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Implementation and development of a computational routine for the evolution of multiple coupled inflationary fields.

Given the previous work “Classicalization of the initial conditions in the inflationary universe”, where the matter present in the universe was modeled by means of a scalar field known as inflaton, the transition of quantum fluctuations (within the context of inflation, it is known that temperature and polarization inhomogeneities of the CMB are driven by scalar and tensor fluctuations) to classical observables was observed. This result was achieved by means of simulations of the field for different modes, for which use was made of the decomposition of the field into amplitude and phase.
However, since a more realistic model of this fact corresponds to studying inflation with multiple sources, the question arises: Is it possible to generalize the result to multiple fields? While it is feasible, it would be necessary to introduce a mechanism by which the multiple fields can be separated into fast and slow evolving components, in order to improve the computational efficiency and accuracy of such simulation. In this project, the separation for multiple fields is proposed and the consistency of the separation model is evaluated.

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