The anti-symmetry law means that field components are related as follows:

\[ \partial_\mu V^\nu = - \partial_\nu V^\mu, \quad - (1) \]

Potential components are related by:

\[ \partial_\mu A^a = - \partial_\nu A^a, \quad - (2) \]

The minimal prescription is:

\[ P_\mu = e A^a, \quad - (3) \]

so \( A^a_\mu \) is a momentum with \( e \). In the limit of

\[ A^a_\mu = \Lambda^a_{\;\nu} A^\nu - (4) \]

for each \( \mu \). Here \( \Lambda^a_{\;\nu} \) is the Lorentz transform.

The matrix:

\[ \Lambda^a_{\;\nu} = \begin{bmatrix} \cos \phi & \; \; 0 & \; \; - \sin \phi \\ 0 & \; \; 1 & \; \; 0 \\ \sin \phi & \; \; 0 & \; \; \cos \phi \end{bmatrix} \quad - (5) \]

Therefore tensors are related by:

\[ V^a_\mu = \Lambda^a_{\;\nu} V^\nu \quad - (6) \]

In the case of a \( Z \) axis electric field:

\[ E_z = \frac{\partial \phi / \partial t}{c} = \phi_0 \frac{1}{c} \frac{\partial \phi / \partial t}{c} \quad - (7) \]
2) For attraction between two charges, experiment shows

\[ \phi_0 = -\frac{e}{4\pi\varepsilon_0 \xi} \]  

(8)

and:

\[ E_z(3) = \frac{3\varepsilon}{4\pi\varepsilon_0 \xi^2} \]  

(9)

So:

\[ V_0 = -\frac{1}{\xi} \]  

(10)

\[ V_3 = \left(\frac{c^2}{\xi}\right) \frac{1}{\xi} \]  

(11)

Therefore:

\[
\begin{bmatrix}
\phi(0) \\
\phi(3) \\
\phi(3)
\end{bmatrix} = \begin{bmatrix}
\frac{c^2}{\xi} & 0 & 0 \\
0 & 0 & -1 \\
-1 & 0 & 0
\end{bmatrix}
\begin{bmatrix}
1 \\
0 \\
1
\end{bmatrix}
\]  

(12)

Therefore:

\[ V_0 = V_3 = \frac{3\varepsilon}{4\pi\varepsilon_0 \xi^2} \]  

(13)

\[ V_3 = V(0) = -1 \]  

(14)

\[ V_0 = V(3) = -1 \]  

(15)

The factor \(\frac{\xi}{4\pi\varepsilon_0}\) has been normalized out as it cancels.

Converting eqns. (5) and (13):

\[ \cos \phi \frac{c}{\xi} = 1 \]  

\[ \sin \phi = \frac{\beta \xi}{c} \]  

(15)

In the Lorentz boost:

\[ \cos \phi = \gamma, \quad \sin \phi = \beta \gamma, \quad \tan \phi = \frac{\beta}{c} \]  

(16)
3) Defining: \[ v = \frac{Z}{k} \] \hspace{1cm} (17)

it is seen that

\[ v^a = \frac{1}{\Lambda^a} \beta Y \] \hspace{1cm} (18)

where \( v^a \) is the relativistic velocity defined in eq. (12):

\[ v^a = \begin{bmatrix} c/v & 0 & 0 & -1 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & c/v \\ -1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \] \hspace{1cm} (19)

and \( \Lambda^a \) is the Lorentz transformation matrix:

\[ \Lambda^a = \begin{bmatrix} \gamma & 0 & 0 & -\beta Y \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \] \hspace{1cm} (20)

Here:

\[ \gamma = \frac{1}{\sqrt{1 - v^2/c^2}} \quad \beta = \frac{v}{c} \] \hspace{1cm} (21)

The Lorentz transformation has been linked to the antisymmetry law defined in eqn. (15):

\[ v^a = \begin{bmatrix} 1 & \beta & 0 & 0 \\ 0 & 0 & 0 & 1/\beta \\ 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 1/\beta \end{bmatrix} \]
In previous work the longitudinal component of the electric field was shown to be:

\[ E_z^{(3)} = -2 \left( \frac{d\phi_3^{(3)}}{dt} + \omega_3 \phi_0^{(3)} + \omega_0 \phi_3^{(3)} \right) - (1) \]

Defining \[ \nabla = \frac{\partial}{\partial t} \]

it is found that:

\[ \phi_3^{(3)} = -\left( \frac{\nabla}{\nabla} \right) \phi_0^{(3)} \]

\[ \phi_0^{(3)} = -\left( \frac{\nabla}{\nabla} \right) \phi_3^{(3)} \]

with:

\[ \phi_0^{(3)} = \phi_3^{(3)} \]

\[ \phi_0^{(3)} = \phi_3^{(3)} \]

Resulting:

\[ E_z^{(3)} = -2 \left( \frac{1}{c} \frac{d\phi_3^{(3)}}{dt} + \left( \omega_0^{(3)} - \frac{\nabla}{\nabla} \omega_3^{(3)} \right) \phi_0^{(3)} \right) \]

\[ = -2 \left( \frac{1}{c} \frac{d\phi_0^{(3)}}{dt} + \left( \omega_3^{(3)} - \frac{\nabla}{\nabla} \omega_0^{(3)} \right) \phi_3^{(3)} \right) \]

