CHAPTER SEVEN

ENERGY FROM SPACE TIME AND LOW ENERGY NUCLEAR REACTIONS

These phenomena when viewed as experimental data completely refute the standard model of physics, which is still unable to deal with them. There are many devices available that take energy from space time (www.et3m.net) in a reproducible and repeatable manner. These devices are being used routinely in the best industry. Low energy nuclear reactors (LENR) are about to be mass produced, but the old physics still cannot explain them. A plausible qualitative explanation for such devices has been given by ECE theory through the use of Euler Bernoulli resonance {1 - 10} in equations containing the spin connection. The first example found was spin connection resonance (SCR) in the Coulomb Law, and after that several other mechanisms were found. The theory has been greatly developed independently by Eckardt and Lindstrom. This chapter aims to explain the simple basics of spin connection resonance.

For over a hundred years there have been many reports of devices producing more electric power than inputted to a given device. Many of these reports were not reproducible and repeatable, but in the past thirty years or so the subject has become more scientific, with more details becoming available of circuit design. Some of the reports were of surges or spikes of power which could not be explained conventionally. Some of these were too large to be artifacts. The subject has been hampered greatly by pseudoscience and charlatans, so from the beginning ECE set out to give a rigorous explanation of such phenomena. A qualitative or plausible explanation was sought based on data that were likely to be reproducible and repeatable and to be free of artifact. Conventional electric resonance must be eliminated carefully before a source of energy from space time can be considered as a possible explanation.

In addition to these requirements of Baconian science the circuit design must preferably be made available as the scientific apparatus, in the usual manner of a scientific experiment, but very often no details of apparatus were available. Possibly this may have been due to inventors who were careful to protect patent rights. So scientists have been reluctant to approach these important subject areas in an open minded, scientific, manner. This is a pity because they are of great potential importance to humankind. If there is any chance whatsoever of obtaining energy from spacetime, then that chance should be exploited to the hilt. A coherent theory for such phenomena was not formulated until spin connection resonance was proposed. The Maxwell Heaviside (MH) theory has no explanation for energy from space time, so there has been a historical tendency to dismiss all such data as artifact, or being indicative of a lack of knowledge of basic principles such as conservation of energy. In the past there has been a widespread belief that energy from space time means energy from nothing. This absurd lack of understanding delayed the acceptance of the subject for many years.

In about 2005 one of the authors of this book (MWE) was asked to give an explanation of a very intense resonance peak in apparatus demonstrated to the U. S. Navy by Alex Hill and colleagues (www.aias.us) whose work was first drawn to the attention of MWE by Albert Collins. John Shelburne, a civilian working for the Navy in Florida, asked MWE to give a plausible explanation in terms of the then new ECE theory. The resonance peak was demonstrated to the U. S. Navy by the Alex Hill group, and the Naval civilian staff were satisfied that the effect was free of artifact. There was an intense resonance of electric power which could not be explained by conventional electric resonance theory, based on Euler Bernoulli theory. Subsequently the Alex Hill group developed devices which are now used in Fortune Fifty industry. Observers are allowed to see the devices in-operation in Fortune Fifty industry.

7. 1. SPIN CONNECTION RESONANCE FROM THE COULOMB LAW

In the simplest instance the Coulomb law in ECE theory is given by:

$$\underline{\nabla} \cdot \underline{E} = \rho / \epsilon_0 \quad -(1)$$

where:

$$\underline{E} = -\left(\underline{\nabla} + \underline{\omega}\right)\phi \quad -(2)$$

where ϕ is the scalar potential in volts, $\underline{\omega}$ is the spin connection vector in inverse metres, $\underline{E}$ is the electric field strength in volts m^{-1}, ρ is the charge density in $C m^{-3}$ and ϵ_0 is the S. I. vacuum pemittivity:

$$\epsilon_0 = 8.854 \times 10^{-12}\ J^{-1} C^2 m^{-1}. \quad -(3)$$

Thus:

$$\underline{\nabla} \cdot \left(\left(\underline{\nabla} + \underline{\omega}\right)\phi\right) = -\rho/\epsilon_0 \quad -(4)$$

i.e. :

$$\nabla^2 \phi + \underline{\omega} \cdot \underline{\nabla}\phi + \left(\underline{\nabla} \cdot \underline{\omega}\right)\phi = -\rho/\epsilon_0 \quad -(5)$$

which is an equation capable of giving resonant solutions from the spin connection vector. The Poisson equation does not give resonant solutions. In one Z dimension Eq. (5) becomes:

$$\frac{\partial^2 \phi}{\partial Z^2} + \omega_Z \frac{\partial \phi}{\partial Z} + \left(\frac{\partial \omega_Z}{\partial Z}\right)\phi = -\rho/\epsilon_0 . \quad -(6)$$

