ECE Theory of Unified Physics And Refutations of The Standard Model

by

M. W. Evans, H. Eckardt, D. W. Lindstrom, Robert Cheshire

and AIAS Author Group.

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ABSTRACT

The progress is reviewed of papers 101 to 230 of the ECE theory of unified physics. The papers are classified as follows: 1) spin connection resonance (SCR) and computer simulation of spacetime devices; 2) geometry; 3) astronomy and cosmology; 4) precession phenomena; 5) conservation, continuity and Poynting theorems; 6) dynamics and fluid dynamics; 7) equivalence principles; 8) antisymmetry laws, refutations of classical electrodynamics; 9) fermion equation, quantum Hamilton, quantum force equations and quantum field theory, refutation of the Dirac equation; 10) photon mass and particle scattering theory, refutation of standard particle theory; 11) refutations of Einsteinian general relativity; 12) towards a new general relativity; 13) interaction of electromagnetism and gravitation and electrodynamics; 14) B(3) field theory; 15) geometrical refutations of the Einstein field equation and general relativity; 16) development of general relativity with the antisymmetric connection; 17) refutations of Higgs boson theory and GWS theory; 18) theory of low energy nuclear reactions.

Keywords: ECE theory of unified physics, refutations of the standard model, review of papers 101 to 230 of ECE theory.

1. INTRODUCTION

There are two hundred and thirty papers available of the ECE theory of unified physics {1 - 10}, and several other papers and volumes (www.aias.us). This article is a concise review of the major progress made in papers 101 to 230 of the series, the papers produced since review paper 100. The ECE theory is the new unified field theory of physics, and has replaced the obsolete standard model in several ways. The refutations of the standard

model have been made side by side with the development of ECE theory, the well known acronym for Einstein Cartan Evans field theory. The central feature of ECE theory is that it unifies physics in terms of Cartan's well known geometry {11}, the first geometry to emerge (in the nineteen twenties) that can be described as rigorously complete and self consistent in all mathematical spaces. The basic philosophy of ECE theory is that of Kepler and his renaissance contemporaries: *ubi materia ibi geometria* - all nature is geometry. This is also the basic principle of general relativity. One of the most important advances made by ECE theory in UFT 101 to UFT 230 on www.aias.us is the simple and conclusive refutation of Einstein's ideas about general relativity, and their replacement by a new relativity. Einstein's work is corrected and strengthened, his contributions remain a pinnacle of human thought: each generation stands on the shoulders of giants.

Similarly Dirac's equation has been refuted and replaced by the fermion equation of ECE theory, the Copenhagen interpretation of physics has been refuted and replaced by a Baconian quantum mechanics unified with general relativity. The great advances made by Dirac and others also remain a pinnacle of thought, and have been corrected and strengthened. Other major advances in ECE quantum mechanics include the inference and development of the quantum Hamilton and quantum force equations. The Maxwell Heaviside (MH) equations of electrodynamics have been refuted by antisymmetry arguments of ECE and developed into general relativity as part of a unified field theory based on Cartan geometry. The conditions under which the well tested mathematical structure of the MH equations are recovered from the ECE theory have been defined with precision by Eckardt and Lindstrom {12 -14}. The Einstein field equation has been refuted conclusively and thoroughly by antisymmetry arguments based on the ineluctable presence of torsion in a self consistent and complete geometry of the general mathematical space {1 - 10}. This means that the theory of big bang and of black holes has also been refuted, since these theories depend on an irretrievably incorrect Einstein field equation. The development and simplification of the geometry of ECE theory - Cartan geometry, has led to the engineering model of the theory, in which the equations of electrodynamics and dynamics have the same structure in the same, general, mathematical space. The dynamical equations of ECE include equations of the gravitomagnetic field, the equivalent of magnetic flux density in electrodynamics. It is inferred in ECE theory that each equation of electrodynamics has its dynamical counterpart. The ECE dynamical equations have been utilized to explain precessional phenomena in astronomy.

The basic features of particle scattering theory in the obsolete standard physics have been refuted. The Einstein de Broglie theory has been shown to be deeply self inconsistent. Standard Compton scattering theory has been shown to be applicable only when the photon mass is identically zero, a contradiction in thought that makes the standard model untenable at its most fundamental level. If the photon mass is finite, the standard theory of Compton scattering collapses completely, and it has been shown that general Compton scattering theory of two particles of mass also collapses into nonsense. Basic absorption theory and Raman scattering theory has been shown to be deeply self inconsistent. Astonishingly, neither considers conservation of momentum. When the latter and basic concept is introduced the standard theory becomes wildly untenable. This year, CERN has finally concluded that the Higgs boson does not exist, so another basic idea of the obsolete standard model has evaporated. During the evolution of ECE theory seen in UFT101 to UFT230 a new approach to scattering theory has been forged, known as R theory, and based on the ECE wave equation.

Metric based general relativity has been thoroughly refuted in a number of complementary ways, culminating in the discovery that there is no self consistent, metric based, general relativity in a spherical spacetime. It has been found that the only possible metric based general relativity must be based on the very general metric developed by Crothers {1 - 10}. In the series UFT 190 ff the metric based general relativity was refuted in several very simple ways, so there is no rational way of saving the metric based general relativity, the theory that is claimed incorrectly to account for light bending and time delay in the solar system. It has been shown that the theory of these phenomena due to Einstein contains several basic errors (UFT 150 and 155). There are many major consequences of these simple refutations, for example the “precision” tests of Einsteinian relativity in the solar system become obviously meaningless. Accurate historical scholarship during the course of development of ECE theory has shown that the Einstein theory of perihelion advance was dismissed as incorrect by Schwarzschild as early as December 1915, only a month after the theory was first published. In UFT 190 ff (www.aias.us) it has been shown that the metric falsely but commonly attributed to Schwarzschild is completely meaningless. This fact becomes crystal clear in at least two ways: firstly the false Schwarzschild metric does not produce a precessing elliptical orbit; secondly UFT 194 shows in a perfectly simple and general manner that the metric based theory is diametrically self inconsistent from basic definitions. The most inexplicable anthropomorphic aspect of the old standard model was the merely dogmatic adherence to Einsteinian general relativity, known to be incorrect for

almost a century, and conclusively shown to be so in UFT 101 to 230 in many different ways. This dogma was so tenacious that the dark matter theory was introduced to try to save the Einstein theory, even thought it has been known since the late fifties to be hopelessly unable to describe whirlpool galaxy velocity curves. It is now known that dark matter does not exist in nature.

In addition to the refutations of the metric based general relativity, UFT101 - UFT213 gradually realized that the connection in geometry must be antisymmetric. The historical truth about the development of the geometry used by Einstein also became clear. It became clear that Riemann inferred only the concept of metric, and did so in the early nineteenth century. The concept of connection was developed by Christoffel in the eighteen sixties. Neither Riemann nor Christoffel inferred curvature, a concept due to Levi-Civita and others in the early twentieth century. Torsion was not inferred until the nineteen twenties, by Cartan and colleagues. So it became clear using accurate historical scholarship that the geometry used by Einstein is basically incorrect. It leaves out torsion. Einstein and others, notably Hilbert, developed general relativity in the decade 1905 - 1915, in an era when torsion was unknown. Unfortunately therefore their work cannot be correct - neither can a century of work in Einsteinian general relativity.