Equation 6: Reproducing structure:

\[ E = -\frac{1}{c} \left( \frac{d\phi}{dt} + \omega \phi \right) \]

Where:
2) \[
\phi = 2 \phi (3) - (8) \\
\omega = \omega _0 (3) - \frac{c}{c} \omega _0 (0) - (9)
\]
Similarly:
\[
E = - \left( \frac{1}{c} \frac{d}{dt} + c_0 \phi _1 \right) - (10)
\]
where:
\[
\phi _1 = 2 \phi _3 - (11) \\
\omega _1 = \omega _0 (3) - \frac{c}{c} \omega _0 (0) - (12)
\]
Similarly the gravitational field is:
\[
g = - \left( \frac{2}{c} + c_0 \right) \omega _1 - (13)
\]
\[
\alpha = \omega _1 - \left( \frac{1}{c} \frac{d}{dt} + c_0 \phi _1 \right) \omega _1 - (14)
\]
The longitudinal electric field and longitudinal gravitational field have a time dependent component through eqs. (10) and (14).
The velocity of propagation of E field is finite through eq. (2). In a vacuum:
\[
v \rightarrow c - (15)
\]
but in a material \( v < c \). In Einsteinian physics the spin connection is missing, and it
Time dependence and finite velocity are also missed.

So in a standard model:

\[ E = -\nabla \phi, \quad -(16) \]
\[ J = -\nabla \mathcal{E}. \quad -(17) \]

So:

\[ E = -\frac{\partial \phi}{\partial z}, \quad -(18) \]
\[ J = -\frac{\partial \mathcal{E}}{\partial z}. \quad -(19) \]

Along the z-axis:

Regarding the ECE theory, all four polarizations of the electromagnetic and gravitational fields are physically meaningless and propagate at a finite velocity \( c \). In a standard model, there are no velocity vectors introduced by self-contraction and error introduced by self-contraction and error. This is an entirely arbitrary assertion that only has done entirely arbitrary assertion that only has done.

Comments are physically meaningful in a vacuum. There is no explanation in any standard model for how the societal electric field between two charges at longitudinal electric field between two or at longitudinal gravitational field between two masses.

Or the simplest level of mathematics:

anti-symmetry law shows that:

\[ E = -\nabla \phi = -\frac{d\mathcal{A}}{dt}, \quad -(20) \]
\[ J = -\nabla \mathcal{E} = -\frac{1}{c} \frac{d\mathcal{I}}{dt}. \quad -(21) \]
In the above analysis, a index is seen utilized to fill in order to show the presence of spin connection resonance. The index appears in the first Cartan structure equation:

$$ T^a_{\mu} = (D \cdot q^a)_{\mu}, \quad (22) $$

which in tensorial notation is:

$$ T^a_{\mu} = \partial_{\mu} q^a - \omega^a_{\mu b} q^b - \omega^b_{\mu a} q^b. \quad (23) $$

$$ = (\partial_{\mu} q^a + \omega^a_{\mu b}) - (\omega^a_{\mu b} + \omega^b_{\mu a}) \quad (24) $$

where by definition:

$$ \omega^a_{\mu b} = \omega^a_{\mu b} q^b, \quad (25) $$

$$ \omega^b_{\mu a} = \omega^b_{\mu a} q^a. \quad (26) $$

By antisymmetry in $\mu$ and $\nu$:

$$ T^a_{\mu} = 2 \left( \partial_{\mu} q^a + \omega^a_{\nu \mu} \right) \quad (27) $$

$$ = -2 \left( \omega^a_{\mu b} + \omega^b_{\mu a} \right) \quad (27) $$

so:

$$ T^a_{\mu} = \sqrt{k} T^a_{\mu} = 2 \Gamma^a_{\mu \nu} = -2 \Gamma^a_{\nu \mu}. \quad (28) $$

In the next note it is shown how the index may be integrated out. This procedure simplifies eq. (27), but loses some information.

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B2(3): Simplified Field Tensors of ECE Theory

The first Cartan structure equation is:

\[ T^a_{\mu \nu} = \partial^a \omega^a_{\mu \nu} - \partial^a \omega^a_{\nu \mu} + \omega^a_{\mu \nu - \omega^a_{\nu \mu}} \] - (1)

i.e.

\[ T^a_{\mu \nu} = \partial^a \omega^a_{\mu \nu} - \partial^a \omega^a_{\nu \mu} \] - (3)

where:

\[ T^a_{\mu \nu} = T^a_{\nu \mu} - (\omega^a_{\mu \nu} - \omega^a_{\nu \mu}) \] - (3

Now, compute the spin connection into the fundamental field definitions. The electromagnetic field is:

\[ F^a_{\mu \nu} = \Phi^a_{\mu \nu} - (4) \]

and the gravitational field is:

\[ G^a_{\mu \nu} = \Phi^a_{\mu \nu} - (5) \]

The gravitational and electromagnetic potentials are:

\[ \Phi^a_{\mu} = \Phi^a_{\mu \nu} \] - (6)

\[ \Phi^a_{\mu} = \Phi^a_{\mu \nu} \] - (7)

