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Gravitational Equivalent of The Faraday Law of Induction

by

Myron W. Evans,
Alpha Institute for Advanced Study, Civil List Scientist.
(emyrone@aol.com and www.aias.us)

Abstract

Einstein Cartan Evans (ECE) theory has shown that there exists a gravitational equivalent of the Faraday law of induction. This can be expressed either in terms of the Cartan torsion. Recently this prediction has been verified experimentally in a spinning superconductor by Tajmar, de Matos et alii. The latter also inferred a graviton in their laboratory experiments. The graviton is described by the ECE wave equation and so this experiment accords with the theory in this way too.

Keywords: Gravitational equivalent of the Faraday law of induction, counter-gravitation, spinning superconductors, graviton.

5.1 Introduction

Einstein Cartan Evans (ECE) unified field theory has been developed recently in many directions [1–12] and has predicted the existence of the gravitational equivalent of the Faraday law of induction. This prediction has recently been verified experimentally [13] using spinning superconductors. In Section 5.2 the gravitational equivalent of the Faraday law of induction is given in terms of the Cartan torsion, and compared with the theory used in ref. [13]. The graviton observed in ref. [13] is explained through the ECE wave equation in Section 5.3, without use of the obsolete Higgs mechanism. It has been

shown experimentally at CERN [14] that the Higgs boson does not exist in nature, so the Higgs mechanism and associated postulates such as spontaneous symmetry breaking and asymptotic freedom must also be rejected on experimental grounds. This means that much of the standard model must also be rejected, i.e. those parts of it that depend on the Higgs mechanism - these include re-normalization and string theory. ECE theory is preferred by Ockham's Razor because it uses only the concepts of geometry and general relativity.

5.2 The Gravitational Induction Law from ECE Theory

This law [1–12] in terms of torsion is based directly on Cartan geometry, specifically the first Bianchi identity:

$$d \wedge T^a + \omega^a{}_b \wedge T^b := R^a{}_b \wedge q^b. \tag{5.1}$$

Here T^a is the torsion form, $\omega^a{}_b$ is the spin connection, $R^a{}_b$ is the curvature form, and q^b the tetrad form [15]. Eq. (5.1) is the standard [15] expression of the first Bianchi identity and may be re-written as:

$$d \wedge T^a = j^a \tag{5.2}$$

where the current term is defined by [1–12]:

$$j^a = R^a{}_b \wedge q^b - \omega^a{}_b \wedge T^b. \tag{5.3}$$

The Hodge dual of Eq. (5.2) is:

$$d \wedge \widetilde{T}^a = \widetilde{j}^a \tag{5.4}$$

where the Hodge dual current is [1–12]:

$$\widetilde{j}^a = \widetilde{R}^a{}_b \wedge q^b - \omega^a{}_b \wedge \widetilde{T}^b. \tag{5.5}$$

If there is no interaction between rotation and translation, it has been shown [1–12] that:

$$d \wedge T^a = 0. \tag{5.6}$$

The gravitational equivalent of the Faraday law of induction is part of Eq. (5.6). In vector notation the latter becomes two equations:

$$\boldsymbol{\nabla} \cdot \boldsymbol{T}_S^a = 0 \tag{5.7}$$

$$\boldsymbol{\nabla} \times \boldsymbol{T}_L^a + \frac{1}{c}\frac{\partial \boldsymbol{T}_S^a}{dt} = \boldsymbol{0} \tag{5.8}$$

and the gravitational equivalent of the Faraday law of induction is Eq. (5.8) in vector notation. Eq. (5.7) is the gravitational equivalent of the Gauss law of magnetism. Here $\boldsymbol{T}_S^a$ is the spin torsion vector defined elsewhere [1–12] and $\boldsymbol{T}_L^a$ is the orbital torsion vector.

Using the notation of Tajmar, de Matos et al. [13] the well known London moment is supplemented by a large gravito-magnetic field $\boldsymbol{B}_g$, which has the units of angular velocity (radians per second). Thus

$$\boldsymbol{B} = -\frac{2m}{e}\boldsymbol{\omega} - \frac{m}{e}\boldsymbol{B}_g \tag{5.9}$$

where $\boldsymbol{B}$ denotes magnetic flux density in tesla (weber per square meter), m and e are respectively the Cooper pair mass and charge of the spinning superconductor, and is the angular velocity of the spinning superconductor. The gravito-magnetic field induces a gravitational field $\boldsymbol{g}$ in units of metre per second squared as follows [13]:

$$\boldsymbol{\nabla} \times \boldsymbol{g} + \frac{\partial \boldsymbol{B}_g}{\partial t} = \boldsymbol{0} \tag{5.10}$$

and this is the gravitational equivalent of the Faraday law of induction in the notation of ref. [13]. Eq. (5.10) is confirmed experimentally [13] and it is seen that it is the same as Eq. (5.8) of ECE theory for each polarization index [1–12] a. The experimental value of $\boldsymbol{B}_g$ [13] is:

$$\boldsymbol{B}_g = 1.84 \times 10^{-4}\boldsymbol{\omega} \tag{5.11}$$

and is indicated by an experimentally observed and anomalous mass increase in niobium Cooper pairs. It is many orders of magnitude greater than the Earth's gravitomagnetic field [13]:

$$\boldsymbol{B}_g(\text{Earth}) = 10^{-14}\text{rad}\, s^{-1}. \tag{5.12}$$

In ECE theory Eq. (5.9) is the direct consequence of the definition of the magnetic flux density in unified field theory. In vector notation:

$$\boldsymbol{B}^a = \boldsymbol{\nabla} \times \boldsymbol{A}^a - \boldsymbol{\omega}^a{}_b \times \boldsymbol{A}^b \tag{5.13}$$

where $\boldsymbol{A}^a$ is the potential field and $\boldsymbol{\omega}^a{}_b$ is the spin connection vector. Thus the gravitomagnetic field in ECE theory is:

$$\boldsymbol{B}_g^a = \frac{e}{m}\boldsymbol{\omega}^a{}_b \times \boldsymbol{A}^b. \tag{5.14}$$

For each a, Eq. (5.8) becomes:

$$\boldsymbol{\nabla} \times \boldsymbol{T}_L + \frac{1}{c}\frac{\partial \boldsymbol{T}_S}{\partial t} = \boldsymbol{0} \tag{5.15}$$

and comparing Eqs. (5.9) and (5.14):

$$\boldsymbol{g} = c^2 \boldsymbol{T}_L, \boldsymbol{B}_g = c\boldsymbol{T}_S. \tag{5.16}$$

Therefore the results in ref. [13] are predicted from first geometrical principles by ECE theory, which is preferred by Ockham's Razor to empiricism (many ad hoc concepts) and to more complicated theories such as the failed Higgs mechanism.

5.3 Experimental Observation of the Graviton and Explanation in ECE Theory

It is claimed in ref. [13] that the graviton has been observed in the laboratory. This claim is unfortunately based on the Higgs mechanism, which clearly does not exist [14] in nature. The claim is however supported by use of the ECE wave equation for gravitation:

$$(\Box + kT)q_\mu^a = 0 \tag{5.17}$$

where q_μ^a is the tetrad eigen-function, k is the Einstein constant and T is the index reduced canonical energy-momentum density:

$$R = -kT \tag{5.18}$$

where R is a well defined [1–12] scalar curvature in inverse meters squared. When the gravitational field becomes independent of all other fields:

$$kT = \left(\frac{m_g c}{\hbar}\right)^2 \tag{5.19}$$

where m_g is the graviton mass, c is the speed of light and $\hbar$ the reduced Planck constant. Thus m_g is observed experimentally in ref. [13]. This is a simpler explanation than that of the standard model, the latter is invalidated additionally by the experimental failure [14] to find the Higgs boson.

Finally ECE theory can also offer a qualitative explanation of why the observed gravitomagnetic field [13] is no less than 31 orders of magnitude greater than that expected from Einstein Hilbert (EH) theory. The basis of the explanation is that EH theory does not consider Cartan torsion at all and the gravitomagnetic field defined in Eq. (5.14) is due to Cartan torsion. The latter is defined by the first Cartan structure equation [15]:

$$T^a = d \wedge q^a + \omega^a{}_b \wedge q^b \tag{5.20}$$

when Eq. (5.20) is used with Eqs. (5.2) and (5.4) spin connection resonance becomes a possibility [1–12]. As shown in Eq. (5.14) the gravitomagnetic field is defined by the spin torsion vector:

$$\boldsymbol{T}^a_S = \boldsymbol{\nabla} \times \boldsymbol{q}^a - \boldsymbol{\omega}^a{}_b \times \boldsymbol{q}^b \tag{5.21}$$

and under well defined conditions [1–12] is amplified at resonance. The conditions in the niobium superconductor allow this resonance to occur, so that $\boldsymbol{T}^a_S$ is amplified. This is a qualitative explanation that does not depend on the non-existent Higgs mechanism.

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