

## The Theological Basis of Big Bang Cosmology and the Failure of General Relativity

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It is shown in this paper that the Big Bang Cosmology has its basis in theology, not in science, that it pertains to a Universe entirely filled by a single spherically symmetric continuous indivisible homogeneous body and therefore models nothing, that it violates the physical principles of General Relativity, that it violates the conservation of energy, and that General Relativity itself violates the usual conservation of energy and momentum and is therefore in conflict with experiment on a deep level, rendering Einstein's conception of the physical Universe and the gravitational field invalid.

*Keywords:* Creationism; Spherical Symmetry; Conservation of Energy and Momentum

### 1. Introduction

Big Bang Cosmology is invalid by the invalidity of General Relativity because it is easily proven that General Relativity violates the usual conservation of energy and momentum. But it is nonetheless worth noting that cosmology is not a science at all; it is theology. The relativistic cosmologists generally fail to mention to the public and their students the fact that the Big Bang Cosmology was first conjured up by the Belgian mathematician and priest Georges Lemaître. Tolman<sup>1</sup> remarks that,

*“non-static homogeneous models ... were first theoretically investigated by Friedmann, and first considered in connexion with the phenomena of the actual universe by Lemaître.”*

Lemaître introduced a creation event into the equations of General Relativity and hence infused physics with the notion of God and His creation of the Universe. The Big Bang theory has been ratified by the Vatican owing to Lemaître's creationism. All Lemaître did was substitute one creation event with another creation event. Indeed, Lemaître admitted to the Swedish Nobel Prize winner in physics, Hannes Alfvén, that he came up with the idea to make physics accord with Catholicism and the teachings of St. Thomas Aquinas. Alfvén was not impressed. Here is what Alfvén<sup>2</sup> reported: *“I was there when Abbe Georges Le-*

*maître first proposed this theory,”* he recalled. Lemaître was, at the time, both a member of the Catholic hierarchy and an accomplished scientist. He said in private that this theory was a way to reconcile science with St. Thomas Aquinas' theological dictum of *creatio ex nihilo* or creation out of nothing. *“There is no rational reason to doubt that the universe has existed indefinitely, for an infinite time,”* Alfvén explained. *“It is only myth that attempts to say how the universe came to be, either four thousand or twenty billion years ago. Since religion intrinsically rejects empirical methods, there should never be any attempt to reconcile scientific theories with religion. An infinitely old universe, always evolving, may not be compatible with the Book of Genesis. However, religions such as Buddhism get along without having any explicit creation mythology and are in no way contradicted by a universe without a beginning or end. Creatio ex nihilo, even as religious doctrine, only dates to around AD 200. The key is not to confuse myth and empirical results, or religion and science.”*

Furthermore, in January 1933, Georges Lemaître travelled with Albert Einstein to California for a series of seminars. After the Lemaître detailed his ‘primordial atom’ or ‘primaeval egg’ expanding Universe theory, now called the Big Bang theory, Einstein<sup>3</sup> stood up, applauded, and said, *“This is the most beautiful and satisfactory explanation of creation to which I have ever listened.”* So evidently Einstein was actually a creationist, revealing thereby that he too was actually theological in his real disposition, despite

his often overt cryptic claims that he was not. Now Big Bang Cosmology only has the façade of science because it is couched in the mantle of complicated, but meaningless, mathematics, in terms of General Relativity which is an invalid theory because it violates the usual conservation of energy and momentum and is therefore in conflict with experiment on a very deep level. Before the Big Bang theory there was actually no alleged ‘scientific’ basis attached to the question of the creation of the Universe; only theology dealt with this question then. It still does.

The point of this is that it does not matter whether one is a theist or atheist, Republican or Democrat, Marxist or Capitalist; one’s ideology, which is subjective, must not influence the outcome of a scientific inquiry. Contrary to scientific method Lemaître used his Catholic ideology to *predetermine* the outcome of a scientific investigation. It is therefore not surprising that his creationist cosmology has no scientific basis. What is surprising is that Einstein and his followers embraced this theological notion and present it to the world as science. As Alfvén rightly pointed out, science and theology are two entirely different thought processes and employ entirely different methodologies and so the one cannot be misconstrued as or confounded with the other. The engineer does not allow his ideology, religion or philosophy of life to predetermine the technical outcome of an engineering project or to influence his methods for designing and building a bridge. No scientist is permitted to do otherwise either when conducting a scientific investigation be it by means of experiment or mathematical analysis because if he or she does he or she is not doing science at all.

## 2. Big Bang Artificial Symmetry and Matter

We will require a little terminology at this stage in relation to tensors since we will be looking at a few tensor expressions. You should not be alarmed by this because you will not be required to know how to carry out any tensor calculations in what follows or to even know what a tensor is. Almost all that you will be required to know is what some given tensor physically or geometrically represents in some tensor equation. This is essentially no more difficult for instance than considering the equation for a straight line;  $y = mx + b$ . You will recall from high school that  $m$  is the slope of the line,  $b$  is the intercept of the line on the  $y$ -axis, and if  $m$  and  $b$  are known, given some value of  $x$  you can calculate the value of  $y$ , if required. Similarly, consider the famous equation,  $E = mc^2$ . There is nothing frightening in this equation either; we merely identify  $E$  as energy,  $m$  as mass, and  $c$  as the speed of light in vacuum, and given the values of  $m$  and  $c$  you can easily calculate  $E$  if required. And in identifying the components in either equation, one geometrical and one related to physics, there is nothing difficult at all. The very same situation arises in the tensor

expressions we will examine, except for a special case we will later investigate, where I will provide you with all additional information anyhow. In this way the frightening mystery of tensors to those not familiar with them will disappear and so they will never again be intimidated by tensors.