So:

\[ F^a_{\mu \nu} = \partial^a \Phi^a_{\mu \nu} - \partial^a \Phi^a_{\nu \mu} - (8) \]

\[ G^a_{\mu \nu} = \partial^a \Phi^a_{\nu \mu} - \partial^a \Phi^a_{\mu \nu} - (9) \]

\[ F^a = d \Phi^a \] - (10)

\[ G^a = d \Phi^a \] - (11)
In vector notation:
\[ E^a = -\nabla \phi - \frac{dA^a}{dt}, \quad (12) \]
\[ B^a = \nabla \times A^a, \quad (13) \]
\[ F^a = -\nabla \Phi^a - \frac{1}{c} \frac{dF^a}{dt}, \quad (14) \]
\[ E^a = \frac{1}{c} \nabla \times F^a, \quad (15) \]

The four senses of polarization in the complex circular basis are:
\[ \alpha = (0), (1), (2), (3), \quad (16) \]

in which
\[ x^a = (x^0, x^1, x^2, x^3), \quad (17) \]

Eqs. (12) to (15) lead for each sense of polarization of the electromagnetic and gravitational fields.

For each \( \alpha \), using antisymmetry:
\[ E^a = -\nabla \phi = -\frac{dA^a}{dt}, \quad (18) \]
\[ F^a = -\nabla \Phi^a = -\frac{1}{c} \frac{dF^a}{dt}, \quad (19) \]
\[ B^a = \nabla \times A^a, \quad (20) \]
\[ E^a = \frac{1}{c} \nabla \times F^a, \quad (21) \]

in which
\[ \frac{dA_x}{dz} = -\frac{dA_z}{dx}, \quad (22) \]
\[ \frac{dF_x}{dz} = -\frac{dF_z}{dx}, \quad (23) \]
This type of ECE theory has the advantage of simplicity, but it obscures the process of spin conversion. Hence it will be very useful for application in electrical and electrical engineering that deal with electric field in its form. (18). Similarly for application in gravitational engineering or cosmology.

For example, eq. (18) shows that the

 longitudinal electric field between two charges has a time dependence as well as an inverse square distance dependence. For the Coulomb field:

$$ A_z = -\frac{e}{4\pi \epsilon_0} \int \frac{1}{r^2} \, dt $$

one feet Natta field:

$$ E_z = -\frac{M B c}{Z^2} \frac{1}{Z} \, dt $$

The gravitomagnetic field $B$ is present in ECE theory as in previous papers. In this type of ECE theory, for every sense of polarization:

$$ d\mu A_n = -d\omega A_p $$

In electromagnetic theory, for example, Eq. (26) is mathematically the same as the theory.
On a superficial level, but eq. (26) is based on torsion and spin connection, neither of which exists in MH theory. Also, the usual gauge transform is MH theory:

\[ A_\mu = A_\mu + \partial_\mu \chi \]  

If \( \gamma_\mu \) is trivial in eq. (26), it antisymmetry equation remains the same, because:

\[ \partial_\mu \chi = 2 \partial_\mu \nu \chi = 0 \]  

It follows for eqs. (28) and (29) that:

\[ \gamma = 0 \]  

The antisymmetry law requires gauge freedom. The whole of twentieth century gauge theory is meaningless.
The antisymmetry of the field tensor \( F_{\mu\nu} \) in ECE theory originates in the fundamental antisymmetry of the commutator as follows:

\[
[\partial_{\mu}, \partial_{\nu}] V^{\rho} = \partial^\rho \partial_{\mu} V^{\nu} - \partial^\rho \partial_{\nu} V^{\mu} - (1)
\]

All quantities with \( \mu \) and \( \nu \) subscripts are also antisymmetric, and they are all generated by the commutator.

The field tensor is:

\[
F^{\mu\nu} = J^{\mu} A^{\nu} - J^{\nu} A^{\mu} + \omega^{\alpha\beta} A^{\alpha\mu} - \omega^{\nu\beta} A^{\alpha\mu} - (2)
\]

where by definition:

\[
\omega^{\alpha\beta} = \omega^{\mu\nu} A^{\mu}_{\beta} - (3)
\]

\[
\omega^{\nu\beta} = -\omega^{\beta\nu} A^{\mu}_{\mu} - (4)
\]

We have:

\[
\omega^{\mu\nu} = -\omega^{\nu\mu} - (5)
\]

so:

\[
\omega^{\nu\beta} A^{\alpha\mu} = -\omega^{\mu\beta} A^{\alpha\nu} - (6)
\]

In vector notation:

\[
\mathbf{\omega} \mathbf{A} - \mathbf{A} \mathbf{\omega} = - (7)
\]

In general:

\[
\mathbf{\omega} \mathbf{A} \mathbf{B} = - (8)
\]

An example of eq. (7) is \( \mathbf{A} \mathbf{B} \mathbf{C} \).
field observed in all inverse Faraday effect:

\[ \frac{B}{(3)^*} = -i \gamma A^{(1)} \times A^{(2)} - (9) \]

For eq. (5):

\[ B^{(3)} \cdot 12 = A^{(0)} \cdot A^{(3)}_{12} - (10) \]