The final major advance made by ECE theory of unified physics occurred in UFT230, when a new equivalence principle was discovered and a new type of philosophical unification made of classical and relativistic physics. This advance has been given the appellation “frame dynamics”, a completely self consistent general relativity developed from the well known fact that passive and active rotations are equivalent. Thus we return to Kepler’s basic statement: *ubi materia ibi geometria*.

The overall progress made in UFT 101 to 230 is therefore clear, the ECE theory has advanced greatly in several directions, and has simplified and clarified. The progress made is summarized in this review in fifteen sections as follows, the acronym UFT denotes the unified field theory papers on www.aias.us. Section 2 reviews spin connection resonance and computer simulation of spacetime energy devices made in UFT107, UFT153 and papers by Eckardt and Lindstrom. Section 3 reviews the progress made in geometry and its applications in UFT101-104, 109, 112, 128, 137, 139, 142, 151, 152, 167, 185 - 189, and 199. Section 4 reviews progress made in astronomy and cosmology in UFT105, 108, 111, 120, 123 - 127, 148, 150, 151, 154 and 155. Section 5 reviews progress in precession theory in UFT110, 114, 117, 119, 145 - 147 and 149. Section 6 reviews the development of

conservation, continuity and Poynting theorems from geometry in UFT 116, 121, 156, and 168 - 170. Section 7 reviews progress made in dynamics and fluid dynamics in UFT 113, 140, 143, and 149. Section 8 reviews the new equivalence principles in UFT 141 (derived from antisymmetry) and 199 (derived from passive and active rotations). Section 9 reviews the progress made in antisymmetry in UFT 131 - 134, and papers by Eckardt and Lindstrom. Section 10 reviews the progress made in ECE quantum mechanics, notably the fermion, quantum Hamilton and quantum force equations, and conclusive refutation of Copenhagen indeterminacy in UFT 129, 130, 135, 135, and 172 - 180. Section 11 reviews the refutation of standard particle scattering theory and its replacement by R theory in UFT 150, 155, 157 - 167, 171 and 180 - 182. Section 12 reviews the refutations of Einsteinian general relativity in UFT 150, 155, and 190 - 195. Section 13 reviews the new relativity of UFT 196 - 199. Section 14 reviews UFT 144 and 154 on the interaction of electromagnetism and gravitation and on electrodynamics. Section 15 reviews the application of B(3) theory to clean fuel technology in UFT 183 and 184. Section 16 reviews the various geometrical refutations of Einsteinian general relativity using the antisymmetry of the connection in UFT 122, 137 and 139.

Section 17 reviews the progress made towards a general relativity and photon mass theory based on an antisymmetric connection, in UFT 201 to 213, while UFT 214 to 223 develop the theory of orbital precession, introducing fractal conical sections to physics and mathematics, and orbital dynamics and N body dynamics with a constrained Minkowski metric.

Section 18 reviews straightforward refutations of Higgs boson theory and electroweak theory, revealing the shaky foundations of the standard physics. Section 19 uses the fermion equation and new methods of geometry to review the ECE theory of low energy reactions, a very useful source of new energy for humankind. Finally Sections 20 and 21 are summaries by Douglas Lindstrom and Robert Cheshire.

2. SPACETIME ENERGY DEVICES AND SPIN CONNECTION RESONANCE

UFT107 has received about ten thousand referrals to date, and is the most read paper on www.aias.us. A referral is the contemporary, real time, method of measuring interest in a paper as defined by Berners-Lee and co workers {15} as is well known. In this paper experimental reports were considered theoretically of spacetime energy detected by a variable frequency Faraday disk generator. It was reported experimentally that the device

exploded due to a surge of power. UFT107 explains this surge of power in terms of spacetime power and spin connection resonance. It uses a rotational tetrad and spin connection resonance equation which was solved numerically to give three different types of power resonance. The dynamics of the homopolar generator were studied and graphed. Notably, electron orbits were graphed for a variable frequency generator. Resonance curves were given for variable current, and a prototype discussed based on Tesla's work. An instrumentation diagram and analysis were included in the paper. This design promises to be the first commercial spacetime device, based on a modification of the well known Faraday disk or homopolar generator. UFT153 continued the study of spin connection resonance in a spherically symmetric spacetime using the now obsolete metrical method of general relativity in a spherical spacetime. UFT107 does not depend on the now obsolete metrical method of general relativity. Progress in the development of ECE theory has been rapid, the obsolescence of metrical general relativity was first realized clearly in the series of papers UFT 190 ff.

Traditional electromagnetic theory has not been able to effectively explain the numerous anecdotal reports of devices that on a local scale seem to produce more energy than they consume. The ECE electromagnetic and gravitational sub-theories offer a strong means of explaining some of these occurrences. Non-traditional effects have been predicted in several of the UFT papers to be very small, with one of the most recent (UFT144) predicting that the spin connection portion of the electric and magnetic fields is about 1/c time the traditional component, in SI units. Such an interaction would in all likelihood not be observable in normal electromagnetic phenomena. Resonant behaviour with this small component being the driving term has emerged as the dominant way of possibly explaining such events. Three types of resonant behaviour have been discussed:

1. Resonance where the full field equation set is used, or a subset of the full set where the rest were demonstrated or assumed to be inconsequential.
2. Resonant coupling of the electromagnetic field to the gravitational field.
3. Resonance resulting from particle motions.

An example of the first is a classic example demonstrating the power of the ECE theory in explaining observations that defy rational explanations with traditional physics For example, from Paper 107 as discussed earlier, there have been reports of a Faraday disk generator exhibiting a powerful resonance effect hitherto unknown. Explanations were given by the

ECE field equations expressed in terms of potentials. These are highly non-linear, hyperbolic, and coupled to each other, making analytic solutions impossible except for the simplest of examples. Numerical methods are inevitably involved with a variation on the Runge Kutta method used typically for one dimensional problems, and Finite Difference or Finite Element techniques being used if the problem requires two or more independent variables. Three types of possible resonances were identified. The first method was used to solve the two equation set for the Faraday disk. All solutions grew in time, even if the terms involving integration constants were set to zero. The second (in UFT107 the third) method utilized a zero crossing of the denominator of the current. The third type of resonance was discussed at length in papers 153, 167-170 where coupling of the electromagnetic field to the local gravitational field was made through the use of a local distortion in the metric. Paper 153, the forerunner to the development of the so called "metric method", looked at the use of the Hamiltonian and the Euler-Lagrange equations in a spherical space-time. We know now that this space- time is invalid, but this did demonstrate the emergence of the Euler-Bernoulli resonance as the mechanism in this form of field coupling. The coupling the electromagnetic field to the gravitational field was developed in paper 167. The distortion of the metric from that of a Minkowski metric for a material-free space to that with material media being present shows up in terms of the relative permittivity and permeability properties of matter. Euler-Bernoulli resonance was demonstrated for a simple one dimensional problem. The gravitational Poynting theorem was introduced in Paper 168, and used in Paper 169 to demonstrate the energetic coupling between the electromagnetic and gravitational field. In Paper 170, the vacuum field as defined by the zero point energy of a harmonic oscillatory and the use of the Poynting theorem was used to explain the electric power absorbed along a straight wire from the vacuum. A discussion of current experiments and technology that utilize this mechanism was also included. A final paper {16} was presented to demonstrate the metric coupled resonance in an infinitely long solenoid subjected to a time dependent driving current. In this paper, a quadratic coupling of the magnetic field to the metric, as typified by a solenoid core undergoing dimensional change with magnetic field due to magnetostriction, or perhaps compression due to electromagnetic forces in the windings, is used to demonstrate resonant behaviour. The finite element method was used to solve the problem containing two independent variables. Heterodyning behaviour was also observed as the resonant point was approached.