The *order* or *rank* of a tensor is simply the total number of suffixes attached to it. These suffixes may be all subscripts or all superscripts or a combination of subscripts and superscripts. If the suffixes of a tensor are all subscripts the tensor is said to be *covariant*. If the suffixes are all superscripts the tensor is said to be *contravariant*. If there are both superscripts and subscripts the tensor is said to be *mixed*. We will be looking at only some 2<sup>nd</sup>-order tensors. That’s all we need to know about tensors for the time being, and there’s nothing complicated in this.

Now Einstein’s field equations<sup>4</sup> “... *couple the gravitational field (contained in the curvature of spacetime) with its sources.*” Qualitatively Einstein’s field equations are:

$$\text{Spacetime geometry} = -\kappa \times \text{causative matter (i.e. sources)}$$

where  $\kappa$  is merely a coupling constant. So although matter is still the cause of a gravitational field in General Relativity, the gravitational field is no longer a force of attraction between two or more bodies as it is in Newton’s theory but instead a curvature in the geometry of spacetime induced by the presence of the material sources. Thus spacetime and matter are *causally* linked in General Relativity. Carroll and Ostlie<sup>5</sup> say that,

“*Mass acts on spacetime, telling it how to curve. Spacetime in turn acts on mass, telling it how to move.*”

Einstein’s field equations take the mathematical form

$$G_{\mu\nu} = -\kappa T_{\mu\nu} \quad (1)$$

where  $G_{\mu\nu}$  is the Einstein tensor describing the curvature of spacetime (the geometry),  $T_{\mu\nu}$  the energy-momentum tensor describing the material sources of the ‘gravitational field’ that induce the curvature in spacetime, and  $\kappa$  is a coupling constant. There is no shape inherent in these equations. Shape is imposed upon the field equations as an entirely arbitrary mathematical device in order to facilitate an analytic solution. Two primary shapes have been used to achieve this: cylindrical symmetry and spherical symmetry, and in the latter case usually to conform to the spherical symmetry used for Minkowski spacetime, which Minkowski developed in relation to Special Relativity. Spherical symmetry is that which is used most and is used in the case of the Big Bang ‘solution’ by assuming spatial homogeneity. Since this imposition is entirely arbitrary due to

certain assumptions there is no *a priori* reason to suppose that any one shape of the Universe is somehow more ‘real’ than any other shape or that the Universe even has any shape at all! With ‘shape’ or ‘symmetry’ comes the equally arbitrary notion of ‘boundary’ and so there is no *a priori* reason to suppose that the Universe has an associated boundary. Indeed, Einstein<sup>6</sup> has remarked,

*“Given certain field variables and a system of field equations for them, the latter will not in general determine the field completely. There still remain certain free data for a solution of the field equations. The smaller the number of free data consistent with the field equations the ‘stronger’ is the system. It is clear that in the absence of any other viewpoint from which to select the equations, one will prefer a ‘stronger’ system to a lesser one.”*

The Big Bang creationism suffers from being subject to a large system of arbitrarily adjustable parameters that result in various models from which one is merely selected in order to satisfy Lemaître’s theistic *creatio ex nihilo* with its associated expansion of the Universe, with the latter being justified by an *ad hoc* reinterpretation of the Hubble-Humason red-shift with distance relation to a red-shift with recessional-velocity relation (i.e. Doppler effect on light). The earlier red-shift and blue-shift observations made by Vespo Slipher rarely even get a mention.

It is also a fact that there are no known solutions to Einstein’s field equations for two or more masses and a fact that there is no existence theorem by which it can even be asserted that his field equations contain latent solutions for two or more masses. That is why it is totally false, for example, to talk about multiple black holes, black holes interacting with one another and other matter, being components of binary systems, swallowing surrounding matter, merging or colliding. Nonetheless S. W. Hawking<sup>7</sup> says,

*“Also, suppose two black holes collided and merged together to form a single black hole. Then the area of the event horizon of the final black hole would be greater than the sum of the areas of the event horizons of the original black holes.”*

According to B. Schutz<sup>8</sup>,

*“... Hawking’s area theorem: in any physical process involving a horizon, the area of the horizon cannot decrease in time. ... This fundamental theorem has the result that, while two black holes can collide and coalesce, a single black hole can never bifurcate spontaneously into two smaller ones.*

*“Black holes produced by supernovae would be much harder to observe unless they were part of a binary system which survived the explosion and in which the other star was not so highly evolved.”*