\emph{alpha} inverse notation:

\[ B^{(3)} \cdot Z = A^{(0)} \cdot A^{(3)}_{Z} - (11) \]

\[ \Rightarrow \]

\[ B^{(3)*} = A^{(0)} \overline{A^{(3)}} - (12) \]

\[ = -i \gamma A^{(1)} \times A^{(2)} \]

\[ \Rightarrow \]

\[ A^{(1)} \times A^{(2)} = -A^{(2)} \times A^{(1)} - (13) \]

\[ \therefore \]

\[ \Rightarrow \]

\[ \overline{A^{(3)*}} = -i \gamma \frac{A^{(1)} \times A^{(2)}}{A^{(0)}} - (14) \]

\[ \text{Finally use:} \]

\[ \gamma = \kappa / A^{(0)} - (15) \]

\[ \text{and} \]

\[ \overline{A^{(3)*}} = -i \kappa \overline{e^{(1)}} \times \overline{e^{(2)}} - (16) \]

\[ \text{where:} \]

\[ \overline{e^{(1)}} = \overline{e^{(2)*}} = \frac{1}{\sqrt{3}} \left( i \overline{i} - \overline{j} \right) - (17) \]
The $Z$ axis electric field is:

$$E^{a}_{03} = 2\phi^{a}_{3} - d_{3}\phi^{0} + \omega_{ab}\phi^{b}_{3} - \omega_{3b}\phi^{0} \quad - (1)$$

Where:

$$\omega = (3). \quad - (2)$$

Therefore:

$$E^{a}_{03} = 2\phi^{(3)}_{3} - d_{3}\phi^{(3)}_{0} + \omega_{ab}\phi^{(b)}_{3} - \omega_{3b}\phi^{(0)} \quad - (3)$$

$$= 2\phi^{(3)} - d_{3}\phi^{(3)}_{0} + \omega_{03} - \omega_{30}.$$  

The antisymmetry is:

$$d_{0}\phi^{(3)}_{3} = - d_{3}\phi^{(3)}_{0} \quad - (3)$$

$$\omega_{03} = - \omega_{30} \quad - (4)$$

Therefore:

$$\omega_{ab}\phi^{(b)}_{3} = - \omega_{3b}\phi^{(0)} \quad - (5)$$

Note carefully that eq. (5) is a different type of antisymmetry from that relevant to the magnetic field:

$$\omega_{1b}\phi^{(b)}_{2} = - \omega_{2b}\phi^{(1)} \quad - (6)$$

Using:

$$\phi_{0} = cA_{0} \quad - (7)$$

Eq. (6) is:

$$\omega_{1b}A^{b}_{2} = - \omega_{2b}A^{b}_{1} \quad - (8)$$

So in vector notation, eq. (8) is:
\[ \omega^{a,b} \times A^b = -c \omega^{a,b} \times A^a \] - (9)

However, in eq. (5), there are scalar valued and vector valued terms. The vectors are:

\[ \begin{align*}
\phi^b &= \phi^1 \hat{i} + \phi^2 \hat{j} + \phi^3 \hat{k} - (10) \\
\omega^b &= \omega^{(3)} \hat{i} + \omega^{(2)} \hat{j} + \omega^{(1)} \hat{k} - (11)
\end{align*} \]

So:

\[ \omega^{(3)} \phi^b = -c \phi^b \omega^{(3)} - (12) \]

or

\[ \omega^{(3)} A^b = -c \phi^b \omega^{(3)} A^a - (13) \]

In general:

\[ \omega^{a,b} A^b = -c \phi^b \omega^{a,b} \] - (14)

Note carefully, that the spin connection of eqs. (9) and (14) are different. While it is true that in eq. (14):

\[ \omega^{a,b} (\text{electric}) \parallel -c \phi^b \omega^{a,b} (\text{electric}) \] - (15)

it does not follow that eq. (9) is zero.
1. Electric Field in Engineering Model

The electric field is:

\[ E_a = \phi \left( 2 \omega_a v_i - d_i q_v - \omega_{ab} q_i - \omega_{ba} v_i \right) \]  

where \( \phi \) is in Volts. By antisymmetry:

\[ E_{ai} = 2 \phi \left( d_i q_v + \omega_a q_i \right) \]  

and:

\[ d_i q_v = -d_i q_v, \]  

\[ \omega_{ab} q_i = -\omega_{ab} q_i. \]  

The following four vectors are used:

\[ \mathbf{\mu} = (d_0, d_i) = \left( \frac{1}{c} \frac{d}{dt}, \nabla \right) \]  

\[ q_a = (q_{a0}, q_a) = (q_{a0}, -\nabla) \]  

\[ \omega_{ab} = (\omega_{ab}, \omega_{ib}) = (\omega_{ab}, -\omega_{ba}) \]  

The electric field vector is:

\[ E_a = E_{01} i + E_{02} j + E_{03} k \]  

Therefore:

\[ E_a = \phi \left( \nabla q_v - q_b \omega_{ab} - \omega_{ba} v_i \right) \]  

\[ = -2 \phi \left( \frac{1}{c} \frac{d}{dt} q_a - \omega_{b} q_i \right) \]  

The \( a \) and \( b \) indices are of \( \phi \) complex.
2. Circular basis:
\[ a = (0), (1), (2), (3), \ldots (10) \]

By definition:
\[ a_{\omega} = a_{\omega b} \sqrt{i} \cdot (11) \]
\[ a_{\omega} = \omega_{a b} \sqrt{i} \cdot (12) \]
\[ a_{\omega} = \omega_{a b} \sqrt{i} \cdot (13) \]

