ESSAY 109 : The Discovery of the Jacobi Cartan Evans (JCE) Identity

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The entire twentieth century in general relativity was based on incorrect geometry, one which wrongly assumed the absence of torsion. The Einstein field equation of 1915 was based on an identity of geometry attributed to Bianchi in 1902, although it appears to have been discovered by Ricci as early as 1880. It is known as the second Bianchi identity. The first Bianchi identity was also inferred in about 1902 at the Scuola Normale Superiore in Pisa. The first identity of Bianchi was corrected by Cartan in Paris in the early twenties using the concept of torsion. The latter is missing completely from the entire era of Einsteinian general relativity. It was unknown in 1915 when Einstein proposed his field equation after a conference at Goettingen during the summer of 1915. Therefore big bang, black holes and any other dogmatic claims based on the Einstein field equation are mathematically incorrect and must be rejected.

This conclusion introduces van der Merwe's Post Einsteinian Paradigm Shift of the early twenty first century in natural philosophy or physics - ECE unified field theory.

The first attempt to correct the second Bianchi identity for torsion was made in UFT88, which has become a classic paper, read tens of thousands of times around the world of physics and the natural sciences. It is currently being read over three thousand times a year. It was written in about 2007 and has never been challenged by the dogmatists of Einsteinian general relativity. It shows conclusively that the presence of torsion completely changes the second Bianchi identity of 1902, the one used by Einstein in 1915. It should be read with UFT99 which gives complete details of the commutator method of proving the antisymmetry of the connection used to define the torsion and curvature tensors. The commutator acts on any tensor in any space of any dimension to produce the torsion and curvature simultaneously. Both the torsion and curvature thus defined are always non zero, and the commutator method produces the equivalent of the first and second Maurer Cartan structure equations, the most fundamental equations of differential geometry.

The dogma used unknowingly by Einstein in 1915 disregards torsion incorrectly, and the procedure is mathematically meaningless. The torsion was removed arbitrarily by Einstein's dogmatic followers by assuming that the connection is symmetric. However, this assumption leads to a symmetric commutator which vanishes. This in turn means that the curvature vanishes. So the assumption of null torsion means that there is also no curvature and gravitation vanishes. The entire twentieth century era of general relativity is fundamentally and irretrievably incorrect. The various proofs using the commutator method have been read many thousands of times from www.aias.us without any objection, and also read by the best in the world (UFT307).

Therefore the Einsteinian general relativity is obsolete and has been replaced by ECE theory to the satisfaction of entire professions. It continues to be taught however by the dogmatists, so there is a deep crisis in physics and two schools of thought, standard model and ECE. We see this by eleven years of accurate scientometrics in UFT307, just published as a softback by New Generation in London.

In UFT112 the Evans torsion identity was discovered, an exact identity of mathematics obeyed by the torsion tensor. Obviously this is missing entirely from torsionless Einsteinian general relativity. In UFT255 the second Bianchi identity was corrected in another way, again showing that the correct consideration of torsion changes it completely, so the Einstein field equation is hopelessly wrong. In UFT313 the fundamental Jacobi identity was used with the little known Ricci identity of about 1880 to produce the final format of the

corrected second Bianchi identity, given the appellation Jacobi Cartan Evans (JCE) identity. The derivation of the JCE identity parallels the original 1902 derivation of the torsionless second from the first Bianchi identity. According to Levi-Civita, a student of Ricci, the latter was actually the first to derive the second Bianchi identity in about 1880 but forgot about the work until it was rediscovered by Bianchi in 1902 and its true significance realized. This is plausible because the derivation needs the use of the Ricci identity, the covariant derivative of a rank two tensor. The JCE identity of UFT313 is fundamentally important to mathematics and introduces a new era of ECE theory described in the next essay. It has been immediately accepted without objection and is already being read almost two thousand times a year along with its vector format in UFT314 and UFT315.