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Axion inflation with derivative a coupling to the gravitational field

Tuesday 1 October 2019 14:00 (30 minutes)

We discuss a version of the Natural Inflation model in which the inflaton field is an axion (pseudoscalar) field coupled to a U(1) gauge fields through an axial coupling $\phi\tilde{F}F$ and to the gravitational field through the kinetic coupling term $G_{\mu\nu}\partial_\mu\phi\partial_\nu\phi$. The couplings mentioned before are compatible with the shift symmetry $\phi \to \phi + c$ which is a virtue of the model because this makes the theory stable under radiative corrections. The axion acquires a natural cosine like potential term when shift symmetry is spontaneously broken at the natural inflation scale f.

The presence of axial couplings leads to a production of gauge particles which acts as a friction term in the dynamics of the inflaton field, producing a slow-roll regime even in presence of a steep potential and that this interaction provides an efficient mechanism for the sourcing of chiral gravitational waves. On the other hand, the presence of a kinetic gravitational coupling provides an extra enhancement of the gravitational friction which allows the natural inflation scale to be $f \ll M_p$.

In this talk we discuss some consequences of the introduction of the non-minimal coupling to gravity in this system. During the talk we review some details about the non-minimally coupled dynamics, and discuss the constraints on the model coming from the measurements of cosmological parameters. We put emphasis on the issue of sourced tensor modes in this model. Finally, we comment on further variations and generalizations of this model.

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