Then eq. (4) is:
\[ a_{\omega} = -a_{\omega} \cdot (13) \]

The electric field is therefore:
\[ E_{a i} = 2 \phi \left( \omega_{a i} + a_{a} \right) \cdot (14) \]
\[ -2 \phi \left( \omega_{a i} + a_{a} \right) \cdot (15) \]

\[ E_{a} = -2 \phi \left( \omega_{a} - a_{a} \right) \cdot (16) \]
\[ \nabla a_{a} = \frac{1}{c} \frac{da_{a}}{dt} \cdot (17) \]

For each \( a \):
\[ (E + 2 \phi a) = -\nabla \phi_{a} = -2 \frac{DA}{dt} \cdot (18) \]

where
\[ A = c \phi a \]
3.) The structure of eqn. (4) gives Euler Bernoulli resonance in letter $\nu$ or $n$. Eqn. (17) shows that the electric field of Maxwell-Helmholtz theory:

$$ E = -\nabla \phi = -2 \frac{DA}{dt} $$

is replaced by $E + 2 \phi / c$ for each polarization index $\alpha$.

**Conclusion**

In general relativity, the electric field can be generated by spinning in space-time. Therefore, electric field strength (volts per metre) is generated by spinning:

$$ E = 2 \phi/c \quad - (20) $$

Similarly:

$$ \theta = 2 \pi a \quad - (21) $$

in gravitational theory.
This is given by:

\[ B_{ij} = A \left( d_i \nu_j - d_j \nu_i + \omega_i b \nu_j - \omega_j b \nu_i \right) \]  

(1)

where:

\[ B^a = B_{23}^a i + B_{31}^a j + B_{12}^a k \]  

(2)

For example:

\[ B_3^a = B_{12}^a = A \left( d_1 \nu_2 - d_2 \nu_1 + \omega_1 b \nu_2 - \omega_2 b \nu_1 \right) \]
\[ = A \left( d_1 \nu_2 - d_2 \nu_1 + \omega_1 b \nu_2 - \omega_2 b \nu_1 \right) \]
\[ = A \left( d_1 \nu_2 - d_2 \nu_1 + 2 \omega_3 \right) \]  

(3)

So:

\[ B_3^a - 2 \omega_3^a = A \left( d_1 \nu_2 - d_2 \nu_1 \right) \]  

(4)

i.e.

\[ B_3^a - 2 \omega_3^a = \left( \nabla \times A \right)_3 \]  

(5)

\[ \overline{B}^a - 2A^a \omega^a = \nabla \times A \]  

(6)

A magnetic field is generated by spinning space time:

\[ \overline{B}^a = 2A^a \omega^a \]  

(7)

The vector form of eq. (1) is:

\[ \overline{B}^a = \nabla \times A^a - \omega^a b \times A^b \]  

(8)
2) Antisymmetry means:

\[ \delta_i^a v_j^a = - \delta_j^a v_i^a, \quad -(q) \]
\[ \omega^{ab} v_j^b = - \omega^{ba} v_i^a, \quad -(10) \]

The structure of eq. (8) leads to Euler—Demoulin's resonance, and eqs. (16) and (17) are equivalent equations which show very clearly that in general relativity, a magnetic field is generated by spinning spacetime.

Similarly, the spatial magnetic field \( F^a \)

is generated by spinning spacetime:

\[ F^a = 2 \Phi \frac{c}{c} \quad -(11) \]

or:

\[ F_{ij} = \frac{\Phi}{c} (\omega_{ij} - \omega_{ji}) \quad -(12) \]

The gravitational field is:

\[ g^a_{ij} = \Phi \left( \omega^a_{0i} - \omega^a_{0j} \right) \quad -(13) \]

In S.I. units, the analogy to "\( v \)"

relates between \( E \) and \( B \) in S.I. units.
3) The gravitational field is \( \frac{c}{k} \) times smaller than the magnetic field.

Analogously:

\[
E_0 = \phi (a_i^o - a_i^0) - (14)
\]

\[
B_{ij} = \frac{\phi}{c} (a_{ij} - a_{ij}) - (15)
\]

In SI units:

\[
g = \frac{2}{4\pi \varepsilon_0 G M}
\]

and

\[
L \quad \text{is smaller than} \quad E
\]

\[
P \quad \text{is} \quad R
\]

for a given distance \( r \) between two charged masses.
1. 132(8): New definition of the magnetic field.

From the antisymmetry law:

\[ \frac{\partial A^a}{\partial t} = \nabla \phi^a \]  \hspace{1cm} -(1)

It is found that:

\[ \nabla \times \left( \frac{\partial A^a}{\partial t} \right) = \nabla \times \nabla \phi^a = 0 \]  \hspace{1cm} -(2)

If it is assumed that:

\[ A^a \parallel \frac{\partial A^a}{\partial t} \]  \hspace{1cm} -(3)

Then:

\[ \nabla \times A^a = 0 \]  \hspace{1cm} -(4)

The magnetic field is then:

\[ B^a = -\epsilon^{abc} b \times A^b = 2 \alpha_{ac} \]  \hspace{1cm} -(5)

and is defined directly by the spin connection.

