REFUTATION OF METRIC BASED GENERAL RELATIVITY FOR SPHERICALLY SYMMETRIC SPACETIMES.

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ABSTRACT

It is shown straightforwardly that metric based general relativity is meaningless in spherically symmetric spacetimes because it contains an irretrievable self inconsistency. The infinitesimal line element of a spherically symmetric spacetime is defied in terms of a function m (r), but constancy of total energy and total angular momentum implies that m (r) itself must be a constant independent of r. Therefore metric based general relativity, a mainstay of twentieth century physics, must be abandoned. The only possibility now is that general relativity may be valid for the most general possible line element, but in that case the subject becomes untenable because of the complexity of the relation between metric and connection. Connection based general relativity as in ECE theory is still valid.

Keywords: refutation of metric based general relativity, ECE theory.

UFT 194

1. INTRODUCTION

In recent papers of this series {1 - 10} it has been demonstrated in a simple and easily understandable way that Einsteinian general relativity cannot be a correct theory of physics. In the previous paper UFT 193 for example (see www.aias.us) it was shown that the Einsteinian general relativity (EGR) produces a force law that cannot describe a precessing elliptical orbit. The same methods as used in EGR were used in UFT 193 to produce the correct force law of attraction for a precessing elliptical orbit. This result means that Einstein could not possibly have produced the precession of Mercury as claimed endlessly in the dogmatic literature that has grown up around EGR. In UFT 150 and 155 it was shown that light bending by gravitation and gravitational time delay cannot be described by EGR. In Section 2 it is shown straightforwardly that metric based general relativity in a spherically symmetric spacetime contains an irretrievable self inconsistency in that it is defined in terms of an r dependent function m(r), where r is the radial coordinate, but its own equation of motion requires the total energy E and total angular momentum L to be constants of motion. It is shown for the first time in this paper that the constancy of E and L implies the constancy of m(r), a self contradiction at the most fundamental level. EGR is one of those theories that can be constructed in a spherically symmetric spacetime, and is invalidated completely and irretrievably by the constancy of m(r).

In Section 3 the future directions and options remaining for general relativity are discussed. At present, metric based general relativity could only be valid in the most general spacetime, where spherical symmetry is not assumed. However that would make the subject untenable due to the resulting complexity of the relation between the connection and metric. Connection based general relativity such as used in the field equations of ECE theory, the only available unified field theory, is still valid, because the metric is used only indirectly in raising and lowering indices. The standard model of physics and cosmology is refuted completely and irretrievably by this and other papers of the ECE series.

2 SELF INCONSISTENCY OF METRIC BASED GENERAL RELATIVITY IN A SPHERICALLY SYMMETRIC SPACETIME.

Consider the infinitesimal line element of a spherically symmetric spacetime {11}:

$$ds^2 = c^2 d\tau^2 = m(r)\, c^2 dt^2 - \frac{dr^2}{m(r)} - r^2 d\theta^2 \quad -(1)$$

in cylindrical coordinates (r, θ) in the plane:

$$dZ^2 = 0. \quad -(2)$$

In general {11} m is a function of r and t but for simplicity of argument and without loss of generality it can be considered to be a function of r. Here τ is the proper time, t is the time in the laboratory frame of the observer and c is the vacuum speed of light that is assumed to be a universal constant in general relativity. The total energy E and total angular momentum L are constants of motion defined by:

$$E = m(r)\, m c^2 \frac{dt}{d\tau} \quad -(3)$$

and

$$L = m r^2 \frac{d\theta}{d\tau} = m r^2 \frac{d\theta}{dt}\frac{dt}{d\tau}. \quad -(4)$$

By definition {12} the line element is:

$$ds^2 = c^2 d\tau^2 = m(r)\, c^2 dt^2 - d\underline{r} \cdot d\underline{r} \quad -(5)$$

where:

$$d\underline{r} \cdot d\underline{r} = v^2 dt^2 = \frac{dr^2}{m(r)} + r^2 d\theta^2. \quad -(6)$$

So in general:

$$c^2 d\tau^2 = \left(m(r)c^2 - v^2\right) dt^2 \quad -(7)$$

and:

$$\frac{dt}{d\tau} = \left(m(r) - \frac{v^2}{c^2}\right)^{-1/2} \quad -(8)$$

Therefore the constant angular momentum is defined as follows:

$$L = mr^2 \frac{d\theta}{dt}\left(m(r) - \frac{v^2}{c^2}\right)^{-1/2} . \quad -(9)$$

From previous work in this series {1 - 10} the angular velocity is defined by:

$$\omega = \frac{d\theta}{dt} = \frac{cb}{r^2} m(r) \quad -(10)$$

where the constant b is defined by:

$$b = c\frac{L}{E} . \quad -(11)$$

Therefore:

$$L = mcbm(r)\left(m(r) - \frac{v^2}{c^2}\right)^{-1/2} \quad -(12)$$

which is the following quadratic for m (r):

$$(mcb)^2 m^2(r) - L^2 m(r) + \frac{L^2 v^2}{c^2} = 0 \quad -(13)$$

Its solution, checked by computer, is:

$$m(r) = \frac{1}{2}\left(\frac{E}{mc^2}\right)^2\left[1 \pm \left(1 - 4\frac{v^2}{c^2}\left(\frac{mc^2}{E}\right)^2\right)^{1/2}\right] \quad -(14)$$

Similarly the total energy E is a constant of motion defined by:

$$E = n(r) m c^2 \left(n(r) - \frac{v^2}{c^2} \right)^{-1/2} \quad -(15)$$

Solving this equation leads to eq. (14) again self consistently.