It is however often asserted in the literature that numerical methods have resulted in solutions for multiple masses. This is not correct at all and is only an abuse of the term ‘numerical methods’ combined with wishful thinking, because without an existence theorem for multiple mass solutions to Einstein’s field equations one cannot say that multiple mass solutions exist. This is compounded by the fact that Einstein’s field equations are *highly nonlinear* and so the Principle of Superposition does not apply. In relation to the popular but erroneous method of linearisation of Einstein’s field equations, even the ardent relativist Wald<sup>9</sup> admits that,

*“The existence of exact solutions corresponding to a solution to the linearised equations must be investigated before perturbation analysis can be applied with any reliability.”*

In relation to solutions without ‘singularities’ Einstein<sup>6</sup> remarks,

*“Approximation methods are of no avail since one never knows whether or not there exists to a particular approximate solution an exact solution free of singularities.”*

The same can be said for ‘solutions’ that contain singularities, such as those for the alleged black hole. After all, all alleged black hole solutions to Einstein’s field equations pertain to a Universe that by mathematical construction contains no matter and so it is impossible to use numerical methods to generate multiple black holes in violation of the very mathematical definition of all black hole solutions being generated by solutions for a Universe that by mathematical construction contains no matter. In fact, since all black holes are obtained from a spacetime that by mathematical construction contains no matter, there is in fact no such thing as a black hole because the alleged black hole has mass and so it cannot appear in a spacetime that by mathematical construction contains no matter. It is very easy in fact to prove that General Relativity does not predict the black hole<sup>10,11,12,13,14</sup> at all and that Newton’s<sup>10,13,15</sup> theory too does not predict the black hole. Furthermore, as already mentioned, the Principle of Superposition does not apply in General Relativity. Mathematically this means that if  $X$  is a solution to Einstein’s field equations and  $Y$  is another solution then the linear combination  $aX + bY$ , where  $a$  and  $b$  are scalars, is *not* a solution. Physically this means that for some given solution (which we know pertains to

either an empty Universe or a Universe containing only *one* body because there are no known solutions to Einstein's field equations for two or more bodies) one cannot simply pile up (i.e. superimpose) matter into that solution to get multiple masses, charges, photons, electromagnetic fields, etc. as one might desire. It is for this reason that all claims for the discovery of multiple black holes are patently false. Multiple black holes and indeed multiple masses cannot be accounted for by General Relativity at all. Indeed, General Relativity cannot account for the simple experimental fact that two suspended fixed masses will approach one another upon release.

Thus, *all* known solutions to Einstein's field equations pertain to a Universe that contains no matter or allegedly either contains only one mass floating around in an infinite spacetime (e.g. the black hole) or is entirely filled by a single continuous indivisible homogeneous mass of some supposed macroscopic density and pressure either constant or a function of time. The Big Bang model allegedly consists of the latter case. Both models do not reflect the actual structure of the Universe we observe and so neither has any physical meaning. So how do the astrophysical scientists get multiple masses (including black holes), galaxies, stars, charges, electromagnetic fields, etc. into their General Relativistic models of the Universe? - they do so by simply applying the Principle of Superposition via a false analogy with Newton's theory of gravitation where the Principle of Superposition applies, in violation of the fact that the Principle of Superposition does not apply in General Relativity and in violation of the fact that there are no known solutions for two or more masses to Einstein's field equations or an existence theorem for two or more masses, and in violation of the additional physical principles of General Relativity and of experimental physics as we shall soon see.

### 3. Conservation of Energy and Mysticism

The conservation of energy is a very well established experimental principle in physics and it simply states that *energy can be neither created nor destroyed; only transformed from one type into another type*. Now according to the Big Bang *creatio ex nihilo* there was initially nothing; no spacetime, no mass, no energy, no photons, just nothingness. Then, from this nothingness, there allegedly appeared an instant presence of a huge amount of energy that expanded and formed fundamental particles, larger masses such as stars and galaxies, and ultimately all that now exists in the Universe. This obviously violates the experimentally well determined conservation of energy. To argue that physical principles themselves did not exist before the Big Bang *creatio ex nihilo* does not constitute a scientific argument by the very nature of the scientific method and so such an argument involves mysticism and myth, not the

empirical methods of science. Oddly too is that in the literature it is sometimes asserted that the Big Bang *creatio ex nihilo* was caused by a quantum fluctuation, which would mean that some strange kind of unsubstantiated quantum principle existed before the Big Bang *creatio ex nihilo* anyhow. But what does a quantum fluctuation in nothingness mean? Such an assertion also smacks of a linguistic vacuum. It is therefore quite meaningless too and so explains nothing for want of scientific validity.

