BIRTH AND GLOBAL EVOLUTION OF THE UNIVERSE: THEORY OR REALITY?

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The standard Hot Big Bang (HBB) model of Universe evolution has been considered as the only theory (in spite of long standing problems as singularity, horizon, flatness and structure formation) which can explain astrophysical observational data. The standard HBB theory describes two stages of global Universe evolution: radiation-dominated era, which extends from 120 s. to 10^12 s., and matter dominated epoch that extends from 10^12 s. to present time.
Thus, HBB model describes physical phenomenon, including nucleosynthesis, starting from cosmic time 120 s.

Alan Guth introduced the concept of inflation into cosmology in 1981. The inflationary stage of Universe evolution is considered to extend from 10^{-37} to 10^{-33} s. During this short period of time the size of the Universe radios increased in e^{60} times. This fact gave possibility to explain many puzzling features of the standard HBB model, what was the reason of great success of inflationary cosmology during last 20 years.

Nevertheless in present contribution we will discuss the reality of some aspects of inflation. The first question is how one (who? observer?) can do measurements during very short period of inflation? To answer this question we can explore very exiting observation of supernovas in fare galaxies, which tell us that Universe undergoes to exponential expansion in present time. That is we are living in inflationary stage of Universe evolution! Does it mean that inflationary expansion of Universe is real? Now and during the very beginning of the HBB?

Taking into consideration inflationary stages of Universe evolution we can conclude that the global evolution of the universe looks like follows: vacuum-like matter (early inflation) – radiation dominated substance (power low, Friedmann, expansion) – matter domination (Friedmann expansion) – matter domination (inflation in present time).

Inflationary expansion of the Universe can be described by self-interacting scalar field theory or by non-linear sigma model. The model of global evolution, based on non-linear sigma model, is more attractive because it contains few scalar fields that have geometrical interaction. Model of this type has been constructed (Chervon, 2001) for three-stage model. We will discuss the problem of including inflation in present time into the model of global Universe evolution.

Section: Cosmology, Gravitation and Space-Time Structure.