As pointed out in previous work:

\[ B (3) = 2 \alpha \omega (3) \]  \hspace{1cm} -(6)

This proves that electrodynamics

is General Relativity.
132.3: Some consequences of antisymmetry

On the U(1) level:

\[ E = - \nabla \phi - \frac{\partial A}{\partial t} \quad - (1) \]

where

\[ \nabla \phi = \frac{\partial A}{\partial t} \quad - (2) \]

Therefore:

\[ \nabla \times \nabla \phi = \nabla \times \left( \frac{\partial A}{\partial t} \right) = 0 \quad - (3) \]

If:

\[ A \parallel \frac{\partial A}{\partial t} \quad - (4) \]

then

\[ B = \nabla \times A = 0 \quad - (5) \]

In free space:

\[ \nabla \times E + \frac{\partial B}{\partial t} = 0 \quad - (6) \]

\[ \nabla \times B - \frac{1}{c^2} \frac{\partial E}{\partial t} = 0 \quad - (7) \]

so:

\[ \nabla \times E = 0, \quad \frac{\partial E}{\partial t} = 0 \quad - (8) \]

This means:

\[ \nabla \times \frac{\partial A}{\partial t} = 0 \quad - (9) \]

\[ \frac{\partial^2 A}{\partial t^2} = 0 \quad - (10) \]

Eq. (9) is the same as Eq. (3). A possible solution of Eq. (10) is:

\[ E = -2 \frac{\partial A}{\partial t} = 0 \quad - (11) \]
2) If it is assumed that $A_{\mu}$ has no time dependence, or that there is no vector potential associated with any static electric field, then:

$$E = - \nabla \phi - \frac{\partial A}{\partial t} = 0 \quad -(12)$$

because:

$$\frac{\partial A}{\partial t} = \nabla \phi = 0 \quad -(13)$$

or:

$$A = 0 \quad -(14)$$

In this case:

$$\frac{\partial}{\partial \mu} A_{\nu} = \frac{\partial}{\partial \nu} A_{\mu} = 0 \quad -(15)$$

and

$$F_{\mu \nu} = \frac{\partial A_{\nu}}{\partial \mu} - \frac{\partial A_{\mu}}{\partial \nu} = 0 \quad -(16)$$

On the EFE level:

$$E^{a}_{\alpha i} = \phi \left( \omega^{a b}_{\alpha} \nu^{b}_{i} - \omega^{a}_{b} \nu^{b}_{\alpha} \right) \quad -(17)$$

$$B^{a}_{ij} = \phi \left( \omega^{a}_{ib} \nu^{b}_{j} - \omega^{a}_{ij} \nu^{b}_{b} \right)$$

In the notation:

$$E^{a}_{\nu} = 2 \phi \frac{\omega^{a}_{\nu}}{\omega_{E}} \quad -(18)$$

$$B^{a}_{\nu} = 2 \phi \frac{\omega^{a}_{\nu}}{c} \quad -(19)$$

On the $U(1)$ level the antisymmetry law
3) means that \( \mathbf{B} = 0 \) \( - (20) \) so \( \mathbf{E} \) can only be static. If it is assumed \( \mathbf{A} = 0 \) no vector potential, \( \Phi = \text{static electric field}, \) the usual \( U(1) \) assumption, then:
\[
\mathbf{E} = 0 \quad - (21)
\]
The symmetry now means that \( U(1) \) sector collapses completely on \( \text{ECE level}, \) the theory simplifies to eqs. (15) and (16). We define:
1) The electric spin connection, \( \mathcal{A}^a = - \frac{U^a}{e} \)  
2) The magnetic spin connection, \( \mathcal{B}^a = \frac{U^a}{e} \)

The spin connection must now be found from:
\[
F^a{}_{\mu\nu} = \mathcal{A}^a (\omega^a{}_{\mu\nu} - \omega^a{}_{\nu\mu}) - (21)
\]
\[
dF + \omega^a{}_{\mu\nu} F^a{}_{\mu\nu} = A R^a{}_{\mu\nu} - (22)
\]
In this structure, the Cartan torsion simplifies to:
\[
T^a{}_{\mu\nu} = \omega^a{}_{\mu\nu} - \omega^a{}_{\nu\mu} - (23)
\]
\[ q_{\mu b} \gamma^\mu - q_{\nu b} \gamma^\nu = (24) \]

and the Riemann torsion is:

\[ \Gamma_{\mu \nu} = \gamma_{\lambda} \Gamma_{\mu \lambda} \]
\[ = \gamma_{\lambda} (\omega_{\mu \lambda} - \omega_{\gamma \lambda}) = (25) \]
\[ = \Gamma^\lambda_{\mu \lambda} - \Gamma^\lambda_{\gamma \lambda} \]

Resulting:

\[ \Gamma^\lambda_{\mu \lambda} = \gamma_{\lambda} \omega_{\mu \lambda} = \omega_{\mu \lambda} \]

An example of eq. (25) is:

\[ \nabla \cdot \frac{E^a + \omega^a b \cdot E^b}{E} = \phi R^a = (27) \]

\[ R^a = R^a_{1} + R^a_{2} + R^a_{3} = (28) \]

So eq. (27) is:

\[ \nabla \cdot \frac{E^a + \omega^a b \cdot E^b}{E} = \phi \frac{R^a}{2} = (29) \]

So:

\[ \nabla \omega_{\mu E} + \omega_{\nu b} \cdot \left( \nabla \cdot \omega^a_{\mu b} \right) + \omega_{\nu b} \cdot \left( \nabla \cdot \omega^a_{\mu b} \right) \]

For example:
If the right hand side is periodic, this can produce resonance. At resonance, the electric field density is amplified.