It is well known to anthropologists that all human societies, prehistoric, ancient and modern (civilized or tribal) have all developed some kind of creation myth to account for the existence of the Universe or at least the immediate world around us, and the related fearful questions of life and death. It has been well established by anthropologists that the human condition craves for a meaning to and explanation of existence and associates this with the fundamental notion of cause and effect that is observed all around us in our everyday lives. It is from this basic inclination that mythology, superstition, sympathetic magic and theology have their etiology. The Big Bang *creatio ex nihilo* is no exception, but it is couched in such pseudo-scientific jargon and elaborate mathematics all in violation of actual physical science in both facts and methods, and an abuse of mathematical methods that confounds thereby physical entities with mathematical entities to give the façade of true scientific inquiry. Heaviside<sup>16</sup> made a penetrating quip in this regard:

*"It was once told as a good joke upon a mathematician that the poor man went mad and mistook his symbols for realities; as M for the moon and S for the sun."*

When an engineer designs and builds a bridge he does not confound his design equations with his physical bridge. Astrophysical scientists however tend to confound their mathematical symbols and equations with physical objects; for example, infinitely dense point-mass singularities. In this way anything can be and has been concocted and falsely presented as legitimate astrophysical science. It is rather ironic that many astrophysical cosmologists oppose theological notions of creationism in science but themselves resort to a creationism by means of Lemaître's theological Big Bang *creatio ex nihilo* of St. Thomas Aquinas to rebuke creationism.

### 4. Additional Physical Principles of General Relativity

Einstein asserted that his Principle of Equivalence and his laws of Special Relativity must hold in sufficiently small finite regions of his gravitational field, and that these regions can be located anywhere in his gravitational field. Here is what Einstein<sup>6</sup> says,

“Let now  $K$  be an inertial system. Masses which are sufficiently far from each other and from other bodies are then with respect to  $K$ , free from acceleration. We shall also refer these masses to a system of co-ordinates  $K'$ , uniformly accelerated with respect to  $K$ . Relatively to  $K'$  all the masses have equal and parallel accelerations; with respect to  $K'$  they behave just as if a gravitational field were present and  $K'$  were unaccelerated. Overlooking for the present the question as to the ‘cause’ of such a gravitational field, which will occupy us later, there is nothing to prevent our conceiving this gravitational field as real, that is, the conception that  $K'$  is ‘at rest’ and a gravitational field is present we may consider as equivalent to the conception that only  $K$  is an ‘allowable’ system of co-ordinates and no gravitational field is present. The assumption of the complete physical equivalence of the systems of coordinates,  $K$  and  $K'$ , we call the ‘principle of equivalence’; this principle is evidently intimately connected with the law of the equality between the inert and the gravitational mass, and signifies an extension of the principle of relativity to co-ordinate systems which are in non-uniform motion relatively to each other. In fact, through this conception we arrive at the unity of the nature of inertia and gravitation. For, according to our way of looking at it, the same masses may appear to be either under the action of inertia alone (with respect to  $K$ ) or under the combined action of inertia and gravitation (with respect to  $K'$ ).

“Stated more exactly, there are finite regions, where, with respect to a suitably chosen space of reference, material particles move freely without acceleration, and in which the laws of special relativity, which have been developed above, hold with remarkable accuracy.”

In their textbook, Foster and Nightingale<sup>4</sup> succinctly state the Principle of Equivalence thus,

“We may incorporate these ideas into the principle of equivalence, which is this: In a freely falling (nonrotating) laboratory occupying a small region of spacetime, the laws of physics are the laws of special relativity.”

Of the Principle of Equivalence Pauli<sup>17</sup> says,

“We can think of the physical realization of the local coordinate system  $K_o$  in terms of a freely floating, sufficiently small, box which is not subjected to any external forces apart from gravity, and which is falling under the influence of the latter. ... It is evidently natural to assume that the special theory of relativity should remain valid in  $K_o$ .”

In relation to the Principle of Equivalence Taylor and Wheeler<sup>18</sup> state in their book,

“General Relativity requires more than one free-float frame.”

Carroll and Ostlie<sup>5</sup> write,

“**The Principle of Equivalence:** All local, freely falling, nonrotating laboratories are fully equivalent for the performance of all physical experiments. ... Note that special relativity is incorporated into the principle of equivalence. ... Thus general relativity is in fact an extension of the theory of special relativity.”

Concerning the Principle of Equivalence, in the Dictionary of Geophysics, Astrophysics and Astronomy<sup>19</sup> we find,

“Near every event in spacetime, in a sufficiently small neighborhood, in every freely falling reference frame all phenomena (including gravitational ones) are exactly as they are in the absence of external gravitational sources.”

Note that both the Principle of Equivalence and Special Relativity are defined in terms of the *a priori* presence of multiple arbitrarily large finite masses and photons. Therefore neither the Principle of Equivalence nor Special Relativity can manifest in a spacetime that by mathematical construction either contains no matter or by mathematical construction contains only one mass. But all known solutions to Einstein’s field equations pertain to a Universe that consists either no matter or only one mass. The Big Bang *creatio ex nihilo* consists of a Universe that is entirely filled by a continuous indivisible distribution of mass with a monotonically decreasing macroscopic density and pressure or a finite averaged macroscopic density and zero pressure in terms of the energy-momentum tensor for a perfect fluid. It therefore violates the Principle of Equivalence and Special Relativity as required by Einstein for his gravitational field.