Resonance in the motion of charged particles was discussed at length in papers 143, 144, 181-184. Following the development of fundamental dynamics from geometric principles in

Papers 143 and 144, paper 181 introduced the concept of the ECE particle matter wave. This went on in Paper 182 where the Hamilton-Jacobi equation was used to describe the interaction between a particle and a field. Compton scattering of a photon from an electron was discussed showing that during the interaction, the photon acquires a finite interacting mass. A correction to the de Broglie-Einstein equations was also given. Paper 183 was a discussion on molecular dissociation due to the B(3) field. This longitudinal magnetic field was shown to produce a driving torque by interaction with a molecule or ion. This torque could be amplified in an Euler type resonance to induce molecular dissociation. Application to industrial processes were discussed culminating in a separate paper UFT184 devoted to a specific (Kurata) process which for example is used to breakdown complex hydrocarbon wastes into useable diesel oil that burns with less emissions than commercial diesel generated from crude oil sources.

In a series of four papers it was shown that for free space conditions using the single polarization ECE engineering equations, that the ECE equations of electromagnetism are equivalent mathematically to the Maxwell-Heaviside (MH) equations at the potential level. This of course is not possible on a physical level, since the MH theory presupposed a flat, torsion free space-time, totally incompatible with ECE theory. In the first paper to discuss this reduction, {12} it was shown that in the static case, for a single polarization, the ECE theory reduced mathematically to the MH theory. This was expanded {13} to include dynamic situations where the vector spin connection was parallel to the vector potential. In the second paper in this series {14} it was shown that this reduction occurred whenever the scalar potential was a separable function of space and time. In the third paper {15} it was shown that if a non-ECE solution existed, but at some point even if only momentarily, the solution became Maxwellian and then it remained Maxwellian. It was speculated that the only possibility for non-Maxwellian behaviour was in the instance of discontinuous potentials, that is, potentials that are not-separable and cannot be represented by Fourier series. It should be pointed out that this reduction is only applicable to free space conditions. The introduction of material properties, such as magnetization, especially if such properties depend upon the fields themselves, then this reduction is not valid, as was demonstrated in the metric papers on electromagnetic theory (UFT167-UFT170).

3. GEOMETRY

Two or three years ago when papers UFT101 onwards were being written, it was not known that the connection was antisymmetric in its lower two indices and the complete incorrectness and resulting obsolescence of the metric based Einstein general relativity was not known. Some of the papers reviewed in this section dealt with the detailed proofs of the Cartan identity, from which the field equations of ECE theory are obtained. Methods were also developed to simplify the poofs of the Cartan structure equations. This type of paper started with UFT88 and UFT99, papers in which the proof is written out in full detail, and gradually became simpler and stronger in papers such as UFT137, UFT139 and UFT167. The original identity given by Cartan related the torsion and curvature, but was given by him in an elegant but concise format, very difficult for non-specialists to understand. Very few textbooks of the twentieth century general relativity even mentioned torsion and it gradually became clear during the course of development of ECE theory that the structure of Cartan geometry was unknown to these twentieth century authors. They considered Riemann geometry as a subject in which only the curvature was defined. Some of them did not appear to know that Riemann inferred only the metric and referred to the connection and curvature as being due to Riemann. In historical fact it was Christoffel who inferred the connection in the eighteen sixties, and Levi-Civita and contemporaries who inferred the idea of curvature in the early years of the twentieth century. It was not until the nineteen twenties that torsion was defined by Cartan and co workers. So it took almost a hundred years to progress from the ideas of Riemann to those of Cartan. It was the latter who finally inferred the correct description of the general mathematical space in terms of both torsion and curvature. It is incorrect to omit torsion and keep curvature, or vice versa.

It also became clear gradually that the twentieth century idea of general relativity was based on the axiomatic but incorrect use of a symmetric connection, by which is meant a connection that is symmetric in its lower two indices. Some textbooks started with this axiom and did not mention torsion at all. The symmetric connection was often referred to as the Riemann connection, the authors did not seem to know that the idea of connection was not known to Riemann at all, and that he never used it. The only book that defined torsion and curvature correctly and clearly, in a manner that was not plagued by nearly incomprehensible mathematical abstraction, was that of S. P. Carroll {11}. The torsion and curvature tensors are always defined by the commutator of covariant derivatives acting on a vector, or more generally, any tensor. This definition is true in any mathematical space in any number of dimensions. This procedure is equivalent to the two structure equations of Cartan and Maurer, which defined two differential forms of geometry known as the torsion and

curvature forms. The structure equations are again elegant but so concise as to be incomprehensible to anyone except the ultra specialist. Before the development of ECE theory they were almost unknown in physics.

In order for these important structure equations to become comprehensible to non-specialists they had to be developed during the course of ECE theory into tensor equations, and then into vector equations, whose structure was gradually simplified for use in practical engineering, notably spin connection resonance. It also had to be shown that they were rigorously equivalent to the action of the commutator in always generating the torsion and curvature. This equivalence is demonstrated through the very obscurely named tetrad postulate. In fact this is a very fundamental result of the invariance of the complete vector field, and not a postulate. So rigorous proofs of the tetrad postulate also had to be given, and Cartan's concise notation explained clearly. These proofs gradually evolved, clarified and simplified in the papers reviewed in this section, and listed in the introduction of this review paper. The two structure equations define curvature and torsion through the mediation of the spin connection of Cartan, a development of the original idea of connection due to Christoffel in the eighteen sixties. Neither Riemann nor Christoffel inferred the idea of curvature, they did not use tensors, which were inferred in about 1900 by Levi-Civita, Ricci, Bianchi and contemporaries. The first inference of the idea of spacetime curvature seems to be due to Levi-Civita in the early years of the twentieth century using the then new tensor methods. This inference did not use, or at least did not clearly define, the idea of the commutator of covariant derivatives, the curvature was defined in isolation. The commutator encapsulates the idea of a round trip around a closed loop in a mathematical space. There are two round trips considered, clockwise and anticlockwise.

It is very important to realize that the round trips in different senses produce a change in the orientation of a vector. The usual example given is the surface of a sphere. If a vector is parallel transported to the north pole along a line of longitude, it arrives with a given orientation. Parallel transport in this context means transport in such a way that the vector is tangent to the line of longitude at each point of transport. If the procedure is repeated by transporting first along the equator and then along another line of longitude to the pole, it arrives with a different orientation. The vector has been operated upon and the operator depends on the paths taken in a given mathematical space. If the space considered is a circle defined in a plane, transport clockwise and anticlockwise has no effect on the vector. So in a flat space there is no effect. The difference between a flat and general space is that in the

former, the connection is zero, in the latter is non zero. The connection is used to define a derivative, one which retains its format under all possible coordinate transformations. This is known as the covariant derivative, and it is the sum of the ordinary derivative and a spin connection term. The difference between two round trips, clockwise and anticlockwise, is represented mathematically by the commutator of two covariant derivatives. The commutator is an operator and acts on the vector being transported.

