

The Independence of the Global Geometry of the Universe from Its Average Density

Mueiz Gafer KamalEldeen

mueizphysics@gmail.com

August 2015

Abstract

A thought experiment shows that the concept of the critical density is nonsense.

Introduction

Strangely , the reaction of physicists to the problematic dependence of the global geometry of the universe on its average density shows no tendency to put an end to this dependence simply by adding the average density of the universe as another constant to Einstein's Field Equation (See a paper by the same author : *Another Cosmological Constant to Solve More Problems about our Cosmological Model*) . Now , I am advancing by a thought experiment an argument that this dependence is not only problematic but also paradoxical.

The Thought Experiment

Let there be a universe with critical density (density parameter $\Omega = 1$). And , let there be a powerful designer who want to create a small prototype of this universe (in the same way as those models made by engineers in small size for their structures which is subjected to complex flow phenomena for which mathematical analysis is not available to avoid financial and safety risks of the experiments on the structures in their real size.).

It can be seen now that the requirements of general geometrical and dynamical similarities which imply that all intensive quantities such as the density must be the same in the real universe and the prototype , contradict the requirement that the prototype density is critical , because according to the equations of the standard model , the critical density depends on Hubble's distance which is different between the real universe and the prototype as required by geometrical similarity. This is a very remarkable result. It tells us that either the existence of this prototype is impossible or there is an error in our equations.

As for the first possibility , although cannot be excluded logically it lacks explanation , and can be excluded if we assume that the size of the prototype is made so large to isolate any doubts about different behavior of different sizes of similar universes due to the elementary structure of matter . So to allow for this prototype to work , we must make some changes in our equations . Now , it is very interesting to know that this

can easily be done by the addition of the average density of the universe to the field equation :

$$R_{\mu\nu} - g_{\mu\nu} R + g_{\mu\nu} \Lambda = k T_{\mu\nu} - k T_{\mu\nu}^{average}$$

Global Geometrical Constant **Global Material Constant**

And thus, the application of the field equation in the universe as a whole is free from the average density which also gives a resolution to many problem such as the *flatness problem* and the *cosmological constant problem*.