CONSTANT m THEORY OF CLASSICAL DYNAMICS

by

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ABSTRACT

The m theory and Evans Eckardt equations of motion are developed for a constant m theory, which is known from a lagrangian method to infer a new type of orbit in the S2 star, one which is an ellipse but which is not Keplerian or Newtonian. It is an ellipse generated with a constant m theory. The constant m theory is shown to replace black hole theory, which is meaningless because Einsteinian general relativity has been refuted in many independent ways.

Keywords: m theory, constant m, classical dynamics.

UFT 423

1. INTRODUCTION

In immediately preceding papers of this series {1 - 41} the m theory of relativistic classical dynamics has been developed in terms of a general m function in which m can have any dependence on r. In UFT419 it was shown the orbit of the S2 star can be described with a constant m function, and it was shown that the S2 star orbits in an ellipse which is not however a Newtonian or Keplerian ellipse. It is an ellipse that can only be described by m theory with a constant m. The central mass about which the S2 star orbits is also described by m theory and in Section 2 the theory is developed. Section 2 is based on Note 420(2). In section 3 some computational and graphical analysis is given of the main results of Section 2.

2. THE CONSTANT m THEORY.

In general the equations of motion of m theory are the Evans Eckardt equations of motion:

$$\frac{dH}{dt} = 0 \quad -(1)$$

and

$$\frac{dL}{dt} = 0 \quad -(2)$$

where H is the hamiltonian:

$$H = m(r)\gamma mc^2 - m(r)^{1/2}\frac{mMG}{r} \quad -(3)$$

and L is the angular momentum:

$$L = \frac{\gamma mr^2}{m(r)}\dot{\phi}. \quad -(4)$$

The generalized Lorentz factor is:

$$\gamma = \left(m(r) - \frac{v_N^2}{m(r)c^2} \right)^{-1/2} \quad -(5)$$

Here m is a mass in orbit around M and G is the gravitational constant. The Newtonian velocity is defined by:

$$v_N^2 = \dot{r}^2 + r^2 \dot{\phi}^2 \quad -(6)$$

in plane polar coordinates (r, ϕ). The total relativistic energy in m theory is defined by:

$$E = m(r)\,\gamma\, m c^2 \quad -(7)$$

and the potential energy by:

$$U = - m(r)^{1/2} \frac{mMG}{r} \quad -(8)$$

The m (r) function is described by the infinitesimal line element:

$$ds^2 = c^2 d\tau^2 = m(r)c^2 dt^2 - \frac{dr^2}{m(r)} - r^2 d\phi^2 \quad -(9)$$

of the most general spherically symmetric spacetime.

A lagrangian method developed in immediately preceding UFT papers gives the equations of motion:

$$F(r) = m(\ddot{r} - r\dot{\phi}^2) = m\left[\frac{dm(r)}{dr} \left(c^2 m(r) + \frac{MG}{2\gamma^3 r\, m(r)^{1/2}} - \frac{3c^2}{2\gamma^2} \right) - \frac{1}{m(r)}\frac{dm(r)}{dr}\dot{\phi}^2 r^2 \left(2 - \frac{MG}{2\gamma^2 c^2 m(r)^{1/2}} \right) - MG\left(\frac{m(r)^{1/2}}{\gamma^3 r^2} + \frac{\dot{\phi}^2}{\gamma c^2 m(r)^{1/2}} \right) \right] \quad -(10)$$

and

$$r\ddot{\phi} + 2\dot{\phi}\dot{r} = r\dot{\phi}\dot{r}\left(\frac{1}{m(r)}\frac{dm(r)}{dr}\left(2 - \frac{MG}{2\gamma c^2 r\, m(r)^{1/2}} \right) + \frac{MG}{\gamma c^2 r^2 m(r)^{1/2}} \right) \quad -(11)$$

which can be integrated by computer. However the more fundamental method is the direct integration of Eqs. (1) and (2), and will be developed in future work. Eq. (10) is the Leibniz equation in m space and Eq. (11) is the conservation of angular momentum in m space. These equations produce an entirely new physics and cosmology, for example forward and retrograde precession, shrinking and expanding orbits, superluminal motion, infinite energy from m space, and much more. Eqs. (10) and (11) can be solved on a laptop but under some circumstances it is an advantage to use a simpler structure obtained by assuming:

$$\frac{dm(r)}{dr} = 0 \qquad -(12)$$

so that m (r) is a constant independent of r:

$$m(r) := \mu . \qquad -(13)$$

As shown in UFT419 this assumption is enough to produce the orbit of the S2 star.

Under the assumption (12), Eq. (10) simplifies to:

$$m\left(\ddot{r} - r\dot{\phi}^2\right) = -mMG\left(\frac{\mu^{1/2}}{\gamma^3 r^2} + \frac{\dot{\phi}^2}{\gamma c^2 \mu^{1/2}}\right) \qquad -(14)$$

and Eq. (11) simplifies to:

$$r\ddot{\phi} + 2\dot{\phi}\dot{r} = MG\left(\frac{\dot{\phi}\dot{r}}{\gamma c^2 r \mu^{1/2}}\right) \qquad -(15)$$

where:

$$\frac{1}{\gamma} = \left(\mu - \frac{\dot{r}^2 + r^2\dot{\phi}^2}{\mu c^2}\right). \qquad -(16)$$

The orbits produced by Eqs. (14) and (15) are graphed as a function of μ

in Section 3.

