THE m THEORY IN HAMILTON DYNAMICS

by

M. W. Evans and H. Eckardt,

Civil List and AIAS / UPITEC

(www.aias.us, www.upitec.org, www.et3m.net, www.archive.org, www.webarchive.org.uk)

ABSTRACT

Using the Hamilton Principle of Least Action and the Hamilton canonical equations, it is shown that m theory is rigorously self consistent. A new equation of motion is derived for m theory from the Hamiltonian dynamics combined with the Euler Lagrange dynamics.

Keywords: ECE2 Theory, m Theory, Hamilton Dynamics.

4FT 425

1. INTRODUCTION

In recent papers of this series {1 - 41} it has been shown that a new source of energy is available in the most general spherically symmetric sapcetime, ("m space") characterized by a function m (r) in the relevant infinitesimal line element. In Section 2 of this paper it is shown that the combined use in m theory of the well known Euler Lagrange and Hamilton dynamics produces a new equation of motion. The canonically conjugate variables of m theory in Hamilton dynamics are defined, and the hamiltonian expressed in terms of these variables. Computation and solution of the new equation of motion provides a great deal of new information about m theory.

This paper is a brief synopsis of detailed notes accompanying UFT425 on www.aias.us. Note 425(1) considers the Hamilton equation in special relativity and defines its well known canonically conjugate generalized coordinates p and q. Note 425(2) reviews the fundamental theory of the Hamilton canonical equations on the Newtonian level and in special relativity and m theory. The conjugate coordinates p and q are defined in each case and the Hamilton equations derived from Hamilton's Principle of Least Action and it shown in detail that Hamilton's dynamics are valid in special relativity and m theory. The new equation of motion of this paper is derived. These results are consolidated and developed in Note 425(3), and the vector Hamilton equations introduced. It is shown that the fundamental theory produces a new equation of motion of m theory in a precisely self consistent way and various solutions of the new equation of motion are discussed. In Note 425(4) the Lagrange equations are used to define the hamiltonian in a well known method and the Hamilton equations derived from the Euler Lagrange equations. The Hamilton equations are exemplified on the Newtonian level for ease of reference. In Note 425(5) the Hamilton equations are used in special relativity and p and q defined in special relativity. These notes are background calculations for the derivation of the new equation of motion of m theory.

2. DERIVATION OF THE NEW EQUATION OF MOTION OF m THEORY.

As shown in Note 425(2) the fundamental equations of m theory in frame (r_1, ϕ) are as follows. The frame is defined by:

$$r_1 = \frac{r}{m(r)^{1/2}} \quad -(1)$$

and as shown in UFT417 ff is needed for self consistency. The lagrangian of m theory is:

$$\mathcal{L} = -mc^2 \left(m(r_1) - \frac{1}{c^2} \left(\dot{r}_1^2 + r_1^2 \dot{\phi}^2 \right) \right)^{1/2} + \frac{mMG}{r_1} \quad -(2)$$

where the potential energy is:

$$U = -\frac{mMG}{r_1} \quad -(3)$$

and describes a mass m orbiting a mass M in a plane. Here G is the Newton constant. The generalized Lorentz factor of m theory is:

$$\gamma = \left(m(r_1) - \frac{v_1^2}{c^2} \right)^{-1/2} \quad -(4)$$

where:

$$v_1^2 = \dot{r}_1^2 + r_1^2 \dot{\phi}^2 \quad -(5)$$

in frame (r_1, ϕ). As shown in UFT424 the hamiltonian of m theory is derived from the lagrangian as follows:

$$H = \frac{p_1^2 c^2}{\gamma m c^2} - \mathcal{L}. \quad -(6)$$

The total relativistic energy of m theory is:

$$E = m(r_1) \gamma m c^2 \quad -(7)$$

and the Einstein energy equation in m space is:

$$E^2 = m(r_1)\left(p_1^2 c^2 + m^2 c^4\right). \quad -(8)$$

The Euler Lagrange equations in m space are:

$$\frac{d}{dt}\frac{\partial \mathcal{L}}{\partial \dot{r}_1} = \frac{\partial \mathcal{L}}{\partial r_1} \; ; \; \frac{d}{dt}\frac{\partial \mathcal{L}}{\partial \dot{\phi}} = \frac{\partial \mathcal{L}}{\partial \phi} \quad -(9)$$

