BPU11 CONGRESS



Contribution ID: 270 Contribution code: S03-GC-203

Type: Poster presentation

On a gauge invariant variable for scalar perturbations during inflation

Tuesday, 30 August 2022 18:00 (1h 30m)

We discuss cosmological perturbations of the scalar type in the spatially flat FRWL background during inflation. There are five independent scalar perturbations. Four of them are perturbations of the FRWL metric and the fifth one represents perturbations of a scalar field. As usual, a scalar field is used to describe dominant (perfect) cosmological fluid responsible for inflation [1].

These five scalar perturbations are not gauge invariant, i.e. their values strongly depend on coordinate system we use and are not physical. In order to obtain physical quantities, gauge invariant variables are introduced. Their values will not depend on a choice of coordinate system we use and will not change under general coordinate transformations.

Frequently used gauge invariant scalar perturbations in the literature are two Bardeen's potentials, the gauge invariant perturbations of a scalar field and the Mukhanov-Sasaki variable [2,3,4]. The main idea is to construct a general gauge invariant variable, that will contain all four mentioned gauge variables. It can be done by looking at a set of expressions defining explained in details in this work. At the end, we discuss about dynamical equation and its solution for a general gauge invariant variable.

Acknowledgement

N.V. acknowledges financial support by the Ministry of Education, Science and Technological Development of Serbia through Mathematical Institute of the Serbian Academy of Sciences and Arts. D.D.D., G.S.Dj., M.M., and M.S. acknowledge the grant of the Ministry of Education, Science and Technological Development of Serbia 451-03-68/2022-14/200124 and 451-03-68/2022-13/200113, ICTP-SEENET-NT03 and CEEPUS CIII-RS-1514-02-2122 Gravitation and Cosmoogy project.

References

- 1. S. Weinberg, Cosmology, Oxford University Press (2008).
- 2. J. M. Bardeen, Phys.Rev. D, 22, 1882 (1980).
- 3. H. Kodoma and M. Sasaki, Prog. Theor. Suppl., 78, 1 (1984).
- 4. V. Mukhanov, H. Feldman and R. Brandenberger, Phys. Rep., 215, 203 (1992).

Primary author: VESIĆ, Nenad (Mathematical Institute of Serbian Academy of Sciences and Arts, Belgrade, Serbia)

Co-authors: DIMITRIJEVIĆ, Dragoljub D. (Faculty of Sciences and Mathematics, University of Niš, Serbia); DJORD-JEVIĆ, Goran S. (Faculty of Sciences and Mathematics, University of Niš, Serbia); MILOŠEVIĆ, Milan (Faculty of Sciences and Mathematics, University of Niš, Serbia); STOJANOVIC, Marko (Faculty of Medicine, University of Nis, Serbia)

Presenter: VESIĆ, Nenad (Mathematical Institute of Serbian Academy of Sciences and Arts, Belgrade, Serbia)

Session Classification: Poster session

Track Classification: Scientific Sections: S03 Gravitation and Cosmology