The result of this operation contains a combination of connections, ordinary derivatives of connections, and connection products. Combinations of these terms are used to define the torsion tensor and the curvature tensor and all the details of this procedure were given in UFT99. These details were almost never given in twentieth century textbooks in general relativity, and only partially by Carroll {11}. A significant feature of the development of ECE theory is that proofs are given in all detail, and that these proofs are simplified and improved. The torsion tensor is a linear combination of two connections with lower indices reversed and this definition is equivalent to the one given in the first Cartan structure equation. The lower two indices of each connection are the same as the indices of the commutator. The latter is by definition antisymmetric, meaning that it changes sign if the indices are interchanged. So the connection is also antisymmetric in its lower two indices. This was first realized in UFT122, more than 150 years since Christoffel inferred the connection in the eighteen sixties. Following upon this realization some more proofs of the antisymmetry were developed.

Why did it take 150 years to realize this? The answer to this question is that when Christoffel inferred the connection, the idea of a round trip was not available, the idea of curvature was not yet inferred. It would take a further forty years for curvature to be inferred. In the eighteen sixties it was known only that the metric of Riemann (1826 - 1866) was symmetric, and then only to a very few ultra specialists in mathematics. There was no way of knowing the symmetry of the connection in its lower two indices, or even of knowing that it has any particular symmetry. It must have been assumed that it was symmetric, and assumed without proof. This was a bad error because any matrix is in general asymmetric, not symmetric. Therefore when the idea of curvature arrived in the early twentieth century, the connection was assumed by bad habit (i.e. dogma) to be symmetric. This basic mathematical error was repeated endlessly, even after Cartan had introduced his structure equations, and even after they were pointed out to Einstein by Cartan. Unfortunately this dogma means that the entire twentieth century era in general relativity must be discarded as being incorrect.

This dogma means that the torsion was incorrectly discarded, because a symmetric connection means that torsion is incorrectly zero. Zero torsion means zero commutator, and no curvature either, and zero torsion and curvature mean a flat spacetime. So any symmetric connection is zero, because a flat spacetime has no connection. The commutator of ordinary derivatives in a flat spacetime is zero and a flat spacetime has no torsion and no curvature.

The negative influence of dogma continued to linger in the development of ECE theory up to UFT122 when it was finally realized that the symmetric connection vanishes in all mathematical spaces. This is one of the major mathematical advances of ECE theory. The papers up to UFT122 are rigorously correct, but UFT122 is the one that discards the symmetric connection and points out that the connection wherever it occurs is always antisymmetric. Papers up to UFT122 make no statement about the symmetry of the connection other than to assume implicitly that it is asymmetric (i.e. the torsion is assumed to exist). Even that though was a great improvement over the dogma that used without reason a symmetric connection with no torsion.

Once it was realized that the connection is antisymmetric, other inferences rapidly followed and developed into the antisymmetry laws of ECE theory, laws that directly refute the standard model both of electrodynamics and gravitation. The antisymmetry laws are reviewed in another section of this paper and have been greatly developed by Eckardt and Lindstrom. UFT186 to UFT189 used the antisymmetric connection with metric compatibility to develop a general relativity based exclusively on torsion. In UFT190 and UFT192 to UFT195, however, the development changed direction in another fundamentally important way, devising direct and simple means of refuting metric based general relativity completely, so that the Einsteinian general relativity disintegrated. For example it was shown that the force law of a precessing ellipse is not that used in Einsteinian general relativity; it was shown that the falsely attributed “Schwarzschild metric” does not produce a precessing ellipse, and finally in UFT194 it was shown in a very simple way that Einsteinian general relativity is fundamentally self inconsistent in all spherical spacetimes. In earlier papers such as UFT150 and UFT155 it had been shown that Einstein’s calculations of light bending and Shapiro’s calculations of time delay are erroneous. Historical scholarship during the course of development of ECE theory had shown that Einstein’s general relativity has been refuted by many of the best scientists, notably Schroedinger, Eddington, Dirac, Levi Civita and others. Finally this type of scholarship showed that Schwarzschild had refuted Einstein’s perihelion calculation as early as December 1915. It is also obvious why the dogmatists

ignored the science, to admit to their theory being dogma would have been a monumental loss of face and funding. However, professional scientists have calmly accepted the end of the Einsteinian era, that much is very clear from the feedback methods devised by Berners-Lee et al{16}

In UFT199 another major advance in the geometry has just been made and given the appellation "frame dynamics". In retrospect it is clear that any type of motion of a particle with a fixed frame and no connection is equivalent to the motion of the frame with fixed particle and no ordinary derivative present, the motion of the frame (frame dynamics) being described entirely by the connection: Kepler's *"Ubi materia ibi geometria"*. A very well known example is that of the equivalence of the active and passive rotation of a vector in a plane. UFT199 promises to result in an entirely new and rigorously correct general relativity based on rationalizing observation with geometry in the manner of Kepler. This development is particularly timely because metric based general relativity can no longer be used. It is incorrect for all spherical spacetimes. So ECE papers that utilized metric based general relativity will have to be redeveloped using frame dynamics. The only metrics that remain valid are the Minkowski metric of special relativity and the Crothers metric.

4 ASTRONOMY AND COSMOLOGY

In the UFT papers 105, 108, 111, 120, 123-127, 148, 150, 151, 154 and 155, several developments were made of astronomy and cosmology. In this phase of development of the ECE theory of unified physics the complete disintegration of the metrical general relativity in UFT194 was obviously not known. The complete incorrectness of the metrical method for all spherical spacetimes became known in UFT194, and attempts to replace it began in UFT196 ff. Such is the rapidity of development of ECE theory that all this has occurred within the space of two or three years, and is a major paradigm shift in physics. The metric based papers in this section are UFT 105, 108, 111, 148, 150, 151 and 154. They refuted the Einsteinian theory by use of torsion, incorporated in various contexts into cosmology. In view of UFT194, these papers and methods will be revised in future work based on a completely new approach, one which uses none of the ideas of the obsolete standard model, and none of the ideas of Einsteinian general relativity. At the time of writing (November / December 2011), it seems that the frame dynamics developed in UFT199 is the best way forward, because it is a fully relativistic theory based on a new and very powerful equivalence principle.

The obsolete Einsteinian theory was based on the use of a metric which was incorrectly, or falsely, attributed to Schwarzschild. It was commonly known as "the Schwarzschild metric". In UFT190 ff, which emerged in late 2011, it was shown to be complete nonsense. So the metric based papers 105, 108, 111, 148, 151 and 154 must now be regarded at the time of writing (November / December 2011) as transitional work which was intended to improve the then known metrical methods (methods that omitted torsion). For example UFT105 attempted to produce a new theory of light bending, UFT108 produced a new theory of binary pulsars without use of gravitational radiation, UFT111 and UFT148 attempted to produce new orbital theorems, and so forth. UFT120 was a comprehensive refutation of black hole theory using torsion, and is the one which has produced the secondmost number of referrals to date, several thousand. UFT120, 123 - 127, 150 and 155 are not affected by the complete collapse of metrical general relativity that emerged in UFT190 ff. UFT123 - UFT127 produced a theory of whirlpool galaxies and so on based on spacetime torsion, and should be regarded as steps towards the understanding that is now beginning to emerge in UFT199. UFT150 refuted the Einstein theory of light deflection by gravitation in several ways, and essays and broadcasts based on it have become very well known, notably the essay "Nobody's Perfect" by co author Horst Eckardt, broadcast by Robert Cheshire and myself. Finally in this section UFT155 refuted the Shapiro theory of time delay. Following upon UFT194 the theory of gravitational light deflection and time delay is now known to be completely incorrect at a fundamental level. UFT150 and UFT155 are early signs of the final refutations of UFT190 ff.