The spin connection in Eq. (6) must be:

$$\omega_Z = \frac{\alpha}{Z} \quad -(7)$$

in order to recover the standard Coulomb law off resonance. This is because:

$$\phi = -\frac{e}{4\pi\epsilon_0 Z}, \quad \frac{\partial\phi}{\partial Z} = \frac{e}{4\pi\epsilon_0 Z^2} = -\frac{\omega_Z}{2}\phi \quad -(8)$$

in the off resonant condition, giving Eq. (7). In the off resonant condition the role of the spin connection is to change the sign of the electric field according to Eq. (8). The way in which the field and potential are related is changed, but this has no experimental effect because $\underline{E}$ is effectively changed by $-\underline{E}$. With the spin connection (7), Eq. (6) becomes:

$$\frac{\partial^2\phi}{\partial Z^2} + \frac{2}{Z}\frac{\partial\phi}{\partial Z} - \frac{2}{Z^2}\phi = -\rho/\epsilon_0 \quad -(9)$$

Now assume that the charge density is initially oscillatory:

$$\rho = \rho(0)\cos(\kappa Z) \quad -(10)$$

where κ is a wave number. Thus:

$$\frac{\partial^2\phi}{\partial Z^2} + \frac{2}{Z}\frac{\partial\phi}{\partial Z} - \frac{2}{Z^2}\phi = -\rho(0)\cos(\kappa Z) \quad -(11)$$

The partial derivatives can be changed to total derivatives to give an ordinary differential equation:

$$\frac{d^2\phi}{dZ^2} + \frac{2}{Z}\frac{d\phi}{dZ} - \frac{2}{Z^2}\phi = -\rho(0)\cos(\kappa Z) \quad -(12)$$

Using the well known Euler method this equation can be reduced to an undamped oscillator equation that has resonant solutions, and this was the earliest attempt at developing the theory of spin connection resonance in UFT63.

This was the first plausible explanation of the Alex Hill devices (www.et3m.net) which have been observed over the years by invited experts, the types of device used by

Fortune Fifty companies are power saving devices in induction motors, described on the www.et3m.net site, and energy saving devices in lighting. These types of devices can be mass marketed so no better proof of the presence of energy from space time can be given. Initially, this type of energy was known as energy from the vacuum, but such a nomenclature lent itself to misrepresentation and misunderstanding, notably to absurd allegations of perpetual motion. These came about because the vacuum was confused with "nothingness" , so that presumably these advocates of perpetual motion thought that no energy can be transferred from nothing to a device. On the contrary, the vacuum of general relativity contains energy, defined by the infinitesimal of proper time and the dynamic metric. This has been known for a century. So transfer of energy occurs from space time to a device. Total energy is conserved.

Therefore the nomenclature of "energy from space time" was adopted and when the request came in from the U. S. Navy to devise an explanation, one was found by using the spin connection and looking for equations with the structure of an Euler Bernoulli equation. It would then be possible for a small driving force to produce a large resonance in output electric power. This theory is the same in structure as conventional electric resonance theory, but the driving force originates in spacetime. The vacuum structure of spacetime has been greatly developed during the evolution of ECE theory by Eckardt and Lindstrom. When first asked to devise a theory the relevant author (MWE) had no details of circuit design, and was given only a qualitative account of the results. So spin connection resonance was devised to provide a qualitative description.