In eq. (27):

\[ \phi R^a = \rho^a / \varepsilon_0 \]  

where \( \rho^a \) is electric charge density.
1. \(132(10)\): Incompatibility of Antisymmetry and \(\mathbb{U}(1)\).

In \(\mathbb{U}(1)\):

\[
\mathbf{E} = -\nabla \phi - \frac{dA}{dt} \tag{1}
\]

\[
\mathbf{B} = \nabla \times \mathbf{A} \tag{2}
\]

The antisymmetry laws are:

\[
\partial_{a} A_{b} = - \partial_{b} A_{a} \tag{3}
\]

i.e.,

\[
\partial_{a} \phi = \frac{dA}{dt} \tag{4}
\]

\[
\partial_{i} A_{j} = - \partial_{j} A_{i} \tag{5}
\]

From (2) and (4):

\[
\nabla \times \frac{dA}{dt} = \frac{d}{dt} (\nabla \times \mathbf{A}) = 0 \tag{6}
\]

So,

\[
\frac{d\mathbf{B}}{dt} = 0 \tag{7}
\]

From (7) \(\mathbb{U}(1)\) Faraday's law:

\[
\nabla \times \mathbf{E} = 0 \tag{8}
\]

This means that both \(\mathbf{E}\) and \(\mathbf{B}\) are static, as usually defined in \(\mathbb{U}(1)\). A static electric field in \(\mathbb{U}(1)\) is defined by:
\[ A = 0 \quad - (9) \]

\[ B = \nabla \times A = 0 \quad - (10) \]

Therefore:

\[ \nabla \phi = 0 \quad - (11) \]

and so:

\[ E = -\nabla \phi = 0 \quad - (12) \]

It is concluded that the antisymmetry law

(3) means that \( E \) and \( B \) vanish. \( A(1) \)

with fundamental

electrodynamics is incompatible antysymmetry.

As described by Ryder (2nd. Ed.)

page 117 \[ \nabla \psi \]

\[ [D_\mu, D_\nu] \psi = [\partial_\mu - i g A_\mu, \partial_\nu - i g A_\nu] \phi = - (13) \]

where \( \psi \) is the gauge field. Eq. (13) is a

where \( \psi \) is the gauge field. Eq. (13) is a

The covariant

parallel transport:

\[ D_\mu \psi = \partial_\mu - i g A_\mu \quad - (14) \]

where:

\[ \gamma = \frac{2}{\mathcal{K}} = \frac{1}{A(0)} \quad - (15) \]
In eq. (13):
\[ [d_\mu, d_\nu] = 0 \quad - (16) \]

So:
\[ [d_\mu, d_\nu] \lambda = -i g \left( d_\mu A_\nu - d_\nu A_\mu - i g \left[ A_\mu, A_\nu \right] \right) \lambda \]
\[ - [d_\mu, A_\mu] \lambda = - (17) \]
\[ = -i g \left( [d_\mu, A_\nu] - i g \left[ A_\mu, A_\nu \right] \right) \lambda \quad - (18) \]

By definition:
\[ [d_\mu, d_\nu] \lambda = - [d_\mu, d_\nu] \lambda \quad - (19) \]
\[ [d_\mu, A_\nu] \lambda = - [d_\mu, A_\nu] \lambda \quad - (20) \]
\[ [A_\mu, A_\nu] \lambda = - [A_\mu, A_\nu] \lambda \quad - (21) \]

As a paper 131, eq. (20) is:
\[ [d_\mu, A_\nu] \lambda = d_\mu A_\nu \lambda \quad - (22) \]
\[ = - [d_\mu, A_\nu] \lambda \quad - (23) \]

So:
\[ d_\mu A_\nu = - d_\nu A_\mu \quad - (24) \]

The only way to resolve this paradox is to use ECE electrodynamics.
Replacement of the Gauge Field.

The U(1) gauge field equation (13) is replaced by:

\[ [D_{\mu}, D_{\nu}] V^\rho = \nabla^\rho \rho_{\mu\nu} V^\sigma - T^{\lambda \mu \nu} \nabla_\lambda V^\sigma \]

in Riemann geometry. The ECE electromagnetic field is:

\[ F^{\lambda \mu} = A^{(0)} T^{\lambda \mu} \]

Define:

\[ A^\rho = A^{(0)} V^\rho \]

so \( A^\rho \) replaces \( A^\lambda \) to give:

\[ [D_{\mu}, D_{\nu}] A^\rho = \nabla^\rho \rho_{\mu\nu} A^\sigma - F^{\lambda \mu \nu} \nabla_\lambda V^\rho \]

i.e.

\[ [D_{\mu}, D_{\nu}] A^\rho = -\Gamma^\lambda_{\mu\nu} A^{(0)} + \ldots \]

where

\[ \Gamma^\lambda_{\mu\nu} = -\Gamma^\lambda_{\nu\mu} \]

Eqn. (29) is equivalent to its Covariant...
5) form, in which:

\[ F^a_{\mu
u} = \partial^\mu A^a_{\nu} - \partial^\nu A^a_{\mu} + i A^a_{\nu} \omega^{\mu} - i A^a_{\mu} \omega^{\nu} \]  \hspace{1cm} (32)

and

\[ J^a_{\mu} = - \partial^\mu A^a_{\mu} \]  \hspace{1cm} (33)

\[ \omega^{\mu} = - \omega_{\mu} \]  \hspace{1cm} (34)

For each \( a \):

\[ J^a_{\mu} = - \partial^\mu A^a_{\mu} \]  \hspace{1cm} (35)

\[ \omega_{\mu} = - \omega^{\mu} \]  \hspace{1cm} (36)

Using the above arguments, it is concluded that the derivative of the potentials do not produce electric or magnetic fields.