Using Eq. (6) the velocity in Eq. (15) is defined by:

$$v^2 = \frac{1}{n(r)} \left(\frac{dr}{dt} \right)^2 + r^2 \left(\frac{d\theta}{dt} \right)^2 . \quad -(16)$$

In metric based general relativity for any spherical spacetime:

$$\frac{dr}{dt} = c b n(r) \left(\frac{1}{b^2} - n(r) \left(\frac{1}{a^2} + \frac{1}{r^2} \right) \right)^{1/2} \quad -(17)$$

and the angular velocity in any spherical spacetime is:

$$\omega = \frac{d\theta}{dt} = \frac{c b n(r)}{r^2}, \quad a = \frac{L}{mc}, \quad b = \frac{cL}{E} . \quad -(18)$$

Therefore:

$$v^2 = c^2 n(r) \left(1 - \left(\frac{mc^2}{E} \right)^2 n(r) \right) \quad -(19)$$

where the following result has been used:

$$\frac{b}{a} = \frac{mc^2}{E} . \quad -(20)$$

It is seen that Eq. (15) and (19) are the same, self consistently. For a metric of type (1), the standard theory uses a null Ricci tensor and symmetric connection to obtain the metric:

$$ds^2 = c^2 d\tau^2 = \left(1 - \frac{r_0}{r} \right) c^2 dt^2 - \left(1 - \frac{r_0}{r} \right)^{-1} dr^2 - r^2 d\theta^2 \quad -(21)$$

which is commonly but erroneously attributed to Schwarzschild. This is the only possible standard solution for a metric of type (1). If this metric is used in the equation for orbital linear velocity:

$$d\underline{r} \cdot d\underline{r} = v^2 dt^2 \quad -(22)$$

the result is:

$$\frac{v^2}{c^2} = \left(1 - \frac{r_0}{r}\right)\left(1 - \left(\frac{mc^2}{E}\right)^2\left(1 - \frac{r_0}{r}\right)\right) \quad -(23)$$

which is the result of special relativity:

$$E \xrightarrow[r \to \infty]{} \left(1 - \frac{v^2}{c^2}\right)^{-1/2} mc^2 . \quad -(24)$$

Therefore in general, v does not reduce to zero as m (r) reduces to 1. However, using Eq. (24) back in the original Eq. (14) gives:

$$m(r) \xrightarrow[r \to \infty]{} \frac{1}{2}\left(\frac{E}{mc^2}\right)^2\left(1 \pm \left(1 - 4\left(\frac{mc^2}{E}\right)\left(1 - \left(\frac{mc^2}{E}\right)^2\right)\right)^{1/2}\right) \quad -(25)$$

which means that m (r) is not unity in general. This is a basic self contradiction that is resolved if and only if:

$$E = mc^2, \quad m(r) = 1, \quad v = 0. \quad -(26)$$

However, this result means that the particle has no velocity, whereas the original theory set out to describe a particle moving with any velocity. In addition, previous work in UFT190 ff. Has shown that the function (21) does not produce a precessing ellipse.

Therefore the gravitational sector of the standard model has been refuted completely.

3. THE FUTURE OF GENERAL RELATIVITY

It may be possible to devise a metrical theory of general relativity in the most general spacetime without assuming spherical symmetry. The aim would be to produce observed orbits from the infinitesimal line element of the most general spacetime. Such a theory would be very obscure and complicated, notably in the relation between metric and connection, and it is not known whether or not it would reduce correctly to special relativity. In UFT 193 classical lagrangian methods were shown to give a precessing ellipse, light bending and gravitational time delay without the use of any kind of relativity and that is a method of classifying observable orbits in terms of force laws. There appears to be no universal force law for all cosmological objects and systems. Connection based general relativity originally produced the Einstein field equation via the so called "second Bianchi identity" {11}. However recent work {1 - 10} has uncovered numerous irretrievable errors in those methods of circa 1915, notably the neglect of torsion. The correct geometry must be one which uses torsion, and an adequate geometry is the one due to Cartan upon which ECE theory is based directly. The connection used in Cartan's type of geometry is the spin connection, and its two fundamental equations are the Cartan Maurer structure equations which define the torsion form and the curvature form with the Cartan tetrad and the spin connection. This geometry is valid in any mathematical space and any dimension.

It is known following the simple but conclusive argument in Section 2 of this paper that the space of ECE theory cannot be spherically symmetric. An attempt to construct a unified field theory based on relativity cannot be based on a spherical spacetime and any attempt must be based on the connection based field equations of ECE. These are structurally identical for electrodynamics and dynamics. So the aim of future work will include attempts at deriving orbital theory from the ECE field equations without the use of an infinitesimal line element.

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