The Impracticability of Interior Solutions of Einstein's Field Equation

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(*To those possible intelligent creatures out of our solar system who use only logic and observation to evaluate scientific claims*)

Abstract

The general curvature of the universe which determine the shape , evolution and fate of the universe is not the same as the average curvature of the universe which is associated with the average density. Mixing them up leads to the problematic dependence of the shape , evolution and fate of the universe on its average density .

General Curvature Is Not The Average Curvature

Before discussing the question whether the assumption that the universe is isotropic and homogeneous in the large scale is a good approximation or not, we have to be aware of the important fact that the general (global) curvature which is related to the shape , evolution and fate of the universe is quite different concept from the average curvature which is associated with the average density of the universe as implied by Einstein's Field Equation.

Let us consider the application of the field equation in the universe as a whole (this is an example of the interior application of the equation)

The average density of the universe is :

$$\sum \rho(x) \, v(x) \, / \, V$$

Where $\rho(x) \equiv$ the density in the region x , $v(x) \equiv$ the volume of the region x , $V \equiv$ the total volume of the universe.
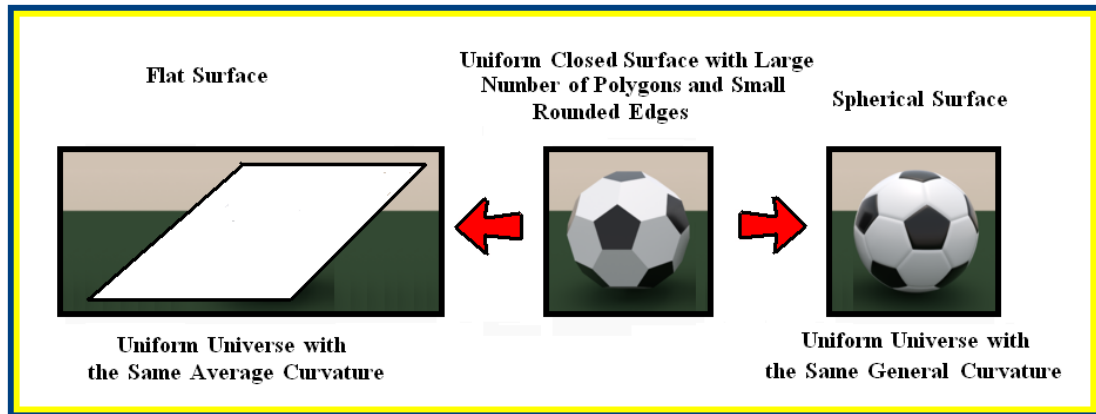
Similarly, the Average Curvature of the universe is:

$$\sum R(x) \, v(x) \, / \, V$$

The General or Global Curvature of the universe is the curvature which associated with the outline of the shape of the universe or the general geometrical description in which we ignore the details when they occur in small parts of the universe .

Interestingly , while wrongly and unconsciously assumed to be similar , the average curvature and the global curvature describe very different properties of the universe as a whole.

Let us clarify that this two terms are not equivalent by the following example using two-dimensional space for simplicity and it is clear that the same analysis can be generalized to any number of dimensions:

The average curvature of a uniform closed surface with large number of polygons and rounded edges is very close to zero while the global curvature of this surface can be thought of as the curvature of a sphere with the same size . The general curvature depends only on the size of this shape and has nothing to do with the average curvature . Another example is the simple fact that the general curvature of the surface of the earth depends only on the radius of the earth and is not related to the average curvature which is affected by the topological details .

Flat Surface   Uniform Closed Surface with Large Number of Polygons and Small Rounded Edges   Spherical Surface

Uniform Universe with the Same Average Curvature   Uniform Universe with the Same General Curvature

Conclusion

Physicists unconsciously mix up global curvature which determines the shape , evolution and fate of the universe with the average curvature which is related to the average density of the universe according to the field equation of the general theory of relativity. This confusion is the main source of the current problems of the Standard Cosmological Model (See other papers by the same author such as : *A Comparison between the Standard Cosmological Model and A Proposed Model with Radial Time and Independent Geometry*).