5. PRECESSION THEORY

Precession theory was developed in UFT110, 114, 117, 119, 145 - 147 and 149 using mainly metrical theory but also field theory. Following upon UFT194, the only valid metrical theory of general relativity is that based on the Minkowski and Crothers metrics. UFT110 developed Thomas precession in terms of the Minkowski metric, and UFT149 developed equations of motion in terms of the same metric. These two papers are still valid without further development. UFT114 developed a theory of the gravitational red shift but it was based on a metrical theory that is now obsolete following upon UFT194 and the gravitational red shift can only be addressed now by a development of a theory such as that of UFT199, now in its earliest phase. Tens of thousands of papers and monographs on the Einsteinian general relativity have also been made obsolete, of course, by UFT194 and UFT190, 192, and 193, and ECE theory of unified physics in general. This is why the science being

developed at the time of writing is a major paradigm shift. UFT117 developed a theory of the earth's gravitomagnetic precession. The parts of UFT117 that depend on the ECE field equations are rigorously valid, but the parts that depend on the twentieth century idea of metric based general relativity have been invalidated by UFT194 and must be redeveloped in future work. The theory that Gravity Probe B set out to "confirm" has been shown to be completely incorrect by UFT190, and 192 - 194. This was the theory based on the falsely attributed Schwarzschild metric. Everything based on that metric is incorrect, and also everything based on any spherical spacetime metrical method of the now obsolete general relativity. This is why the conclusions of UFT194 represent a major paradigm shift that has only just emerged.

UFT119 set out to developed a theory of the equinoctial precession and of galactic dynamics, and again the parts of that paper that depend on the ECE field equations are correct, while those parts that used the now obsolete metrical method are obsolete because of UFT194. All these papers are correct mathematically, but UFT194 showed up a fatal self inconsistency in the very foundations of metrical general relativity. This fatal self inconsistency was not known until late 2011. One of the major implications of UFT194 is that satellites sent up to test an obsolete theory will produce data that should be used to test a new, rigorously correct, general relativity free of any Einsteinian concept. Experimental data from these satellites are always useful, but it is pointless to go on claiming that they verify an incorrect theory, Einstein's general relativity. UFT145 to 147 dealt with the Sagnac interferometer. The parts of these papers that are based on the Minkowski metric can be used without further development, but not those parts that use a metric that is different from the Minkowski metric, because UFT194 has shown that all such metrics are self inconsistent. Earlier developments of the Sagnac effect in UFT1 to UFT99 are still valid, because they rested on the new ECE field equations, and not on the twentieth century metrical method.

Another major discovery of ECE theory is that any metric inferred from the Einstein field equation is incorrect because of the omission of torsion, and this is summarized in the monograph {1 - 10}, "Criticisms of the Einstein Field Equation" published in early 2011.

6. CONSERVATION, CONTINUITY AND POYNTING THEOREMS

These are developed in UFT116, 121, 156, and 168 - 170. In UFT116 the ECE equations of dynamics are developed in vector notation in parallel with the equations of electrodynamics. The continuity equation is developed from the tetrad postulate of Cartan

geometry as a special case. In UFT121 the Noether theorem is deduced from the tetrad postulate, which is therefore made the basis both of energy conservation and continuity in physics. UFT156 was written as an attempt to develop a metric based theory of electrodynamics, but as with all metric based theories it is refuted by UFT194. A Poynting theorem for gravitation was developed in UFT168 in parallel with the idea of a Poynting theorem for electromagnetism. These Poynting theorems are therefore geometrically based and depend on the first structure equation and Cartan and Evans identities. In UFT169 a method was developed to describe the deflection of light by gravitation with the Poynting theorem, and this seems to be the only valid method of doing so in view of UFT194. Finally UFT170 developed a theory of the vacuum with the Poynting method.

7. DYNAMICS AND FLUID DYNAMICS

These are papers of field equation theory unaffected by UFT194 because they do not use metrical theory. They are UFT113, 140, 143 and 149. UFT113 developed a set of dynamical equations from the Cartan identity and the Evans identity, proven in UFT137, UFT139 and UFT167. UFT140 applied this method to concepts of fluid dynamics, and UFT143 developed new concepts in fundamental classical dynamics by incorporating terms from the spin connection. The geometrical concepts used in these papers are the first Cartan structure equation, the Cartan identity and the Evans identity. Hypotheses are made to produce dynamics from the geometry, and as usual, the hypotheses must be tested with experimental data. The underlying geometry of Cartan is unchanged, the Evans identity being an example of the Cartan identity itself. In the Evans identity, Hodge duals of tensors are used together with the Hodge dual of the antisymmetric connection. In four dimensions the Hodge dual of an antisymmetric tensor is another antisymmetric tensor $\{1 - 10\}$. The Hodge dual of the antisymmetric connection is defined as in UFT167 and earlier papers by the antisymmetric indices of the connection. The latter is not a tensor, but its Hodge dual can be defined in this way, and the Hodge dual produces another well defined antisymmetric connection. The importance of these new mathematical methods is that the Cartan identity gives the inhomogeneous field equations both of dynamics and fluid dynamics, as well as those of electrodynamics. These structures are summarized in vector format throughout the development of ECE theory, notably in the engineering model. The Evans identity gives the homogeneous field equations and their structures. The field equations rest rigorously therefore on geometry that correctly includes torsion. Cartan geometry seems to be adequate for physics at the time of writing. Other geometries may be used provided they account both

for torsion and curvature.

8. EQUIVALENCE PRINCIPLES

Two types of equivalence principle have been inferred, in UFT141 and UFT199. UFT141 rested on the first Cartan structure equation and used antisymmetry to infer the equivalence principle assumed by Newton - the equivalence of gravitational and inertial mass was therefore proven mathematically for the first time. Antisymmetry is inferred from the antisymmetry of the Christoffel connection proven as in Section 3 of this review paper. The equivalence of inertial and gravitational mass has been proven experimentally to phenomenal accuracy, so UFT141 represents a very accurate experimental proof of the antisymmetry first inferred in UFT122. It also proves that there is no such thing as a symmetric Christoffel connection. Unfortunately the whole of twentieth century general relativity was based on a symmetric connection and is therefore meaningless. From a continuous study of feedback, which shows how ECE theory is being received, this astonishing paradigm shift has been accepted, essentially throughout the entire university sector worldwide.

UFT199 has just been completed and introduces a completely new equivalence principle based on the equivalence of active and passive rotations in a plane. The rotation of a vector clockwise in a static reference frame is equivalent to the anticlockwise rotation of the frame itself, keeping the vector static. In UFT199 this well known fact of simple geometry is generalized into Cartan geometry, considering in the first instance the definition of the covariant derivative in Cartan geometry. It is inferred that the ordinary derivative of a vector is equal to the spin connection acting on the vector, these being the two terms of the covariant derivative. The ordinary derivative generalizes the rotation of the vector in a static frame; the spin connection generalizes the idea of a rotating frame with static vector. This equivalence principle leads to a rigorous and completely new relativity known as “frame dynamics”. In UFT199 an example is given in which the solar system orbit is described with spin connection components, so the orbit is understood as the motion of the frame - frame dynamics, and the orbit becomes pure geometry - *“ubi materia ibi geometria”* of Johannes Kepler.