Big Bang *creatio ex nihilo*, owing to its mathematical structure of a single continuous indivisible mass distribution throughout the entire Universe, cannot account for the presence of multiple masses, such as stars, black holes, and galaxies, bearing in mind that the Principle of Superposition does not apply in General Relativity as explained in Section 2 above. So once again it is a physically meaningless model. So how do the astrophysical scientists get multiple masses such as stars and galaxies and black holes (primordial or otherwise), photons, electromagnetic fields, nebulae, etc. into the Big Bang *creatio ex nihilo* Universe? Very simple; they do so by applying the Principle of Super

position in violation of the fact that in General Relativity the Principle of Superposition does not apply.

## 5. The Big Bang Equation

We shall now consider the so-called FLRW (Friedmann-Lemaître-Robertson-Walker) metric or line-element i.e. distance formula, given by,

$$ds^2 = dt^2 - (R(t))^2 \left( \frac{dr^2}{(1-kr^2)} + r^2(d\theta^2 + \sin^2 \theta d\phi^2) \right) \quad (2)$$

where  $k$ , which is related to the spatial curvature, can take only the values  $-1, 0, 1$ , and the speed of light in vacuum  $c$  is set to unity so that the coefficient of  $dt^2$  is 1 rather than  $c^2$ . The term  $R(t)$  is a dimensionless scale factor that causes the spatial part of the metric to expand or contract, depending upon its form. There are a number of important things to note about this equation. It is obtained without any hypothesis about the presence of matter. The only requirements (see for example Tolman<sup>1</sup>) in its derivation are that the Universe is homogeneous and isotropic (an empty Universe is certainly homogeneous and isotropic) and on the assumption of homogeneity the metric is supposed to have spherical symmetry in the form,

$$ds^2 = dt^2 + g_{ij} dx^i dx^j \quad (i, j = 1, 2, 3).$$

The quantity  $g_{ij}$  is called the metric tensor. The  $dx^i$  and  $dx^j$  are not tensors; merely differential elements of the variables  $x^i$  and  $x^j$ .

The spatial geometry of the FLRW metric is given by,

$$d\sigma^2 = \left( \frac{dr^2}{(1-kr^2)} + r^2(d\theta^2 + \sin^2 \theta d\phi^2) \right). \quad (3)$$

Metric (3) “... is clearly flat if  $k = 0$ , but for  $k = \pm 1$  it is curved. For  $k = 1$  it is a space of constant positive curvature, the three-dimensional counterpart of a sphere, and the space is closed in the sense that it has a finite volume. For  $k = -1$  it is a space of constant negative curvature, and it is open in the sense that its volume is infinite.”<sup>4</sup>

In the derivation of metric (2) Tolman<sup>1</sup> remarks,

“... we have made no hypothesis as to the nature of the material filling the model ...” “We may now, however, introduce a more specific hypothesis by assuming the material filling the model can be treated as a perfect fluid.”

“... it will be noticed that the pressure and density are functions of the time  $t$  alone, and at a given value of  $t$  would be independent of position in the universe, in agreement with the spatial homogeneity of the model which we have already discussed.”

McMahon<sup>20</sup> says,

“To model the large-scale behavior of the universe such that Einstein’s equations are satisfied, we begin by modeling the matter and energy in the universe by a perfect fluid. The particles in the fluid are galaxy clusters and the fluid is described by an average density  $\rho$  and pressure  $P$ .”

Notice that McMahon has falsely ‘slipped in’ the notion of multiple masses by the words “The particles in the fluid are galaxy clusters...” despite introducing “average density  $\rho$  and pressure  $P$ ” by which the model is mathematically constructed as a Universe entirely filled by a single continuous indivisible homogeneous mass in terms of a perfect fluid. McMahon effectively applies the Principle of Superposition where it does not apply in order to obtain multiple galaxies in what is a one body model by means of a perfect fluid with averaged density and pressure. This is the standard method by which the astrophysical scientists insert multiple masses (including the fictitious black holes) and photons and electromagnetic fields and everything else in the real Universe into what is in actual fact a mathematically constructed model that is either an empty Universe or a one-body Universe, since General Relativity cannot accommodate two or more masses. Tolman<sup>1</sup> however remarks,

“In interpreting the expressions for density  $\rho_{oo}$  and pressure  $p_o$  ... it must be remembered that these quantities apply to the idealized fluid in the model, which we have substituted in place of the matter and radiation actually present in the real universe.”

Now the Big Bang *creatio ex nihilo* with its associated expansion of the Universe is obtained by means of selecting an appropriate *ad hoc* value of  $k$ , since  $k = 0$  and  $k = -1$  produce continuously expanding universes when taken in conjunction with an *ad hoc* formulation of the scale factor  $R(t)$  such that it produces expansion. In the case of  $k = 0$  there is no upper limit on the quantity  $r$  in the spatial metric (2) and hence in the metric (3) and so it is effectively an infinite spherically symmetric flat Universe without the presence of  $R(t)$  and so there is no meaning to expansion of an already infinite Universe. Taking  $k = 1$  produces a universe that expands to a maximum value and then contracts back down to zero. In addition,  $R(t)$  is conveniently formulated by means of a whole host of *ad hoc* assumptions, both quantitative and qualitative, which include re-interpreting the Hubble-Humason relation as a red-shift with recess-

sional-velocity relation (i.e. Doppler effect on light) instead of the red-shift with distance relation originally proposed by Hubble and Humason, and making  $R(t)$  such that  $R(0) = 0$ ; for instance arranging things so that  $R(t) = t^{2/3}$  or  $R(t) = t^{1/2}$ . All this is accomplished by a convoluted mathematical process in developing the Friedmann equations and playing around with them by adjusting various parameters in order to get the desired result – *creatio ex nihilo* and expansion of the Universe in the fashion of Lemaître’s creationism.

