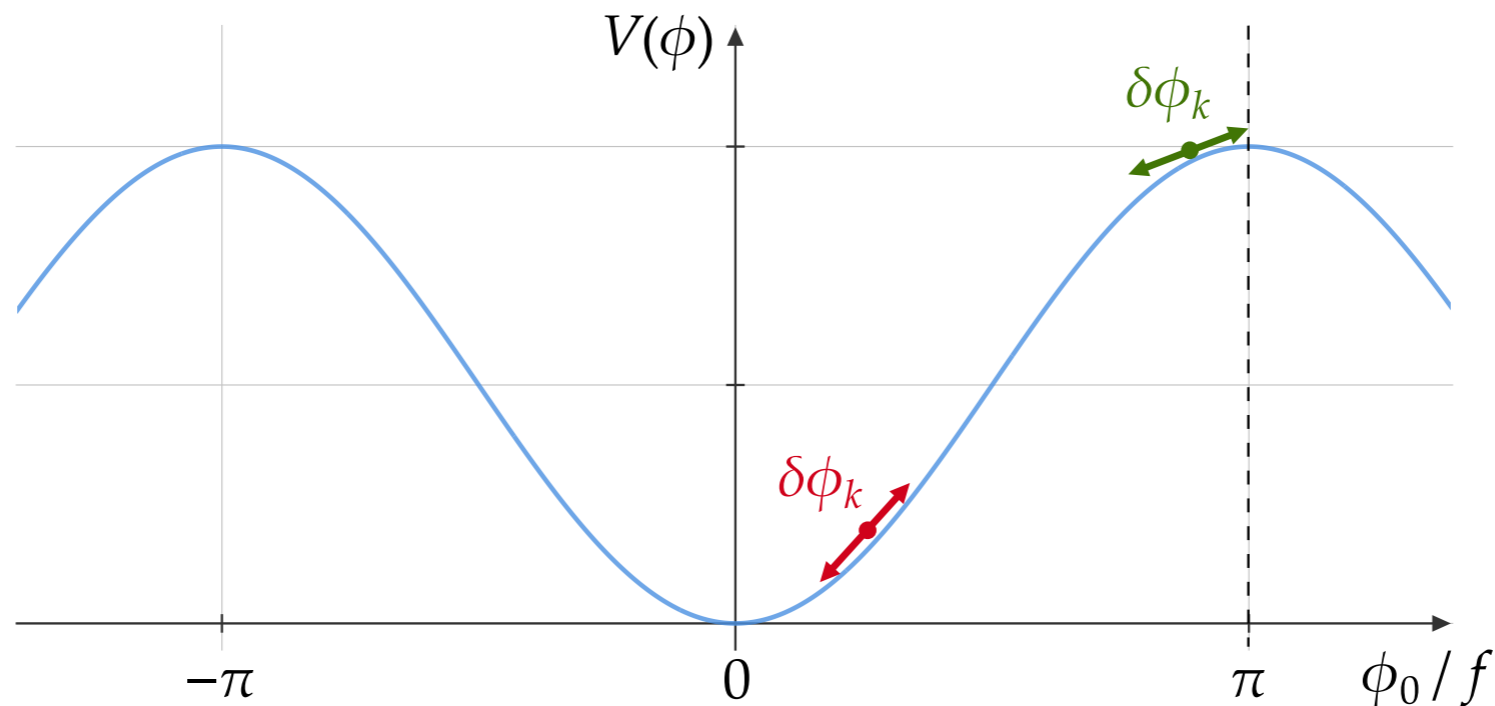
Conclusions

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THANKS FOR THE ATTENTION