Frame dynamics is capable of great development and is the result of another major change of thinking (or paradigm shift) in physics - orbits can be predicted neither by Newtonian theory nor by the incorrect Einstein theory. In frame dynamics the observation of

orbits in astronomy is rationalized in terms of geometry as described in Section 3 of this review paper. This is exactly what Kepler did with the orbit of Mars, he showed it to be an ellipse. It is well known that the Newtonian dynamics fails to provide the centrifugal force. This was shown conclusively and clearly, and astonishingly for the first time, in Section 3 of UFT196 by starting with the functional equation of an ellipse and deriving the force law in cylindrical polar coordinates: a very simple method but one that gave a fundamental new insight. The force law was found to be negative valued, directed along the radius unit vector, and inversely proportional to r squared. It was an inverse square law, but purely attractive, so that an object of mass m would fall in to an object of mass M in the old thinking. The latter is a disaster because the orbit would collapse. In frame dynamics the orbit is due to the ever present motion of the frame itself. There is no anthropomorphic "attraction" between m and M, there is no universal gravitation. If the ellipse is made to precess the force law is different, it becomes the sum of inverse square and inverse cube terms.

9. ANTISYMMETRY

The first papers on antisymmetry are UFT131 - 134, and were applied to electromagnetism and gravitation. These papers developed from the important inference in UFT122 that the Christoffel connection is antisymmetric, another major paradigm shift in physics that has been accepted by the university and other sectors worldwide. The tetrad postulate of Cartan geometry means that the Christoffel connection can be developed as the sum of two terms, and this fact of geometry led to the antisymmetry laws of ECE theory and the Lindstrom constraint theory. This part of ECE theory has been developed extensively by Eckardt and Lindstrom and applied to practical engineering problems. These results by Eckardt and Lindstrom are reviewed in this section. The first major result of the antisymmetry laws was the refutation of gauge theory, which had already been abandoned in ECE theory in papers following UFT71. The obsolete U(1) gauge theory of the standard model was based on the diametrically self contradictory "massless photon" and the idea of the invariance of physical properties under a U(1) gauge transformation. Unfortunately that was a theory without a spin connection, a theory developed in the flat Minkowski spacetime. As soon as the spin connection is introduced there is no gauge invariance. Without the spin connection there is no generally valid relativity. Twentieth century physics was a dogmatic construction based on an incorrect general relativity for gravitation, and an incorrect gauge theory of electromagnetism, a gauge theory that was not only incorrect, but one of special

relativity.

As soon as antisymmetry was applied rigorously to the old field tensor of electrodynamics, it split into two components, one being the negative of the other. The consequences of this result were a disaster for U(1) gauge theory, in consequence of its dogma the Maxwell Heaviside theory itself became meaningless as shown in UFT131 - 134. It was also shown that the only way out was to adopt Cartan geometry and the ECE hypothesis introduced in the first papers of 2003 that transformed Cartan geometry into a generally covariant electrodynamics.

Antisymmetry proved to be a useful concept for engineering. The biggest single advantage offered by the antisymmetry equations (UFT132,133,134) when applied to practical application of the ECE equations for electromagnetism was the addition of six new equations to the equation set, providing enough additional equations to solve field problems without making drastic assumptions regarding the form of the solutions. The electric antisymmetry equations provided two equivalent definitions for the electric field which in essence removed two variables from the equation system. The magnetic antisymmetry equation provided a constraint on the spin connection and vector potential. This was expressed in a differentio-algebraic relationship by Lichtenberg (to be published in Journal of Foundations of Physics and Chemistry).

The Lindstrom Constraint was introduced in UFT133, 134 as a sub-set of the magnetic antisymmetry equations in an attempt to reduce the number of variables paralleling what was experienced for the electric antisymmetry counterpart. This constraint proved to be too limiting however since it limited the magnetic vector potential to that of the ECE vacuum state, and so was later retracted for single polarization electromagnetics {13}. This constraint will be re-examined during the development of electromagnetics using multi- polarization techniques in future papers. The existence of orbital and spin forms for the torsion tensor was introduced in Paper 134. This was developed into an electromagnetic theory in Paper 144. The ECE vacuum state was defined and explored in two papers {18,19}. The vacuum state is what remains when the ECE electric and magnetic fields are set to zero. This leads to solvable equations only if all antisymmetry laws are included. The vacuum state was shown to consist of a potentially energetic family of plane waves for the vector and scalar potentials. One family of solutions that consistently emerged was in the form of a hyperbolic tangent. This offered propagating step functions for the vector potential. The hyperbolic tangent form of solution was also observed for the ECE component of Coulomb's Law

which had the form of a topological charge density. This offered a hint at the possibility of a virtual particle model, even though the ECE theory for electromagnetism is a field theory. The second vacuum paper {19} demonstrated that the existence of the vacuum state does not normally influence the electromagnetic state of a device. The electromagnetic state of a device for example, simply floats upon the vacuum state. It was also demonstrated that the speed of propagation of the waves in the vacuum state was light speed for empty space. It was suggested that energetic interaction of a circuit with the vacuum could only occur if a change in geometry (boundary conditions) for the circuit occurred.

10. THE UNIFICATION OF QUANTUM MECHANICS AND GENERAL RELATIVITY, REFUTATION OF COPENHAGEN INDETERMINACY AND THE DIRAC EQUATION.

These advances were made in UFT129, 130, 135, 136 and 172 - 180. Prior to these advances, unification of quantum mechanics and general relativity was achieved in the first ECE papers in 2003, when it was shown that the wave equations of physics emerge from the tetrad postulate of geometry. The Dirac equation was simplified in UFT129 and 130 into an equation with 2 x 2 matrices rather than the 4 x 4 Dirac matrices. These 2 x 2 matrices were given a geometrical interpretation within the context of Cartan geometry. UFT129 developed the rest fermion, and UFT130 the fermion in motion. UFT135 and 136 extended this analysis to SU(2) electrodynamics and SU(3) nuclear theory. At that stage of development the Dirac equation itself was not criticised, indeed the Dirac equation had been derived earlier in UFT4 but the meaning of its negative energy interpretation questioned.

In UFT172 the fermion equation was developed to show that it has rigorously non-negative eigenvalues, thus eliminating from physics the obscurities that result from the Dirac sea interpretation, providing for the first time a single particle fermion equation. The half integral spin, Lande factor, Thomas factor, Darwin term, ESR, NMR, fine and hyperfine structure and identically positive probability current were deduced from the single particle fermion equation. Much of the self destructive obscurity of twentieth century physics resulted from the need for a quantum field theory that was a multi particle theory. The latter in turn arose from the use of the original Dirac matrices. These produced what were apparently negative energy eigenvalues. In contrast the fermion equation produces rigorously positive eigenvalues and refutes the use of the Dirac matrices for this reason. In future work quantum field theory can be developed as a single particle theory that is simpler and free of the dogma of negative energy. In UFT173 the fermion equation was given in a simple

covariant format and the half operator method of solution introduced. In UFT174 solutions of the fermion equation were given for the hydrogen and helium atoms, and the Pauli Exclusion Principle deduced straightforwardly from the fermion equation using parity inversion.

In UFT175 the quantum Hamilton equations were inferred in which position and momentum are defined simultaneously, thus refuting the Copenhagen indeterminacy at the outset. The untenable nature of indeterminacy was demonstrated with a novel anti-commutator method. In UFT176 higher order commutators were used to further refute the Copenhagen indeterminacy in a particularly clear and simple way. In UFT177 this work developed into the inference of a novel force equation of quantum mechanics, and force eigenvalues illustrated. UFT178 gives a relativistic quantum force equation and developed spin orbit coupling. UFT179 gives a generally covariant fermion equation, and UFT180 develops the idea of a wave equation derived from the tetrad postulate.