There is no point in investigating the mathematical complexities associated with the so-called Friedmann equations because that would plunge us into the pointless drudgery of playing the physically meaningless mathematical games of Big Bang *creatio ex nihilo* and its associated falsity of expansion of the Universe. The fact that a model that treats the Universe as a single continuous indivisible distribution of mass has no physical meaning is sufficient to invalidate the model, especially when we recall that such a model cannot satisfy Einstein’s requirement that his Principle of Equivalence and his Special Relativity must manifest in sufficiently small finite regions of his gravitational field and that both are defined in terms of the *a priori* presence of multiple arbitrarily large finite masses and photons; and that the Principle of Superposition does not apply in General Relativity; and that there are no known solutions to Einstein’s field equations for two or more masses and no existence theorem by which it can even be asserted that his field equations contain latent solutions for two or more masses; and that it is easily proven that General Relativity is invalid because it violates the usual conservation of energy and momentum, placing it in conflict with experiment on a very deep level.

## 6. Invalidity of General Relativity

To satisfy the requirement of the usual conservation of energy and momentum Einstein introduced his ‘pseudo-tensor’, denoted by the symbol  $t_{\nu}^{\mu}$ . We note that the pseudo-tensor, as we shall soon see, is *not* a tensor owing to its definition, and so it is not in keeping with Einstein’s requirement that all equations of physics must be tensorial so that the laws of physics are the same for all observers independent of their motion. This is a serious problem. The notation for the pseudo-tensor requires explanation. We see that there are two suffixes, one superscript and one subscript. Thus it is 2<sup>nd</sup>-order and mixed: its covariant order is one and its contravariant order is one and so its total order is two. We can write the energy-momentum tensor as a mixed tensor as well, thus:  $T_{\nu}^{\mu}$  and also the Einstein tensor too,  $G_{\nu}^{\mu}$ . We can also write the metric tensor as  $g_{\nu}^{\mu}$ . Similarly we can write these tensors in contravariant form:  $T^{\mu\nu}$ ,  $G^{\mu\nu}$  and  $g^{\mu\nu}$  merely for mathematical convenience when

necessary. How this is achieved is of no consequence for our discussion.

Now, according to Pauli<sup>17</sup> the components of Einstein’s pseudo-tensor are,

‘the “energy components” of the gravitational field’.

According to Eddington<sup>21</sup>  $t_{\mu}^{\sigma}$  denotes

“...potential energy, momentum and stress”,

and he also says,

“We call  $t_{\mu}^{\sigma}$  the pseudo-tensor-density of potential energy”.

Einstein<sup>22</sup> asserts that the sum of the energy and momentum of his gravitational field and its sources is given by,

$$\mathfrak{E} = (t_{\mu}^{\sigma} + T_{\mu}^{\sigma}). \quad (4)$$

Note that this is *not* a tensor sum since  $t_{\mu}^{\sigma}$  is not a tensor.

For energy and momentum to be conserved the divergence of the expression for the total energy and momentum of the gravitational field and the sources thereof must be zero. But the divergence of Einstein’s expression for the conservation of energy and momentum is an *ordinary divergence*, not a *tensor divergence*, contrary to his requirement that all the equations of physics be tensorial. Einstein<sup>22</sup> gives the *ordinary divergence* of his energy-momentum expression thus;

$$\frac{\partial(t_{\mu}^{\sigma} + T_{\mu}^{\sigma})}{\partial x_{\sigma}} = 0 \quad (5)$$

Einstein<sup>22</sup> says of equation (5),

“Thus it results from our field equations of gravitation that the laws of conservation of momentum and energy are satisfied.”

“... we have to introduce the totality of the energy components of matter and gravitational field.”

Now Einstein’s allegation that by equation (5) “... the laws of conservation of momentum and energy are satisfied” is completely false because Einstein’s pseudo-tensor is a meaningless concoction of mathematical symbols and so it *cannot* be used to make any calculations or to represent any physical entity or to model any physical phenomena. Thus, Einstein’s expression (4) for the total energy and

momentum of his gravitational field and the ordinary divergence (5) of it are nonsense. Here is the proof. Einstein's pseudo-tensor is defined as<sup>23</sup>:

$$\sqrt{-g} t_{\nu}^{\mu} = \frac{1}{2} \left[ \delta_{\nu}^{\mu} L - \left( \frac{\partial L}{\partial g_{,\mu}^{\sigma\beta}} \right) g_{,\nu}^{\sigma\beta} \right]$$

where

$$L = -g^{\alpha\beta} \left( \Gamma_{\alpha\kappa}^{\gamma} \Gamma_{\beta\gamma}^{\kappa} - \Gamma_{\alpha\beta}^{\gamma} \Gamma_{\gamma\kappa}^{\kappa} \right)$$

$$\Gamma_{bc}^a = \frac{1}{2} g^{ad} \left( \frac{\partial g_{dc}}{\partial x^b} + \frac{\partial g_{bd}}{\partial x^c} - \frac{\partial g_{bc}}{\partial x^d} \right)$$

