

Uniformity of Cosmic Microwave Background as a Non-Inflationary Geometrical Effect

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The concordance cosmological model involving inflation describes the Universe very well. However, strict constraints are imposed by the recent observational data on the shape of the inflaton potential, excluding a lot of inflationary scenarios. We propose an alternative interpretation of the cosmic microwave background (CMB) data. We demonstrate that in the framework of the Λ CDM model supplemented in the spherical space with an additional perfect fluid with the constant parameter $-1/3$ in the linear equation of state, there is an elegant solution of the horizon problem without inflation. Under the proper choice of the parameters, light travels between the antipodal points during the age of the Universe. Thus, one can suggest that the observed CMB radiation originates from a very limited space region, which explains its uniformity. We reach the agreement with the supernovae data and discuss a possibility that the Universe was not uniform at the early stage and that creation of galaxies and large scale structure is due to inhomogeneities that originated in the Big Bang. We also show that changing the amplitude of the initial power spectrum, one can adjust the proposed cosmological model to the CMB anisotropy, and that the necessary change is well inside the experimentally allowed constraints.

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Summary

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