Subsequently it was found that spin connection resonance occurs in magnetostatics (UFT 65). The ECE equations of magnetostatics can be written as:

$$\underline{\nabla} \cdot \underline{B}^a = 0 \quad -(13)$$

$$\underline{\nabla} \times \underline{B}^a = \mu_0 \underline{J}^a \quad -(14)$$

$$\underline{B}^a = \underline{\nabla} \times \underline{A}^a - g\,\underline{A}^b \times \underline{A}^c \quad -(15)$$

and in this case spin connection resonance is defined by the simultaneous equations:

$$\underline{\nabla} \times \left(\underline{\nabla} \times \underline{A}^a - g\,\underline{A}^b \times \underline{A}^c \right) = \mu_0 \underline{J}^a \quad -(16)$$

and:

$$\underline{\nabla} \cdot \underline{A}^b \times \underline{A}^c = 0. \quad -(17)$$

Eq. (16) can be developed with the vector identities:

$$\underline{\nabla} \times \underline{\nabla} \times \underline{A}^a = -\nabla^2 \underline{A}^a + \underline{\nabla} \left(\underline{\nabla} \cdot \underline{A}^a \right) \quad -(18)$$

and:

$$\underline{\nabla} \times \left(\underline{A}^b \times \underline{A}^c \right) = \underline{A}^b\, \underline{\nabla} \cdot \underline{A}^c - \underline{A}^c\, \underline{\nabla} \cdot \underline{A}^b + \left(\underline{A}^c \cdot \underline{\nabla} \right) \underline{A}^b - \left(\underline{A}^b \cdot \underline{\nabla} \right) \underline{A}^c \quad -(19)$$

To simplify the problem for the sake of illustration, assume that the vector potential has no divergence:

$$\underline{\nabla} \cdot \underline{A}^a = \underline{\nabla} \cdot \underline{A}^b = \underline{\nabla} \cdot \underline{A}^c = 0 \quad -(20)$$

and assume that $\underline{A}^c$ is space independent so that:

$$\left(\underline{A}^b \cdot \underline{\nabla} \right) \underline{A}^c = \underline{0}. \quad -(21)$$

Eq. (16) becomes:

$$\nabla^2 \underline{A}^a + g \left(\underline{A}^c \cdot \underline{\nabla} \right) \underline{A}^b = -\mu_0 \underline{J}^a \quad -(22)$$

which can be reduced to:

$$\frac{\partial^2 A_Z^a}{\partial X^2} + \kappa_0^2 A_Z^a = \mu_0 J_Z^a(0) \cos(\kappa X) \quad -(23)$$

as in UFT 65. This has the resonant solution:

$$A_Z^a \rightarrow \infty \qquad (24)$$

at:

$$\kappa = \kappa_0 = \left(g \left(\frac{\partial A_Z}{\partial X} \right) \right)^{1/2} . \qquad (25)$$

Spin connection resonance can also occur in the Faraday law of induction if it is assumed that there is a magnetic current density:

$$\underline{\nabla} \times \underline{E}^a + \frac{\partial \underline{B}^a}{\partial t} = \mu_0 \underline{j}^a \qquad (26)$$

UFT 65 assumed that there was no scalar potential and that the electric field is defined by:

$$\underline{E}^a = - \frac{\partial \underline{A}^a}{\partial t} \qquad (27)$$

leading to another example of spin connection resonance. Subsequently, UFT 74 led to spin connection resonance in magnetic motors (M. W. Evans and H. Eckardt, Physica B, 400, 175 - 179 (2007)). In UFT 92 the theory was developed for the Coulomb law in radial coordinates. The most influential of these early papers of ECE theory is UFT 107, which applied spin connection resonance to the Faraday disk generator using the concept of rotating spacetime. It was shown that at resonance the vector potential goes to infinity, and this seemed to give a plausible qualitative explanation of experimentally observed resonance in a variable frequency Faraday disk generator.

In these early papers the antisymmetry laws of ECE theory had not yet been inferred, but several types of spin connection resonance were defined. As explained already in this book the antisymmetry laws give the possibility of many more resonances and infinities, thus giving plenty of support for the experimental data of the Alex Hill group (www.et3m.net). Subsequently the subject of spin connection resonance was developed by Eckardt and Lindstrom, and an account of these developments is given later in this chapter.

The essential point in all these developments is that spin connection resonance occurs only in a theory of general relativity applied to electromagnetism.