Quite often in the literature  $\partial g_{ab}/\partial x^c$  is written in the simplified form  $g_{ab,c}$  and  $\partial g^{ab}/\partial x^c$  as  $g^{ab,c}$ . In tensor analysis we can perform a simple operation called *contraction* on a mixed tensor, which reduces the order of the tensor by two. We *contract* a mixed tensor (and Einstein's pseudo-tensor) by setting  $\nu = \mu$ . So contracting Einstein's pseudo-tensor gives an *invariant*  $t$ , thus<sup>23</sup>:

$$\sqrt{-g} t_{\mu}^{\mu} = \frac{1}{2} \left[ 4L - \left( \frac{\partial L}{\partial g_{,\mu}^{\sigma\beta}} \right) g_{,\mu}^{\sigma\beta} \right] \quad t_{\mu}^{\mu} = t$$

Performing the calculation of the second part inside the brackets (the details are not important for our purposes) gives:

$$\left( \frac{\partial L}{\partial g_{,\mu}^{\sigma\beta}} \right) g_{,\mu}^{\sigma\beta} = 2L$$

Substituting this result into the expression above and rearranging gives the invariant:

$$t = \frac{L}{\sqrt{-g}}$$

where  $g$  is the determinant of the metric tensor and hence is composed of the components of the metric tensor. By the definitions of  $L$ ,  $\Gamma_{bc}^a$  and  $g$ , we see that  $t$  is an invariant that is composed *solely* of the components of the metric tensor and their first derivatives<sup>23</sup>. Tolman<sup>1</sup> also remarks:

"... it will be noted that the value of  $t_{\mu}^{\nu}$  at any point will be determined by the values of the components of the metrical tensor  $g_{\alpha\beta}$  and their first derivatives  $\partial g_{\alpha\beta}/\partial x^{\gamma}$  at that point."

Now the pure mathematicians G. Ricci-Curbastro and T. Levi-Civita<sup>24</sup>, inventors of the tensor calculus, proved in

1900 that invariants that are composed *solely* of the components of the metric tensor and their first derivatives *do not exist!* Thus Einstein's pseudo-tensor is totally meaningless and hence his formulation of the usual conservation of energy and momentum totally invalid.

The upshot of this is that Einstein's field equations *must* take the following form<sup>23,25</sup>

$$\frac{G_{\mu\nu}}{\kappa} + T_{\mu\nu} = 0 \quad (6)$$

The  $G_{\mu\nu}/\kappa$  are the components of a gravitational energy tensor. This expression is not only the necessary form of Einstein's field equations, it is also an expression for the total sum of the energy and momentum of his gravitational field (compare with equation (4) above). Now the tensor divergence of both sides of this equation is zero so energy and momentum are conserved *but* the total energy of Einstein's gravitational field *is always zero*; the  $G_{\mu\nu}/\kappa$  and the  $T_{\mu\nu}$  *must vanish identically* (so that when  $T_{\mu\nu} = 0$  there is no spacetime and hence no gravitational field); there is *no possibility* for the localization of gravitational energy (i.e. *there are no Einstein gravitational waves*). This also means that Einstein's gravitational field *violates* the experimentally well-established usual conservation of energy and momentum making them inconsistent with experiment on a deep level and hence invalid. According to Pauli<sup>17</sup> Einstein

"... raised the objection that, with this definition of the gravitational energy, the total energy of a closed system would always be zero, and the maintenance of this value of the energy does not require the continued existence of the system of one form or other. The usual kind of conclusions could not then be drawn from the conservation laws."

But Einstein's objections are futile on account of the failure of his formulation of the usual conservation of energy and momentum. Thus, General Relativity is invalid.

We can of course rewrite equation (6) in mixed tensor form so that it more closely resembles expression (4), thus

$$\frac{G_{\nu}^{\mu}}{\kappa} + T_{\nu}^{\mu} = 0.$$

In either case the result is necessarily the very same.

## 7. The Cosmic Microwave Background

In view of the foregoing discussion it is quite clear that the so-called Cosmic Microwave Background Radiation (CMBR) is not the afterglow of a Big Bang *creatio ex nihilo* since the Big Bang Cosmology has no valid basis



whatsoever in any scientific theory, and especially since General Relativity itself is invalid. What then is the true nature of the CMBR? In 1965 Penzias and Wilson<sup>26</sup> reported the detection of an isotropic signal that they interpreted as of cosmic origin. However, their observations were from the ground and in all directions they pointed their antenna they detected this signal. There was no valid reason for them to have supposed that this signal is of cosmic origin. It did not occur to them and the astrophysical scientists of the time that the signal they detected could have been quite possibly due to emissions from the Earth that are scattered by the atmosphere thereby resulting in an isotropic signal from an Earth-bound anisotropic source. Contemporary astrophysical scientists still cling to the alleged cosmic origin of the CMBR as a remnant of the Big Bang *creatio ex nihilo* and rely heavily on this claim to validate Big Bang creationism.