and the Hamilton canonical equations in m space are:

$$\dot{p}_1 = -\frac{\partial H}{\partial r_1} \quad -(10)$$

and

$$\dot{q}_1 = \frac{\partial H}{\partial p_1} \quad -(11)$$

with canonically conjugate generalized coordinates:

$$p_1 = \gamma m v_1 \, , \; q_1 = r_1 \quad -(12)$$

and:

$$p_\phi = L \, , \; q_\phi = \phi \quad -(13)$$

where L is the angular momentum of m theory:

$$L = \gamma m r_1^2 \dot{\phi}. \quad -(14)$$

This is a constant of motion, so:

$$\frac{dL}{dt} = 0. \quad -(15)$$

Note carefully that the lagrangian is defined by

$$\mathcal{L} = \mathcal{L}(q, \dot{q}, t) \quad -(16)$$

and the hamiltonian is defined by:

$$H = H(q, p, t) \quad -(17)$$

in which p and q are generalized coordinates that are canonically conjugate and independent as is well known. On the other hand $\dot{q}$ and q are not independent. It is also possible to define the vector Hamilton equations:

$$\dot{\underline{p}}_1 = -\frac{\partial H}{\partial \underline{q}_1} \quad -(18)$$

and

$$\dot{\underline{q}}_1 = \frac{\partial H}{\partial \underline{p}_1} . \quad -(19)$$

The canonically conjugate generalized coordinates of m theory are:

$$p_1 = \gamma m v_1 , \quad q_1 = r_1 \quad -(20)$$

and in general the hamiltonian and lagrangian of m theory are related by:

$$\mathcal{L} = p_1 \dot{q}_1 - H \quad -(21)$$

As shown in UFT424:

$$p_1 \dot{q}_1 = m(r_1) \gamma m c^2 - \frac{m c^2}{\gamma} . \quad -(22)$$

In the lagrangian formulation of m theory:

$$\dot{p}_1 = \frac{\partial \mathcal{L}}{\partial r_1} \quad -(23)$$

and in the hamiltonain formulation of m theory:

$$\dot{p}_1 = -\frac{\partial H}{\partial r_1} . \quad -(24)$$

It follows that:

$$\frac{\partial \mathcal{L}}{\partial r_1} = -\frac{\partial H}{\partial r_1} \quad -(25)$$

and

$$\frac{\partial (p_1 \dot{r}_1)}{\partial r_1} = 0. \quad -(26)$$

Eqs. (25) and (26) both give the new equation of motion:

$$\frac{\partial}{\partial r_1}\left(\gamma m(r_1)\right) = \frac{\partial}{\partial r_1}\left(\frac{1}{\gamma}\right) \quad -(27)$$

in a precisely self consistent way Q. E. D.

From Eqs. (27) and (4), computer algebra shows that:

$$\frac{dm(r_1)}{dr_1} = -\frac{2 r_1 \dot{\phi}^2}{c^2}\left(\frac{1+\gamma^2 m(r_1)}{1-\gamma^2 m(r_1)}\right) \quad -(28)$$

which is a differential equation for $dm(r_1)/dr_1$ in terms of m (r1). Therefore the use of the Hamilton equations means that m (r_1) is no longer empirical. The angular momentum of m theory is:

$$L = \gamma m r_1^2 \dot{\phi} \quad -(29)$$

so Eq. (28) can be written as:

$$\frac{dm(r_1)}{dr_1} = -\frac{2L^2}{\gamma^2 c^2 m^2 r_1^3}\left(\frac{1-\gamma^2 m(r_1)}{1+\gamma^2 m(r_1)}\right) \quad -(30)$$

where L is a constant of motion. In general Eq. (30) needs specialized methods of solution, but certain limiting cases can be discussed qualitatively. For example when r_1 is very large and $\dot{\phi}$ is very small, as in the orbit of the S2 star discussed in UFT417 ff:

$$\frac{dm(r_1)}{dr_1} \rightarrow 0. \quad -(30)$$

This is the condition used in a preceding UFT paper to describe the orbit of the S2 star, producing the startlingly original result that the orbit is essentially an ellipse, but one which is not described by the Kepler or Newton laws. The S2 star refutes Einsteinian general relativity by the order of a hundred times, but is well described by m theory.