Remember:

\[ F^a_{\mu
u} = A^{(0)} (\omega^{\mu} - \omega_{\nu}) \]  \hspace{1cm} (37)

We have, by definition:

\[ F^\lambda_{\mu\nu} = \nabla^\lambda F^a_{\mu\nu} = A^{(0)} (\Gamma^{\lambda}_{\mu\nu} - \Gamma_{\mu\nu}^{\lambda}) \]

\[ = A^{(0)} \nabla^\lambda (\omega^{\mu} - \omega_{\nu}) \]  \hspace{1cm} (38)
So:
\[
\Gamma_{\mu} = \omega^{a}_{\mu} = \omega_{\mu}^{\lambda} - (39)
\]
\[
\Gamma_{\mu} = \omega_{\mu}^{\lambda} - (40)
\]

Also define:
\[
\omega_{\mu}^{a} = \omega_{\mu b}^{a} - (41)
\]

so:
\[
A^{(0)}(\omega_{\mu}^{a} - \omega_{\mu}^{b}) = \omega_{\mu b}^{a} A_{b} - \omega^{a}_{\mu b} A_{b} - (42)
\]

Therefore:
\[
\Gamma_{\mu}^{a} = \omega_{\mu b}^{a} A_{b} - \omega^{a}_{\mu b} A_{b} - (43)
\]

which replaces the old \( U(1) \):
\[
\Gamma_{\mu} = d_{\mu} A_{\mu} - d_{\lambda} A_{\lambda} - (44)
\]
New Fundamental Antisymmetry of the Riemannian Curvature.

This is based on the electromotipoide result:
\[ [\partial, A_3] A^3 = (\partial A) A^3 \quad \phi. \quad - (1) \]

In Riemann geometry:
\[ [\partial_\mu, \Gamma^\nu_{\alpha\lambda}] V^\lambda = \partial_\mu (\Gamma^\nu_{\alpha\lambda} V^\lambda) - \Gamma^\nu_{\alpha\lambda} \partial_\mu V^\lambda \]
\[ = (\partial_\mu \Gamma^\nu_{\alpha\lambda}) V^\lambda + \Gamma^\nu_{\alpha\lambda} \partial_\mu V^\lambda - \Gamma^\nu_{\alpha\lambda} \partial_\mu V^\lambda \]
\[ = (\partial_\mu \Gamma^\nu_{\alpha\lambda}) V^\lambda \quad - (2) \]

It follows that:
\[ \partial_\mu \Gamma^\nu_{\alpha\lambda} = - \partial_\nu \Gamma^\mu_{\alpha\lambda} \quad - (3) \]

The Riemannian curvature is therefore:
\[ R^\rho_{\mu\nu\sigma} = \partial_\mu \Gamma^\rho_{\nu\sigma} - \partial_\nu \Gamma^\rho_{\mu\sigma} + \Gamma^\rho_{\kappa\lambda} \Gamma^\kappa_{\mu\sigma} - \Gamma^\rho_{\kappa\lambda} \Gamma^\kappa_{\mu\lambda} \]
\[ = 2 \left( \partial_\mu \Gamma^\rho_{\nu\sigma} + \Gamma^\rho_{\mu\lambda} \Gamma^\lambda_{\nu\sigma} \right) \quad - (4) \]

and this greatly simplifies and clarifies its meaning. The complete antisymmetry are:
\[ R^\rho_{\mu\nu} = - R^\rho_{\nu\mu \rho} - (5) \]
\[ \Gamma^\rho_{\mu\lambda} = - \Gamma^\rho_{\lambda\mu} - (6) \]
\[ \Gamma^\rho_{\mu\lambda} \Gamma^\mu_{\nu\sigma} = - \Gamma^\rho_{\nu\lambda} \Gamma^\mu_{\mu\sigma} - (7) \]
\[ \Gamma^\rho_{\mu\lambda} \Gamma^\mu_{\lambda\nu} = - \Gamma^\rho_{\lambda\nu} - (8) \]

Similarly, the Riemann tensor is:
\[ T^{\lambda}_{\mu\nu} = \Gamma^\lambda_{\mu\nu} - \Gamma^\lambda_{\nu\mu} - (9) \]
\[ = 2 \Gamma^\lambda_{\mu\nu} - (10) \]

The only symmetry that appears is eq. (5). Finally, the creation of Riemann geometry must itself be a commutator, or have a commutator structure. These are all fundamental geometries. They advance in Riemann (and Cartan) geometry. They work their way through all geometries of the twentieth century, which were derived from Riemann and Cartan geometry.