These papers represent another major paradigm shift in quantum physics, eliminating the dogmatic twentieth century adherence to negative energy. “Negative energy”, a contradiction in thought, was shown to result from the wrong choice of matrices by Dirac in his first papers. The correct choice of matrices follows from the fermion equation.

11. PHOTON MASS AND REFUTATION OF STANDARD MODEL PARTICLE SCATTERING THEORY.

These major advances and refutations are given in UFT150, 155, 157 - 167, 171, and 180 - 182. The original motivation for these papers on particle scattering theory was an attempt to devise new experiments to measure the mass of the photon. The first attempt was made in UFT150, which was originally intended as a development of Einstein’s calculation of light deflection due to gravitation to include finite photon mass. However, it was found that Einstein’s calculation contained errors, self inconsistencies and obscurities which are summarized in UFT150 and in the popular broadcast “Nobody’s Perfect”. Following upon UFT194, it is now known that the Einstein method is fundamentally self inconsistent and meaningless, because it is a metric based method that uses the incorrectly attributed and meaningless “Schwarzschild metric”. The outcome is that gravitational light bending must be looked at again with an entirely new relativity, such as that of UFT199. The experiment and calculation that catalysed Einstein into fame are meaningless dogma. This conclusion is sometimes referred to as the post Einsteinian paradigm shift. In UFT155 it was shown that

the Shapiro time delay calculation is erroneous and that there is no self inconsistency between light bending and time delay. Following upon UFT194 it is now known that the time delay method is meaningless because it is a self contradictory metric based method. It is not known why dogmatists continued to refer to these experiments as “precision tests” of a theory when that theory is so riddled with errors known since December 1915, errors pointed out repeatedly by leading scientists and culminating in the systematic, detailed and conclusive refutations of ECE theory reviewed in this paper.

In UFT158 the usual theory of Compton scattering of a massless photon from an electron was re examined with a view towards the investigation of photon mass. The correct equations were given of the scattering of a massive photon from a massive electron, using the fundamental postulates that attempted to unify special relativity and quantum mechanics, the de Broglie Einstein postulates of about 1922, based on the doctoral thesis of de Broglie. By giving the correct, incisively deduced, equations for the first time, the theory was found to be severely self inconsistent and was found to give a mirage of correctness when the photon mass is set to zero. The award of a Nobel Prize to Compton was based on this mirage. Not for the first or last time. In UFT159 and 160 the general theory of Compton scattering was developed and became wildly incorrect when tested with sufficient rigour. The first attempts were made in these papers to replace the theory with one based on the ECE wave equation, given the appellation “R Theory”. In UFT161 the original two de Broglie postulates were augmented with a third, which made the mass of a particle proportional to the parameter R of the ECE wave equation. These were given the appellation “October Postulates” of October 2010. In UFT162 these incisive criticisms were extended to the Einstein absorption theory, which again relies on the idea of massless photon. As soon as photon mass is introduced the Einstein theory of absorption becomes completely untenable because it did not consider conservation of momentum. So another aspect of standard physics was easily refuted completely. A similar outcome occurred for the theory of Raman scattering. This situation was remedied in UFT`163 to 166 with the development of R theory and R spectra for atoms and molecules. A lot of further development is possible along these lines.

In UFT171 the electron positron collision theory behind such experiments as LEP and CERN was shown to be wildly incorrect and a self consistent R theory given. The basics of the particle scattering experiments made at such huge expense are incorrect. Their fine details cannot be correct, and as yet there is no sign of a Higgs boson. This basically

incorrect theory has been very heavily parameterized (with as many as about 25 adjustable parameters), and obscure concepts such as symmetry breaking added to give a meaningless, tasteless soup. With so many parameters anything can be fitted, and as shown in UFT171 the basic theory is wildly wrong. Only R theory can be used to test data of any interest from particle colliders.

UFT167 was an attempt to develop a metric based theory of electrodynamics, but UFT194 means that UFT167 must now be regarded as a transitional paper, for the same reason as any metric based theory with the exception of one based on the Minkowski and Crothers metrics. Finally UFT180 - 182 develop R theory in several directions.

12. SYSTEMATIC REFUTATIONS OF EINSTEINIAN GENERAL RELATIVITY.

These systematic, simple and powerful refutations should end the era of Einstein's general relativity. The main ones are UFT150 and 155, and UFT190 and 192 - 195. The refutations in UFT150 and 155 are confirmed conclusively by UFT194, because the Einstein theory of light bending and the Shapiro theory of time delay are metric based theories. All such theories have been refuted in UFT194 in all spherical spacetimes. In addition the mathematical details of UFT150 and UFT155 are correct in all respects and have been accepted as such by the entire profession. In UFT190 the analytical function of the precessing ellipse was compared with the result from the Einstein theory and several inconsistencies found within the Einstein theory. At this point it was realized that the Einstein theory does not produce a precessing elliptical orbit. This point was made by Schwarzschild in a letter to Einstein of December 1915, Schwarzschild showed that Einstein's theory of perihelion precession was incorrect only a month after Einstein published it. In UFT192 it was shown conclusively that the function incorrectly attributed to Schwarzschild cannot produce a precessing ellipse. The function needed to do that within a metrical theory is much more complicated. So it became obvious that the Einstein theory is deeply flawed. In UFT193 it was shown that the force law of lagrangian dynamics needed to give a precessing ellipse is not that claimed in the Einstein theory. It is important to note that in UFT193, the same lagrangian methods were used as those in the Einstein theory. So there is no way out for the latter. The true force law for a precessing ellipse is a sum of inverse square and cube terms, the one claimed in the Einstein theory is a sum of inverse square and inverse fourth order terms. This is a clear, simple and conclusive refutation of the Einstein theory. This refutation was confirmed by use of the computer to demonstrate the converse

refutation conclusively: that a force law consisting of a sum of inverse square and fourth order terms does not give a precessing ellipse at all. It gives a very complicated function that is totally different from a precessing ellipse. This is con 1usive confirmation of Schwarzschild's refutation of Einstein in December 1915.

At this point it became clear that there is a fundamental flaw in the very basics of the metrical method used to construct the line element in Einstein's relativity. In the important and milestone paper UFT194, this flaw was found in an astoundingly simple way by taking the definitions of the total energy and angular momentum obtained by the Lagrangian methods of the Einstein theory. These definitions were used to find an expression for the function which had been falsely attributed to Schwarzschild. The false function is one of r, the radial coordinate of the cylindrical polar system in a plane. In UFT194 it was found that this cannot be true, the relevant metrical function is a constant for all spherical spacetimes, thus refuting all of Einsteinian general relativity directly and in a conclusive manner. Why has it taken nearly a century to find this fatal flaw? The answer is that Einstein general relativity became an example of Langmuir's pathological science, an example of repeated dogma, repetition made carelessly without scholarship, thus heavily damaging the progress of science. In UFT195 it was shown that only the Crothers metric of a very general spacetime survives the refutation of UFT194.