3. NUMERICAL AND GRAPHICAL ANALYSIS OF EQUATION OF MOTION.

Section by Dr. Horst Eckardt.

The m theory in Hamilton dynamics

M. W. Evans*, H. Eckardt†
Civil List, A.I.A.S. and UPITEC

(www.webarchive.org.uk, www.aias.us,
www.atomicprecision.com, www.upitec.org)

January 10, 2019

3 Numerical and graphical analysis

In section 2 a differential equation for m(r_1) has been derived. in Eq. (28) it contains orbit variables r_1 and $\dot{\phi}$ which have been reduced to r_1 by inserting the angular momentum which is constant. The result is Eq. (30). In addition there is a dependence on γ which is a function of the coordinates again. Since γ is near to unity in moderatedly relativistic systems, we have assumed $\gamma = 1$, leading to a differential equation for m(r_1) which only depends on r_1, i.e. it is an ordinary differential equation:

$$\frac{d\,\mathrm{m}\,(r_1)}{dr_1} = -\frac{2L^2}{c^2\,m^2\,{r_1}^3}\frac{(1+\mathrm{m}\,(r_1))}{(1-\mathrm{m}\,(r_1))}. \tag{31}$$

This equation can be solved numerically. It is to be observed that the right hand side of the equation becomes singular for m(r_1) = 1. Therefore it was not possible to integrate over this point. We can only consider cases where m stays above or below unity. The results are graphed in Figs. 1 and 2. We integrated from right to left, i.e. started at $r_1 = 1$ in both cases. In the first case (Fig. 1) m drops to 1 for a certain radius and gets undefined below this radius. In the second case (Fig. 2) m diverges for this radius, this means it rises to 1, then it is undefined. This is different from the supposed behaviour that for m< 1 it drops further, ending at m=0.

There is an additional problem when inserting values for the constants L etc. from the solution of the Hamilton equations as should be done for reasons of consistency. There is only a valid range for L which is well below the value obtained from the solution of the equations of motion. This shows that the current calculation should only be considered as a first try to obtain m(r_1), thus avoiding a phenomenological function.

*email: emyrone@aol.com
†email: mail@horst-eckardt.de

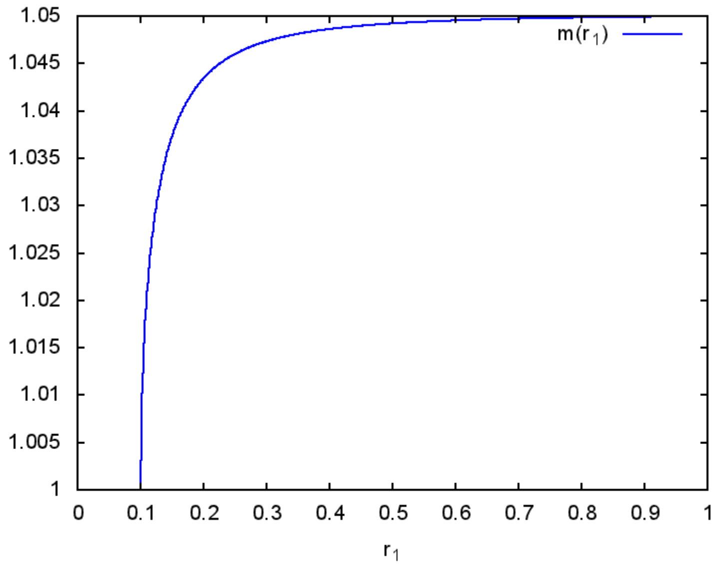

Figure 1: m function for a starting value $m(1) > 1$.

