EDUCATIONAL NOTE 1

U(1) GAUGE THEORY

This theory produces the result:

$$[D_\mu, D_\nu]\, \psi = -ig\, F_{\mu\nu} \psi \qquad (1)$$

(Lewis H. Ryder, "Quantum Field Theory", Cambridge University Press, 2nd edition, eq. (3.167) ff.). Here ψ is the gauge field and $F_{\mu\nu}$ is the electromagnetic field:

$$F_{\mu\nu} = \partial_\mu A_\nu - \partial_\nu A_\mu \qquad (2)$$

In the standard model it is accepted that:

$$F_{\mu\nu} = - F_{\nu\mu} \qquad (3)$$

because:

$$[D_\mu, D_\nu] = - [D_\nu, D_\mu] \qquad (4)$$

However, in the standard model it is not stated that the antisymmetry in Eq. (4) also implies:

$$\partial_\mu A_\nu = - \partial_\nu A_\mu \qquad (5)$$

because the indices μ and ν are the indices of the commutator. The antisymmetry (5) is fundamental, and must be used in the definition (2). The latter is built upon the fundamental symmetry (5), a fundamental symmetry which is always present and cannot be ignored. When

$$\mu = \nu \qquad (6)$$

then

$$\partial_\mu A_\nu = 0 \qquad (7)$$

a result which shows that the fundamental U(1) sector symmetry is untenable as shown in ECE papers 130 ff. The U(1) sector symmetry is fundamental to electroweak and Higgs boson theory of the type used at CERN, so this type of theory collapses.

The Anthropomorphic Factor.

It is claimed arbitrarily in the standard model that Eq. (3) is true but Eq. (5) is not true, or is somehow "irrelevant". This is illogical because the same indices μ and ν are used in both equations. The root cause of this irrationality is that Eq. (2) was inferred a long time before Eq. (1), so the commutator method was used to "force" the result (2). The latter was first used by Heaviside in the vector format:

$$\underline{E} = -\underline{\nabla}\varphi - \frac{\partial \underline{A}}{\partial t} \qquad (8)$$

$$\underline{B} = \underline{\nabla} \times \underline{A} \qquad (9)$$

and Heaviside regarded φ and A as having only mathematical meaning. The vector equations (8) and (9) were later put into the tensor format (2) by Poincaré, Lorentz and others. Later still, gauge theory was used to produce the result (1). It was not realized until 2009 that Eqs. (5) and (7) must be the most fundamental result of U(1) gauge theory.

The anthropomorphic factor insists on ignoring Eq. (5) as if it does not exist, while at the same time accepting Eq. (3). This is because Eq. (5) leads to the collapse of U(1) theory as shown in ECE papers 130 ff.

In this case:

$$[D_\mu, D_\nu]\, V^\rho = R^\rho_{\sigma\mu\nu}\, V^\sigma - T^\lambda_{\mu\nu} D_\lambda V^\rho \tag{10}$$

It is accepted that:

$$[D_\mu, D_\nu] = -\,[D_\nu, D_\mu] \tag{11}$$

and that in consequence:

$$R^\rho_{\sigma\mu\nu} = -\,R^\rho_{\sigma\nu\mu} \tag{12}$$

$$T^\lambda_{\mu\nu} = -\,T^\lambda_{\nu\mu} \tag{13}$$

Here

$$T^\lambda_{\mu\nu} = \Gamma^\lambda_{\mu\nu} - \Gamma^\lambda_{\nu\mu} \tag{14}$$

Therefore

$$\Gamma^\lambda_{\mu\nu} = -\,\Gamma^\lambda_{\nu\mu} \tag{15}$$

and when:

$$\mu = \nu \tag{16}$$

then

$$\Gamma^\lambda_{\mu\nu} = 0 \tag{17}$$

Eqs. (15) to (17) were inferred in ECE papers 122 ff.

The Anthropomorphic Factor.

Eqs. (11) to (13) are accepted but in the standard model the symmetry (15) is contravened with

$$\Gamma^{\lambda}_{\mu\nu} = ?\ \Gamma^{\lambda}_{\nu\mu} \neq 0 \tag{18}$$

which implies:

$$T^{\lambda}_{\mu\nu} = ?\ 0 \tag{19}$$

This is despite the fact that the same μ and ν indices are used in Eqs. (13) and (15). The illogicality of Eqs. (18) and (19) was introduced about 1900 onwards, and Eqs. (18) and (19) were used by Einstein in his field equation. As discussed in Paper 139 this has had the consequence that the twentieth century cosmology is entirely meaningless.

So this anthropomorphic state of mind rests on the entirely wrong assertion that μ and ν lead to antisymmetry in Eqs. (12) and (13) but somehow do not lead to antisymmetry in Eq. (15).

To make this absolutely clear, Eq. (10) can be written as:

$$D_{\mu\nu}\, V^{\rho} = -\ \Gamma^{\lambda}_{\mu\nu} D_{\lambda} V^{\rho} + \ldots \tag{20}$$

where:

$$D_{\mu\nu} = -\ D_{\nu\mu} \tag{21}$$

so

$$\Gamma^{\lambda}_{\mu\nu} = -\ \Gamma^{\lambda}_{\nu\mu} \tag{22}$$

This is because the μ and ν indices are the same on both sides of Eq. (20). In the case:

$$\mu = \nu \tag{23}$$

the symmetric commutator is zero by definition:

$$[D_\mu, D_\nu] = 0 \quad , \quad \mu = \nu \tag{24}$$

so the symmetric connection always vanishes

$$\Gamma^{\lambda}_{\mu\nu} = 0 \quad , \quad \mu = \nu \tag{25}$$

This means that the connection only has an antisymmetric part as in Eq. (15). The latter result is as fundamental as the antisymmetry of the commutator, and the result cannot be ignored or dismissed as "irrelevant". The absurd use of a symmetric connection is continued for anthropomorphic reasons.