From: JACK SARFATTI <sarfatti@pacbell.net>
Subject: **Rotating superconductors, tetrads in Minkowski space, LC-connection, QED & EEP**
Date: July 21, 2009 6:40:00 PM PDT
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17 Attachments, 169 KB

http://www.scribd.com/doc/861665/Abnormal-Gravitational-Fields-of-Rotating-Superconductors

First, how to compute the Levi-Civita (LC) connection field from tetrads simply using Einstein's Equivalence Principle (EEP).

The LC-connection field in Einstein's 1915 GR encodes all the inertial g-force contingent non-objective observables in covariantly accelerating LNIFs. The LC-connection coefficients {^wuv} are only non-zero in the LNIFs. The EEP implies they are all zero in coincident LIFs.

Let a,b,c = coincident zero g-force LIF indices, u,v,w non-zero g-force LNIF indices. Translational g-forces need non-gravity internal symmetry forces to sustain them, rotation sustained by conservation of angular momentum if irreversible friction is ignorable.

The EEP implies

{^cab}$_{LIF}$ = ew^ce^uae^vb{^wuv}$_{LNIF}$ + e^cue^ua,b = 0

using orthogonality of the 16 tetrad coefficients

ec^w'e^au'e^bv'ew^ce^uae^vb{^wuv} + ec^w'e^au'e^bv'e^cue^ua,b = 0

{^w'u'v'}$_{LNIF}$ = - ec^w'e^au'e^bv'e^cue^ua,b = 0

Remember e^u$_{LNIF}$a$_{LIF}$ maps locally coincident LNIFs & LIFs together.

Einstein's GCTs are physically mappings of locally coincident LNIFs together (Rovelli's "iii" in 2.1.3 below).

Rovelli's SO1,3 "ii" are physically mappings of locally coincident LIFs together.

Finally internal symmetry U1 SU2 SU3 "Yang-Mills" maps are rotations in internal fiber space where there is no obvious way to measure a "frame" the way we can LNIFs and LIFs in spacetime.

2.1.3 Gauge invariance

The general definition of a system with a gauge invariance, and the one which is most useful for understanding the physics of gauge systems is the following, due to Dirac. Consider a system of evolution equations in an evolution parameter t. The system is said to be "gauge" invariant if evolution is under-determined. That is, if there are two distinct solutions that are equal for t less than a certain $\hat{t}$. See Figure 2.1. These two solutions are said to be "gauge equivalent". Any

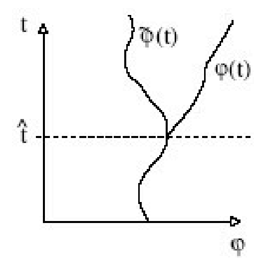


Figure 2.1: Dirac definition of gauge: two different solutions of the equations of motion must be considered gauge equivalent if they are equal for $t < \hat{t}$.

two solutions are said to be gauge equivalent if they are gauge equivalent (as above) to a third solution. The gauge group $\mathcal{G}$ is a group that acts on the physical fields and maps gauge equivalent solutions into one another. Since classical physics is deterministic, under-determined evolution equations are physically consistent only under the stipulation that only quantities invariant under gauge transformations are physical predictions of the theory. These quantities are called the gauge invariant observables.

The equations of motion derived by the action (2.33) are invariant under three groups of gauge transformations: (i) local Yang-Mills gauge transformations, (ii) local Lorentz transformations and (iii) diffeomorphism transformations. They are described below. Gauge invariant observables must be invariant under these three groups of transformations.

Second, look at the bare Lagrangian density of Quantum ElectroDynamics (QED) in Einstein's 1905 SR

$$\mathcal{L} = \bar{\psi}(i\gamma^{\mu} D_{\mu} - m)\psi - \frac{1}{4}F_{\mu\nu}F^{\mu\nu} \ ,$$

where

- γ_{μ} are Dirac matrices;
- ψ a bispinor field of spin-1/2 particles (e.g. electron-positron field);
- $\bar{\psi} \equiv \psi^{\dagger}\gamma_0$, called "psi-bar", is sometimes referred to as Dirac adjoint;
- $D_{\mu} = \partial_{\mu} + ieA_{\mu} + ieB_{\mu}$ is the gauge covariant derivative;
- e is the coupling constant, equal to the electric charge of the bispinor field;
- A_{μ} is the covariant four-potential of the electromagnetic field generated by electron itself;
- B_{μ} is the external field imposed by external source;
- $F_{\mu\nu} = \partial_{\mu}A_{\nu} - \partial_{\nu}A_{\mu}$ is the electromagnetic field tensor.
- http://en.wikipedia.org/wiki/Quantum_electrodynamics