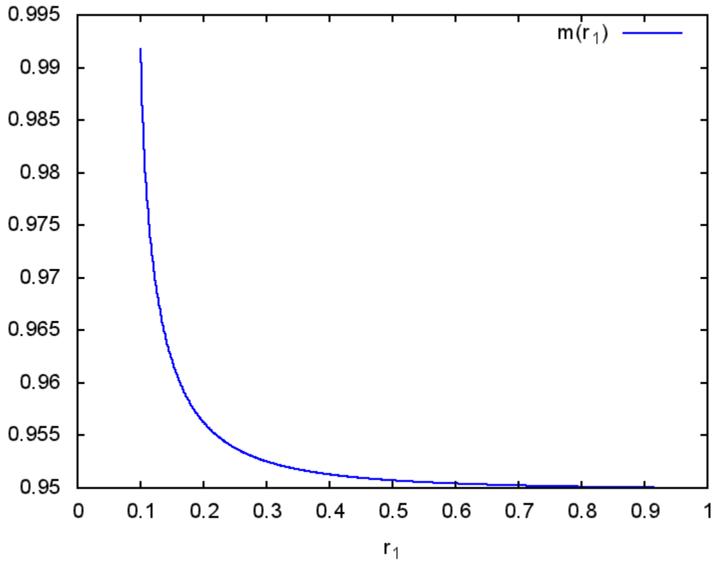

Figure 2: m function for a starting value $m(1) < 1$.

ACKNOWLEDGMENTS

The British Government is thanked for a Civil List Pension and the staff of AIAS and others for many interesting discussions. Dave Burleigh, CEO of Annexa Inc., is thanked for voluntary posting, site maintenance and feedback maintenance. Alex Hill is thanked for many translations, and Robert Cheshire nd Michael Jackson for broadcasting and video preparation.

REFERENCES

{1} M. W. Evans, H. Eckardt, D. W. Lindstrom, D. J. Crothers and U. E. Bruchholtz, "Principles of ECE Theory, Volume Two" (ePubli, Berlin 2017).

{2} M. W. Evans, H. Eckardt, D. W. Lindstrom and S. J. Crothers, "Principles of ECE Theory, Volume One" (New Generation, London 2016, ePubli Berlin 2017).

{3} M. W. Evans, S. J. Crothers, H. Eckardt and K. Pendergast, "Criticisms of the Einstein Field Equation" (UFT301 on www.aias.us and Cambridge International 2010).

{4} M. W. Evans, H. Eckardt and D. W. Lindstrom "Generally Covariant Unified Field Theory" (Abramis 2005 - 2011, in seven volumes softback, open access in various UFT papers, combined sites www.aias.us and www.upitec.org).

{5} L. Felker, "The Evans Equations of Unified Field Theory" (Abramis 2007, open access as UFT302, Spanish translation by Alex Hill).

{6} H. Eckardt, "The ECE Engineering Model" (Open access as UFT203, collected equations).

{7} M. W. Evans, "Collected Scientometrics" (open access as UFT307, New Generation, London, 2015).

{8} M .W. Evans and L. B. Crowell, "Classical and Quantum Electrodynamics and the B(3) Field" (World Scientific 2001, open access in the Omnia Opera section of www.aias.us).

{9} M . W. Evans and S. Kielich, Eds., "Modern Nonlinear Optics" (Wiley Interscience, New York, 1992, 1993, 1997 and 2001) in two editions and six volumes, hardback, softback and e book.

{10} M. W. Evans and J. - P. Vigier, "The Enigmatic Photon" (Kluwer, Dordrecht, 1994 to 1999) in five volumes hardback and five volumes softback, open source in the Omnia Opera Section of www.aias.us).

{11} M. W. Evans, Ed. "Definitive Refutations of the Einsteinian General Relativity" (Cambridge International Science Publishing, 2012, open access on combined sites).

{12} M. W. Evans, Ed., J. Foundations of Physics and Chemistry (Cambridge International Science Publishing).

{13} M. W. Evans and A. A. Hasanein, "The Photomagneton in Quantum Field Theory (World Scientific 1974).

{14} G. W. Robinson, S. Singh, S. B. Zhu and M. W. Evans, "Water in Biology, Chemistry and Physics" (World Scientific 1996).

{15} W. T. Coffey, M. W. Evans, and P. Grigolini, "Molecular Diffusion and Spectra" (Wiley Interscience 1984).

{16} M. W. Evans, G. J. Evans, W. T. Coffey and P. Grigolini", "Molecular Dynamics and the Theory of Broad Band Spectroscopy (Wiley Interscience 1982).

{17} M. W. Evans, "The Elementary Static Magnetic Field of the Photon", Physica B, 182(3), 227-236 (1992).