In recent years it has been alleged by the scientific teams of the COBE and WMAP satellites that the CMBR has been detected as a cosmic source. However, these claims do not stand up to scientific analysis by any stretch of the imagination. Professor Pierre-Marie Robitaille of Ohio State University, an foremost expert in imaging science, has carried out very detailed analyses of the COBE<sup>27</sup> and WMAP<sup>28</sup> satellites and the reports of their scientific teams and has revealed thereby that both COBE and WMAP have contributed nothing of any value to science other than confirming the presence of a dipole signal, already detected previously by the Russian Relikt-1 satellites<sup>29</sup> and experiments with balloons. Robitaille has shown without any doubt that both COBE and WMAP are so riddled with design faults and inappropriate and substandard signal processing methods that neither satellite has produced anything useful to science. For instance, the imaging instruments of WMAP have an effective signal to noise ratio barely greater than unity, at best, and so WMAP is incapable of distinguishing signal from noise, yet its scientific team claims to have successfully mapped the Galaxy. Robitaille<sup>28</sup> remarks,

*“WMAP is unable to confirm that the ‘anisotropic signal’ observed at any given point is not noise. The act of attributing signal characteristics to noise does not in itself create signal”*

*“The requirement that the signals of interest are frequency independent cannot be met, and has certainly never been proven.”*

*“There is no single map of the anisotropy, since all maps are equally valid, provided coefficients sum to 1.”*

*“There is no unique solution and therefore each map is indistinguishable from noise. There are no findings relative to anisotropy, since there are no features in the maps which could guide astrophysics relative to the true solution.”*

*“WMAP images do not meet accepted standards in medical imaging research.”*

The radiation shield of the FIRAS instrument on COBE is defective and so signal from the sky has been diffracted over the shield into the FIRAS horn. Furthermore, the scientific teams of both the COBE and WMAP satellites claim to have extracted a signal that is ~1000 times weaker than the galactic foreground (i.e. the noise) when they have no *a priori* knowledge of the nature of the signal and no ability to manipulate the signal source. They have therefore claimed to have achieved a feat with obsolete equipment that laboratory experience has shown to be impossible, even with the most sophisticated equipment in the best radiological laboratories in the world today.

George Smoot<sup>30</sup>, the principal investigator for the COBE Differential Microwave Radiometers (DMR), relates that to extract the weak multipoles by data processing, which Smoot calls *“wrinkles in the fabric of time”*, required first the removal of the dipole, galactic foreground, and the quadrupole signals. Smoot puzzled over why the multipoles did not appear until the quadrupole was finally removed by data processing methods, since the raw data contained no systematic signal variations. Robitaille’s<sup>27</sup> answer is simple: *“when Smoot and his colleagues imposed a systematic removal of signal, they produced a systematic remnant. In essence, the act of removing the quadrupole created the multipoles and the associated systematic anisotropies”*. Smoot’s *“wrinkles in the fabric of time”* are nothing more than consistent residual ghost signals produced by his data processing. The appearance of such systematic ghost signals throughout an image when processing large contaminating signals is very well known in medical radiology. Robitaille<sup>27,28</sup> advises that *“Apparent anisotropy must not be generated by processing”*.

Owing to the very many defects in the COBE satellite and the inappropriate and substandard signal processing methods applied by the COBE-FIRAS team, the claim that COBE determined the *most perfect blackbody spectrum ever measured* is patently false.

Robitaille<sup>27,28,29,31,32</sup> has cogently argued that the CMBR is actually due to emissions from the oceans of the Earth, scattered by the atmosphere, thereby producing an isotropic signal from an anisotropic source. He has pointed out that we know from submarines at sea and from microwave ovens in the home that water is a powerful absorber, and hence emitter, in the far-infrared and microwave bands. Robitaille<sup>33</sup> has also analysed the emissions from hydrogen

bonds in water and proven that Kirchhoff's Law of Thermal Emission<sup>34,35,36</sup> is not universal, contrary to Kirchhoff's claims and adopted by physicists ever since. Crothers<sup>37</sup> remarks,

*'The COBE and WMAP teams model the Earth as a black-body source of emission at ~ 280 K. But Robitaille points out that "since the oceans are not enclosed" they do not satisfy the requirements for application of Kirchhoff's law of thermal emission, and so the emission profiles of the oceans "do not necessarily correspond to their true temperatures". By means of scattering in steady-state conditions, Robitaille argues: "Consequently, a mechanism for creating isotropy from an anisotropic ocean signal is indeed present for the oceanic ~3 K Earth Microwave Background".'*

Now even in the unlikely event that the so-called CMBR is not ultimately reassigned to the oceans of the Earth this does not alter the fact that neither COBE nor WMAP have contributed anything of value to science, or the fact that the CMBR is not the afterglow of a Big Bang *creatio ex nihilo*, since the Big Bang Cosmology is a fiction.

### Dedication

I dedicate this paper to my late brother:

**Paul Raymond Crothers**  
12<sup>th</sup> May 1968 – 25<sup>th</sup> December 2008

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