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A new model of cosmic inflation

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Abstract

Currently most successful model for the origin and evolution of the universe is the Big Bang Model. However, the Big Bang model has few issues regarding the unnaturalness of the initial conditions. To resolve the unnaturalness of Big Bang model, the theory of Cosmic inflation was proposed. Inflation is a rapid accelerating expansion of the universe which solves the horizon problem and the flatness problem. The basic predictions of cosmic inflation agree with the currently observed data. In order to solve the problems of the Big Bang cosmology, inflation has to continue for sufficiently long time and ends after that. Currently most popular model is 'slow-roll' inflation, in which inflation is driven by the potential energy of a scalar field called inflaton, while the inflaton is slowly rolling down the potential. In this model the inflation ends when the rolling down of the inflaton is no more slow. It still has a question mark on the naturalness of the potential. Therefore, it is worth exploring other possibilities which widens the horizon of knowledge. The old inflation model is based on a potential of a scalar field which is temperature dependent and eventually ends inflation. Instead, in our model we propose a time dependent potential to end the inflation. This time dependence has been suggested by Quantum Field Theory calculations in de Sitter space.