Above the Greek indices are really GIF indices a,b,c

Switch notation

Each Dirac gamma matrix needs to be coupled to the tetrads and spin connections of the locally gauge Poincare group (later dS, Ads & conformal groups)

$$\gamma_{\mu} = \left(e_{\mu}^{a}\gamma_{a} + \frac{1}{2}\omega_{\mu}^{ab}\left[\gamma_{a}, \gamma_{b}\right] \right)$$

on Dirac's 4-spinors (use Pauli matrices on Weyl's 2-spinors

$$D_{\mu} = e_{\mu}^{a}\partial_{a} + \frac{1}{2}\omega_{\mu}^{ab}\left[\partial_{a}, \partial_{b}\right] + ie\left(e_{\mu}^{a}A_{a} + \frac{1}{2}\omega_{\mu}^{ab}\left[A_{a}, A_{b}\right] \right)$$

Note the new rotational terms and the nonlinear commutators of the U1 electromagnetic gauge potentials (do they really vanish?) that include torsion-free non-dynamical rotational object of anholonomy as well as a possible dynamical torsion field, e.g. Gabriel Kron's rotating electromechanical networks can be described as well. So can Jim Corum's "Tesla" devices, alleged Podkletnov et-al.

In addition

$$F_{\mu\nu} \stackrel{\dagger}{=} e^a_\mu e^b_\nu F_{ab} + \frac{1}{2}\left[\omega^{ab}_\mu, \omega^{cd}_\nu\right] F_{ab} F_{cd}$$

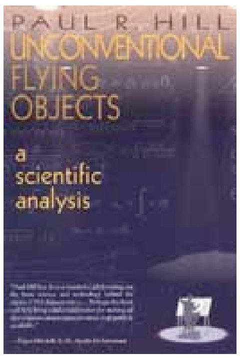
Note I am guessing on the spin-connection terms for rotating frames and possible torsion fields coupled to matter fields.

Also remember

e^au = I^au + A^au

I^au = Kronecker delta

A^au is Paul Hill's "acceleration field".



http://ldolphin.org/hill.html

Finally for rotating superconductors

$$i\hbar\frac{\partial\Psi(\mathbf{r})}{\partial t} = \left(-\frac{\hbar^2}{2m}\nabla^2 + V(\mathbf{r}) + g|\Psi(\mathbf{r})|^2\right)\Psi(\mathbf{r})$$

Replace the above flat space-time inertial frame partial derivatives with my above non-inertial rotating frame Du. Use the simple rotating tetrads below for a start.

On Jul 20, 2009, at 2:32 PM, JACK SARFATTI wrote:

> LIF coordinates T,X,Y,Z
>
> LNIF coordinates t,x,y,z
>
> ignore special relativity time dilation corrections
>
> wr/c << 1
>
> w = rotational frequency

r^2 = x^2 + y^2 = X^2 + Y^2

T = t

Z = z = axis of rotation of the GNIF

X = xcoswt - ysinwt

Y = xsinwt + ycoswt

e^Tt = T,t = 1

e^T = dt

A^T = 0

e^Z = dz

A^Z = 0

e^Xx = coswt

e^Xy = - sinwt

e^Xt = -(xw/c)sinwt - (yw/c)coswt

e^X = coswt dx - sinwt dy - (xsinwt + ycoswt)wdt

A^X = (coswt - 1)dx - sinwt dy - (xsinwt + ycoswt)wdt = spin 1 geometrodynamic Yang-Mills gauge potential

Note A^X --> 0 when w ---> 0

e^Yx = sinwt

e^Yy = coswt

e^Yt = (xw/c)coswt - (yw/c)sinwt

e^Y = sinwt dx + coswt dy + (xcoswt - ysinwt)wdt

A^Y = sinwt dx + (coswt - 1) dy + (xcoswt - ysinwt)wdt

Minkowski space-time connection coefficients

e^wae^av,u

a = T,X,Y,Z Global Inertial Frame GIF (not rotating, axis of rotation not accelerating etc.)

u,v,w = t,x,y,z Global Non-Inertial Frame (GNIF)

The covariant curl of the connection with itself = curvature had better equal zero - at least for the connection symmetrized in lower GNIF indices, u&v

Since curvature is zero global frames are zero.

Show that the torsion is zero - is it?

The GNIF metric is

invariant ds^2 = e^aea = e^TeT + e^XeX + e^YeY + e^ZeZ = e^Te^T - e^Xe^X - e^Ye^Y - e^Ze^Z

= [1 - (w/c)^2(x^2 + y^2)](cdt)^2 + 2wydxdt - 2wxdydt - dx^2 - dy^2 - dz^2

= (cdt)^2 - dx^2 - dy^2 - dz^2 - (w/c)^2(x^2 + y^2)(cdt)^2 + 2wydxdt - 2wxdydt

= GIF metric + rotational warp

Ray Chiao calls the time-space cross-terms in the rotating metric the "gravimagnetic field."