13. TOWARDS A NEW GENERAL RELATIVITY

Attempts were made to search for a new relativity in UFT196 - UFT199. In UFT196 the methods of special relativity were used to construct a relativistic kinetic energy which was used in a lagrangian method to describe the observed orbit of a planet, a precessing ellipse. In Section 3 of UFT196 a simple refutation of the Newtonian description of orbits was found simply by differentiating the function of an ellipse as described already in this review paper. This method showed that the centrifugal force, so called, does not exist, and so the Newtonian description is refuted directly. In UFT197 the rotational Hooke law was implemented in a new approach to general relativity, and in UFT198 the new relativity was used to give a simple explanation of the velocity curve of a whirlpool galaxy. In UFT199 a new and powerful equivalence theorem has been forged which allows a fully relativistic treatment of all orbits, UFT199 has been reviewed already in this paper.

14. INTERACTION OF FIELDS AND ELECTRODYNAMICS

Two papers of the series 101 to 199 have been dedicated to the subject of interaction of fields and electrodynamics, UFT144 and UFT154. UFT144 developed orbital and spin electric and magnetic fields in classical electrodynamics, a development based on the first Cartan structure equation and the Cartan and Evans identities. There may be some experimental evidence for the existence of such fields. UFT154 was based on a metrical method refuted in UFT194, and must be regarded as a transitional paper.

15. THE DEVELOPMENT OF KURATA / B(3) TECHNOLOGY.

Recently the fundamental B(3) field has been utilized in a number of new technologies that produce clean burning fuel, clean water from polluted sources, and fuel from sea water mixed with residuals. The first industrial scale plant based on Kurata / B(3) technology has been opened in Cordoba in Spain, initially producing forty thousand tons of clean burning diesel a year. So the B(3) field is used routinely in industry. UFT183 and 184 were written to support this new technology by providing an explanation of how B(3) helps the process of converting waste products into clean burning fuel. There are plans for rapid growth of this clean fuel technology, especially the ability to provide new energy from sea water mixed with residuals.

16. GEOMETRICAL REFUTATIONS OF THE EINSTEIN GENERAL RELATIVITY

As discussed already in this paper, the existence of torsion and the antisymmetric connection is enough to refute the Einstein theory directly. The most relevant papers in this context are UFT122, 137 and 139. The whole series of two hundred ECE papers to date can be viewed as numerous refutations of the Einstein theory, but more importantly, as the emergence of the first unified field theory in the history of physics. In view of the overwhelming acceptance of the theory, this theory is known now as the ECE theory of unified physics.

17. TOWARDS A NEW GENERAL RELATIVITY

This development occurs mainly in UFT201 to UFT213, and also devises new methods for measuring photon mass, for example UFT202. UFT203 develops general relativity with a Minkowski metric, UFT204 develops a Newtonian theory of perihelion precession, UFT205 develops the theory of torsion and curvature of any orbit; UFT206 gives the equations of motion of the new general relativity; UFT207 demonstrates the self consistency of the new field equations; UFT208 gives the orbital equation of motion and applies it to whirlpool

galaxies and the solar system; UFT209 is the first in a series of rigorous proofs of the antisymmetry of the Christoffel connection; UFT210 defines the time evolution of the equations of the new relativity; UFT211 gives another rigorous proof of the antisymmetry of the Christoffel connection; UFT212 gives a third proof of antisymmetry; UFT213 gives a fourth proof of antisymmetry. UFT214 onwards to UFT223 develop an entirely new theory of precessing orbits and fractal conical sections. UFT214 gives a new theory of precessing elliptical orbits; UFT215 gives an original classical theory of orbital precession; UFT216 gives a new law of gravitation and orbital deflection; UFT217 introduces fractal conical sections to physics and mathematics; UFT218 gives the theory of two and three dimensional orbits; UFT219 develops a new theory of N particle orbits; UFT220 develops Kepler's law for precessing orbits; UFT221 develops the N particle gravitational problem; UFT222 develops the theory of fractal precessing conical sections; UFT223 develops the theory of orbital dynamics with a constrained Minkowski metric.

18. REFUTATIONS OF HIGGS BOSON THEORY AND ELECTROWEAK THEORY

The standard physics rests on such a shaky basis that it is possible to refute it entirely using straightforward arguments such as those given in UFT224, which reviews many refutations of the U(1) symmetry and massless photon theory. The Higgs boson theory is entirely refuted in these papers, which introduce the B(3) field and its definitive demonstration of finite photon mass. In UFT225 key equations of the Glashow Weinberg Salaam electroweak theory are shown straightforwardly to be incorrect in many ways, so there can be no confidence in GW theory, a cornerstone of Higgs boson theory.

19) DEVELOPMENT OF THE ECE THEORY OF LOW ENERGY NUCLEAR REACTION.

Low energy nuclear reaction (LENR) is now known to be reproducible and repeatable, and in UFT226 to UFT230 the ECE theory is applied to show that LENR is easily feasible. In UFT226 a new general method is applied to LENR. In UFT227 the ECE fermion equation is applied to LENR to show that it is feasible experimentally, and a very valuable source of new energy. In UFT228 it is shown that quantum tunnelling combined with absorption produces transmission coefficients compatible with low energy fusion. In UFT229 a new general quantum theory of absorption is applied to LENR in order to demonstrate its feasibility in another way. Finally in UFT230 a new fundamental theory of the Cartan tetrad

is used to develop new ECE equations which are applied to LENR.

20) SUMMARY (BY DOUGLAS LINDSTROM)

Progress in the development of the ECE theory of unified physics has been reviewed. This is a very broad theory, so that developments on several fronts have been touched upon. Such topics as spin connection resonance (SCR) and computer simulation of spacetime devices, advances in differential geometry, astronomy and cosmology, precession phenomena, conservation laws, continuity and Poynting theorems, dynamics and fluid dynamics, equivalence principles, and antisymmetry laws were addressed. These lead to refutations of classical electrodynamics and standard particle theory, the refutation of the Dirac equation, and finally the Einstein field equation and general relativity, thereby opening the way for insights into photon mass and particle scattering theory, and the first steps toward a new general relativity with the antisymmetric connection. Refutations of the Higgs boson theory and GWS theory have signaled serious flaws in the current methods of funding for scientific research. Recently the topic of low energy nuclear reactions has been addressed and a satisfactory explanation offered for its mechanisms.

21. BREAKING DOWN COMPLEXITIES IN SCIENCE (BY ROBERT CHESHIRE)

The UFT papers to the lay person (mathematically untrained) are almost frightening! Rigorous and accurate algebraic equations, many constants and variables. Alpha to Omega - all “Greek” to those without the code or language. Dr. Evans, however, is fluent in at least three languages - High Mathematics, English and his native tongue, Silurian Welsh - part of the oldest language in Western Europe and used for Britons for six thousand years. The significance of such linguistic mastery is that Dr. Evans, being also a poet in English and Welsh (primarily), there engages with descriptions of the human emotions - as well as the higher level mathematical, albeit in these totally separate arenas.

So, Dr Evans - as with many more in the AIAS - is also dedicated to clarity of meaning and function as well as the return of Physics to comprehensibility - both linguistic and mathematical.

Many of the important advances of science are mathematically described by more than two hundred and thirty papers referred to in this text. My won remit was and is to continue the broadcasting of essays by Dr. Evans and colleagues, as was originally set up with Simon Clifford. These essays, on the publication page of www.aias.us, give reason and plain

English explanation of many of not all the advances shown in the UFT papers to date. It is rewarding to know that even the higher level, mathematically minded will read these essays just as do those less mathematical. There are no obfuscations of the factual results here at AIAS, and the Essays are written with appeal to a more general readership and audience, to those with genuine interest in this monumental, 21st century scientific development.

(Robert Cheshire, Broadcaster and Fellow of the AIAS)

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