The theory continued to develop until it reached the stage described in UFT 259, in which charge current density had been given a geometrical meaning and in which the antisymmetry laws could be incorporated to give spin connection resonance in a simpler way than in the early papers. This is typical of the development of ECE theory, the theory simplified and clarified during the course of 260 papers to date. The latest stages of development are summarized conveniently in the analysis of the Coulomb law using the electric charge density defined by:

$$\rho^a = \epsilon_0 \left(\underline{\omega}^a{}_b \cdot \underline{E}^b - c\underline{A}^b \cdot \underline{R}^a{}_b(\text{orb}) \right) \quad -(28)$$

where ϵ_0 is the vacuum permittivity, $\underline{\omega}^a{}_b$ is the spin connection vector, $\underline{E}^b$ is the electric field strength, c is the universal constant known as the speed of light, and $\underline{R}^a{}_b$ is the orbital part of the curvature vector. As explained already in this book the electric field strength is:

$$\underline{E}^a = -c\underline{\nabla} A^a_0 - \frac{\partial \underline{A}^a}{\partial t} - c\omega^a{}_{0b}\underline{A}^b + cA^b{}_0\,\underline{\omega}^a{}_b \quad -(29)$$

where the four potential is defined by:

$$A^a_\mu = \left(A^a_0, -\underline{A}^a\right) = \left(\frac{\phi^a}{c}, -\underline{A}^a\right) \quad -(30)$$

where ϕ^a is the scalar potential. The electric current density is defined by:

$$\underline{J}^a = \epsilon_0 c \left(\omega^a{}_{0b}\underline{E}^b - cA^b{}_0\underline{R}^a{}_b(\text{orb}) + c\underline{\omega}^a{}_b \times \underline{B}^b - c\underline{A}^b \times \underline{R}^a{}_b(\text{spin}) \right) \quad -(31)$$

where $\underline{R}^a{}_b(\text{spin})$ is the spin part of the curvature vector and where $\underline{B}^b$ is the magnetic flux density.

As discussed in UFT 259 the equations of electrostatics in ECE theory are

$$\underline{\nabla} \cdot \underline{E}^a = \underline{\omega}^a{}_b \cdot \underline{E}^b \quad -(32)$$

$$\omega^a{}_{0b} \underline{E}^b = \phi^b \underline{R}^a{}_b (\text{orb}) \quad -(33)$$

$$\underline{\omega}^a{}_b \times \underline{E}^b + \phi^b \underline{R}^a{}_b (\text{spin}) = \underline{0} \quad -(34)$$

$$\underline{E}^a = -\underline{\nabla} \phi^a + \phi^b \underline{\omega}^a{}_b . \quad -(35)$$

In order to obtain spin connection resonance Eq. (32) must be extended to:

$$\underline{\nabla} \cdot \underline{E}^a = \underline{\omega}^a{}_b \cdot \underline{E}^b - c \underline{A}^b (\text{vac}) \cdot \underline{R}^a{}_b (\text{orb}) \quad -(36)$$

where $\underline{A}^b$ is a vacuum potential of ECE theory. The static electric field is:

$$\underline{E}^a = -\underline{\nabla} \phi^a + \phi^b \underline{\omega}^a{}_b \quad -(37)$$

so from Eqs. (36) and (37):

$$\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c) \phi^c = \underline{\nabla} \cdot (\phi^b \underline{\omega}^a{}_b) + \underline{\omega}^a{}_b \cdot \underline{\nabla} \phi^b + c \underline{A}^b (\text{vac}) \cdot \underline{R}^a{}_b (\text{orb}) \quad -(38)$$

The ECE anti symmetry law means that:

$$-\underline{\nabla} \phi^a = \phi^b \underline{\omega}^a{}_b \quad -(39)$$

leading to the Euler Bernoulli resonance equation:

$$\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c)\phi^c = \frac{1}{2} c \underline{A}^b(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(40)$$

and undamped spin connection resonance . The left hand side contain's the Hooke's law term and the right hand side the driving term originating in a vacuum potential. However tiny this term may be it can be amplified geratly by undamped resonance, confirming the Alex Hill result in another way. This is the most complete theory of Coulomb law resonance to date.

Denoting:

$$\rho^a(\text{vac}) = \frac{\epsilon_0 c}{2} \underline{A}^b(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(41)$$

the equation becomes:

$$\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c)\phi^c = \frac{\rho^a(\text{vac})}{\epsilon_0} \quad -(42)$$

The left hand side is a field property and the right hand side is a property of the ECE vacuum.

In the simplest case:

$$\nabla^2 \phi + \omega_0^2 \phi = \frac{\rho(\text{vac})}{\epsilon_0} \quad -(43)$$

and produces undamped resonance if the driving term is oscillatory as already described in thsi book.

7. 2. LOW ENERGY NUCLEAR REACTIONS (LENR)