Using Newtonian Approximation of Einstein's Field Equation to Determine the Cosmological Constant

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Abstract

It is shown that the large-scale application of the Newtonian approximation and general relativity leads to certain value for the cosmological constant.

Introduction

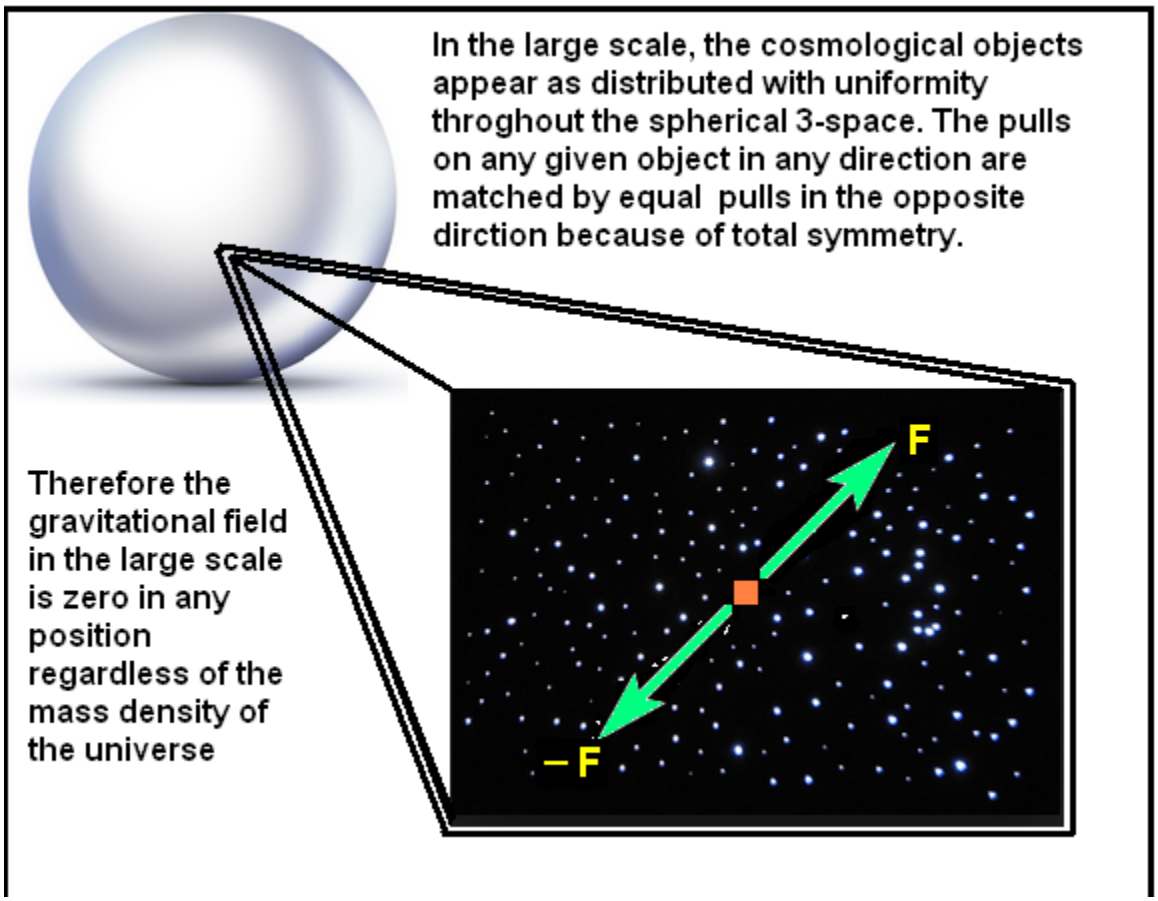
Newton's law of gravity was replaced by General Relativity for both theoretical and observational reasons and in spite of being essentially different from General Relativity, Newton's law of gravity can be recovered from the field equation of General Relativity as an approximation in special cases, this fact played an important role during the construction of the field equation. What I am going to put in front of the reader is another major role for this fact.

Analysis

According to the standard modern cosmology, there are three possibilities of the shape or the large-scale geometry of our universe but whatever is the real shape of the universe, the field equation of General Relativity should be applicable and correct in all these possibility.

Let us fist pay our attention to the fact that every case in Newton's Gravity can be proved with General Relativity.

Now when we consider the possibly of spherical shape of the universe in which the matter is uniformly and homogenously distributed throughout the space as appears in the large scale (our argument will not be affected even if this is not a precise description of our universe because General Relativity and Newtonian Approximation is applicable and correct also in the ideal case) we will find according to Newton's law of gravity that the value of the gravitational field in any region of such a space must be zero because of the total symmetry and similarity of all directions (there is no preferable direction for a gravitational force that could act on an object) so we arrive at the important fact that in this case the gravitational field is zero regardless of the value of the density of matter in the universe . But can this be explained by General Relativity? In General Relativity, as we are always told, the existence of matter must be associated with the geometrical deformation of space that causes gravitational effects? Is it a contradiction?



This conflict between general theory of relativity and its Newtonian Approximation cannot be resolved except if we abandon the unnecessary and unjustified assumption that the large scale geometry of the universe should depend on the average density simply by assuming that this average density of the universe is a part of the cosmological constant and therefore the large-scale geometry of the universe well not be affected by this density while the local application of the field equation ,in which deviations from uniformity come to light, remains with its well-known successful results .

More arguments to support this inevitable idea and more details and results including the resolution of the Cosmological Constant Problem is found in other papers by the author such as:

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

- *The Detestability of the Zero-Point Energy in General Relativity and Quantum Mechanics*

- *A logical Analysis of the Cosmological Constant Problem and Its Solution*

- *Another Cosmological Constant to Solve Major Problems of Cosmology*

- *The Resolution of the Flatness Problem without Inflation*

- *A Comparison between the Standard Cosmological Model and a Proposed Model with Radial Time and Spherical Space*

- *Adaptable Cosmological Constant to Solve Major Problems of Modern Cosmology*