SUCCESSFUL GENERATION OF THE OBSERVED BARYON ASYMMETRY FOR SFC BARYOGENESIS IN DIFFERENT INFLATIONARY SCENARIOS

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PROBLEM INVESTIGATED

We analyze the baryon asymmetry generation according to the Scalar Field Condensate (SFC) baryogenesis model for several inflationary scenarios and different reheating models.

BARYON ASYMMETRY

The baryon asymmetry is described by

$$\beta = (N_b - N_{\bar{b}})/N_\gamma \sim N_b/N_\gamma = \eta,$$

where N_b is the number of baryons, N_{-b} is the number of anti-baryons, N_γ - the number of photons.

$$\eta \sim 6 \times 10^{-10},$$

is precisely measured today, the best baryometers being BBN and CMB measurements.

There exist many baryogenesis models, which successfully generate this number at quite different epochs between the end of inflation and before BBN.

Most popular ones: GUT baryogenesis, SUSSY baryogenesis, baryogenesis through leptogenesis, Afleck and Dine baryogenesis, Scalar Field Condensate baryogenesis (SFC), warm baryogenesis, etc.

SFC BARYOGENESIS MODEL

First ideas on SFC baryogenesis model and analytical construction of that model were presented 1990-1991 by Dolgov and Kirilova

The produced baryon asymmetry in SFC baryogenesis model depends on the generated baryon excess B, the reheating temperature of the Universe T_R and the value of the Hubble parameter at the end of inflation H_I:

$$\beta \sim N_B/T_R^3 \sim BT_R/H_I.$$

T_R and H_I values depend on the kind of inflation and reheating.

We calculated β of the Universe produced in the SFC baryogenesis model using the available results on B for all previously studied range of model's parameters and considering different models of inflation and reheating.

ANALYSIS AND RESULTS

There are numerous possibilities for reheating at the end of inflation resulting into a wide range for the allowed values of T_R. We have used in our analysis $T_R = [10^5 - 10^{14}]$ GeV.

Our numerical analysis of the evolution of B(t) produced in the SFC baryogenesis model and the estimation of the produced β for different sets of models parameters and different T_R of several inflationary scenarios shown that:

1. SFC baryogenesis model produces β by orders of magnitude bigger than the observed one for: new inflation, new inflation model by Shafi and Vilenkin, chaotic inflation with high T_R, the simplest Shafi-Vilenkin chaotic inflationary model and MSSM inflation. Strong diluting mechanisms are necessary to reduce the resultant baryon excess at low energies to its observational value today.

2. **SFC baryogenesis model produces similar to the observed baryon asymmetry value for: Modified Starobinsky inflation, chaotic inflation with lower T_R, chaotic inflation in SUGRA and Quintessential inflation.**

Curiously enough these are also models preferred by the Planck CMB data analysis.

THANK YOU

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