The Newtonian velocity in Eqs. (14) and (15) is:

$$v_N^2 = \dot{r}^2 + r^2 \dot{\phi}^2 \quad -(17)$$

and in the limit:

$$v_N << c \quad -(18)$$

it follows that:

$$\frac{1}{\gamma} \rightarrow \mu^{1/2}. \quad -(19)$$

The limit (18) corresponds to:

$$c \rightarrow \infty \quad -(20)$$

in comparison with v_N. Note carefully that Eq. (20) is meant to convey the fact that v_N is much less than c. It does not mean that c becomes infinite, because c is a universal constant. In these limits Eqs. (14) and (15) reduce to:

$$m(\ddot{r} - r\dot{\phi}^2) = -\mu^2 \frac{mMG}{r^2} \quad -(21)$$

and

$$r\ddot{\phi} + 2\dot{\phi}\dot{r} = 0. \quad -(22)$$

Eq. (21) indicates that the effective mass about which m orbits is

$$M(\text{effective}) := M_1 = \mu^2 M. \quad -(23)$$

In the Newtonian limit:

$$\mu \rightarrow 1. \quad -(24)$$

Eqs. (21) and (22) give an ellipse with half right latitude:

$$\alpha = \frac{L^2}{m^2 M_1 G} \quad -(25)$$

and ellipticity:

$$\epsilon = \left(1 + \frac{2HL^2}{m^3 M_1 G}\right)^{1/2} . \quad -(26)$$

All the orbital characteristics are determined by a choice of m space, i.e. by a choice of μ.

The hamiltonian in the Newtonian limit is:

$$H = \frac{1}{2} m v_N^2 - \frac{m M_1 G}{r} \quad -(27)$$

where:

$$v_N^2 = M_1 G \left(\frac{2}{r} - \frac{1}{a}\right) \quad -(28)$$

and:

$$a = \frac{\alpha}{1-\epsilon^2} \quad -(29)$$

is the semi major axis of the ellipse. From Eqs. (27) and (28):

$$H = \frac{1}{2} m M_1 G \left(\frac{2}{r} - \frac{1}{a}\right) - \frac{m M_1 G}{r} = -\frac{m M_1 G}{a} \quad -(30)$$

with magnitude or modulus:

$$|H| = \frac{m M_1 G}{a} \quad -(31)$$

so:

$$a = \frac{\alpha}{1-\epsilon^2} = \frac{m M_1 G}{|H|} . \quad -(32)$$

The semi minor axis is:

$$b = \frac{\alpha}{(1-\epsilon^2)^{1/2}} = \frac{L}{(2m|H|)^{1/2}} \quad -(33)$$

and the distance of closest approach of m to M is:

$$r_{min} = a(1-\epsilon) = \frac{\alpha}{1+\epsilon}. \quad -(34)$$

The maximum separation of m from M is:

$$r_{max} = a(1+\epsilon) = \frac{\alpha}{1-\epsilon}. \quad -(35)$$

The angular momentum in the Newtonian limit is:

$$L = mr^2\dot{\phi}. \quad -(36)$$

From Eqs. (25) and (26) it is clear that the half right latitude α decreases as M_1 increases, i.e. as μ increases, and the ellipticity decreases as μ increases.

All orbits are governed by the choice of spherical spacetime. The choice of μ determines the orbit. The concept of central mass is defined by spherical spacetime with constant μ as in Eq. (23). If M is regarded as the unit kilogram in S. I. Units the central mass is:

$$\underline{M} = \mu^2 \, kg. \quad -(37)$$

Precession is introduced by Eqs. (14) and (15), and general orbital characteristics are defined by Eqs. (10) and (11). For whirlpool galaxies the most general orbit that gives the observed constant v as r becomes infinite is:

$$\phi = \frac{1}{m}\int\left(\frac{m(r)}{A}\left(m(r) - \frac{A}{m(r)c^2}\right)\right)^{1/2}\frac{dr}{r^2} \quad -(38)$$

If the following choice is made:

$$\mu = \mu_1 + \mu_2 + \cdots + \mu_n \quad -(39)$$

then the whirlpool galaxy consists of n orbits of type (38). For constant m (r):

$$\phi = \frac{1}{m}\left(\frac{\mu}{A}\left(\mu - \frac{A}{\mu c^2}\right)\right)^{1/2}\int\frac{dr}{r^2} \quad -(40)$$

$$= -\, r_0 / r$$

which is a spiral with:

$$r_0 = \frac{1}{m}\left(\frac{\mu}{A}\left(\mu - \frac{A}{\mu c^2}\right)\right)^{1/2} \quad -(41)$$

In general, m (r) depends on r and cannot be taken outside the integral, so Eq. (38) must be integrated numerically to produce all kinds of galactic structures. If the folloing choice is made:

$$m(r) = m_1(r) + m_2(r) + \cdots + m_n(r) \quad -(42)$$

the number of spiral like features is n.

3. COMPUTATION AND GRAPHICS

Section by Dr. Horst Eckardt.

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