Paper 61 (notes) : Reduction of ECE Theory to the Standard Coulomb Law.

In ECE theory the electric field is defined in the simplest instance by:

$$\underline{E} = -\underline{\nabla}\phi + \phi\underline{\omega} \quad -(1)$$

and in the standard Coulomb law it is defined by:

$$\underline{E} = -\underline{\nabla}\phi. \quad -(2)$$

Therefore if:

$$\underline{\nabla}\phi = -\phi\underline{\omega} \quad -(3)$$

the mathematical form of the standard Coulomb law is obtained:

$$\underline{E} := -2\underline{\nabla}\phi. \quad -(4)$$

Thus $\phi$ has been replaced by $2\phi$ by definition. This makes no difference to the inverse square law. If:

$$\Phi := 2\phi = \frac{e}{4\pi\epsilon_0 Z} \quad -(5)$$

and

$$\underline{\nabla}\Phi = -\Phi\underline{\omega} \quad -(6)$$

then

$$\boxed{\omega_Z = \frac{1}{Z}} \quad -(7)$$

WE ALWAYS OBSERVE A SPIN CONNECTION IN THE COULOMB LAW IF OF THE TYPE (7) IF WE OBSERVE THE INVERSE SQUARE DEPENDENCE. THIS IS AN IMPORTANT RESULT.

2) Comments:

Any observable departures from the inverse square Coulomb law would indicate that the spin connection is not of the form (7). In general relativity the electric field must always be defined according to eq. (1), and the vast majority of experimental data confirm the inverse square dependence leading to the result (7) for the spin connection. Eq (3) is similar to the operator equivalence equation of quantum mechanics, eq (3) indicates:

$$\underline{\omega} \rightarrow -\underline{\nabla} \quad -(8)$$

and the operator equivalence is:

$$\underline{p} \rightarrow -i\hbar\underline{\nabla}. \quad -(9)$$

The electric field can be defined equivalently in two ways:

$$\boxed{\underline{E} = -\underline{\nabla}\,\underline{\Phi} = \underline{\Phi}\,\underline{\omega}} \quad -(10)$$

where:

$$\underline{\Phi} = 2\phi. \quad -(11)$$

Eq (10) is the most fundamental definition of the electric field in general relativity (ECE theory). As described by Jackson (3rd ed., 1999) the Coulomb law is the most precise in electrodynamics, so it may be concluded that $\omega_z = 1/Z$ to great precision in the overwhelming majority of

3)

These considerations confirm that ECE theory is correct to very high precision, and give a simple meaning to the spin connection. The result of general relativity, eq. (10) is preferred to the result of special relativity, eqn. (2), on several grounds, notably that other aspects of electrodynamics such as the inverse Faraday and Eddington effects require a generally covariant unified field theory for their objective interpretation on the classical level.

Dramatically new results such as those by the Mexican group are also accounted for by ECE theory by considerations of resonance as in previous work.

It is significant that spin connections of the type (7) also occur as Christoffel connections of the Schwarzschild metric of spherically symmetric space-time. These are well known to indicate a dynamic space-time. Electrodynamics is also now known to be a phenomenon of dynamic space-time, and similarly for the natural, engineering and life sciences.

These considerations for the electric field may now be extended to the magnetic field, again using the simplest possible formalism.