{18} M. W. Evans, "The Photon's Magnetic Field: Optical NMR Spectroscopy" (World Scientific 1993).

{19} M. W. Evans, "On the Experimental Measurement of the Photon's Fundamental Static Magnetic Field Operator, B(3): the Optical Zeeman Effect in Atoms", Physica B, 182(3), 237 - 143 (1982).

{20} M. W. Evans, "Molecular Dynamics Simulation of Induced Anisotropy: I Equilibrium Properties" , J. Chem. Phys., 76, 5473 - 5479 (1982).

{21} M. W. Evans, "A Generally Covariant Wave Equation for Grand Unified Theory" Found. Phys. Lett., 16, 513 - 547 (2003).

{22} M. W. Evans, P. Grigolini and P. Pastori-Parravicini, Eds., "Memory Function Approaches to Stochastic Problems in Condensed Matter" (Wiley Interscience, reprinted 2009).

{23} M. W. Evans, "New Phenomenon of the Molecular Liquid State: Interaction of Rotation and Translation", Phys. Rev. Lett., 50, 371, (1983).

{24} M .W. Evans, "Optical Phase Conjugation in Nuclear Magnetic Resonance: Laser NMR Spectroscopy", J. Phys. Chem., 95, 2256-2260 (1991).

{25} M. W. Evans, "New Field induced Axial and Circular Birefringence Effects" Phys. Rev. Lett., 64, 2909 (1990).

{26} M. W. Evans, J. - P. Vigier, S. Roy and S. Jeffers, "Non Abelian Electrodynamics", "Enigmatic Photon V olume 5" (Kluwer, 1999)

{27} M. W. Evans, reply to L. D. Barron "Charge Conjugation and the Non Existence of the Photon's Static Magnetic Field" , Physica B, 190, 310-313 (1993).

{28} M. W. Evans, "A Generally Covariant Field Equation for Gravitation and Electromagnetism" Found. Phys. Lett., 16, 369 - 378 (2003).

{29} M. W. Evans and D. M. Heyes, "Combined Shear and Elongational Flow by Non Equilibrium Electrodynamics", Mol. Phys., 69, 241 - 263 (1988).

{30} Ref. (22), 1985 printing.

{31} M. W. Evans and D. M. Heyes, "Correlation Functions in Couette Flow from Group Theory and Molecular Dynamics", Mol. Phys., 65, 1441 - 1453 (1988).

{32} M. W. Evans, M. Davies and I. Larkin, Molecular Motion and Molecular Interaction in the Nematic and Isotropic Phases of a Liquid Crystal Compound", J. Chem. Soc. Faraday II, 69, 1011-1022 (1973).

{33} M. W. Evans and H. Eckardt, "Spin Connection Resonance in Magnetic Motors", Physica B., 400, 175 - 179 (2007).

{34} M. W. Evans, "Three Principles of Group Theoretical Statistical Mechanics", Phys. Lett. A, 134, 409 - 412 (1989).

{35} M. W. Evans, "On the Symmetry and Molecular Dynamical Origin of Magneto Chiral Dichroism: "Spin Chiral Dichroism in Absolute Asymmetric Synthesis" Chem. Phys. Lett., 152, 33 - 38 (1988).

{36} M. W. Evans, "Spin Connection Resonance in Gravitational General Relativity", Acta Physica Polonica, 38, 2211 (2007).

{37} M. W. Evans, "Computer Simulation of Liquid Anisotropy, III. Dispersion of the Induced Birefringence with a Strong Alternating Field", J. Chem. Phys., 77, 4632-4635 (1982).

{38} M. W. Evans, "The Objective Laws of Classical Electrodynamics, the Effect of Gravitation on Electromagnetism" J. New Energy Special Issue (2006).

{39} M. W. Evans, G. C. Lie and E. Clementi, "Molecular Dynamics Simulation of Water from 10 K to 1273 K", J. Chem. Phys., 88, 5157 (1988).

{40} M. W. Evans, "The Interaction of Three Fields in ECE Theory: the Inverse Faraday Effect" Physica B, 403, 517 (2008).

{41} M. W. Evans, "Principles of Group Theoretical Statistical Mechanics", Phys. Rev., 39, 6041 (1989).