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Second Extended Draft

A New Discovery in Vigier's Theory from Sirag's Gravimagnetism

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Start with Saul Paul's "equation (1)" that Barut attributes to Pauli.

$q^2 = Gm^2$ (1)

I call this "charge without charge". Equation (1) suggests that mass generates electric charge through gravitation at least under certain conditions that one sees in Blackett's "gravimagnetism".

What are those conditions? Consider a mass m moving uniformly in a circular orbit of radius r with angular frequency ω. The classical orbital angular momentum magnitude is

$L = mr^2\omega$ (2)

Next consider the Lorentz force on a charge q with no electric field. The cyclotron frequency is

$\omega = qB/m$ (3)

Substitute Sirag's equation (1) into (3)

$\omega = G^{½}B$ (4)

Subsitute (4) into (2) to get

$L = mr^2 G^{½}B$ (5a)

Or

$B = L/(mr^2 G^{½})$ (5b)

Which is Blackett's gravimagnetism that a rotating uncharged mass generates a magnetic field.

Next we go to Vigier's theory that light has a rest mass m* where

$m^* = hH/c^2 = 10^{-65}$ gm (6)

h = Planck's quantum of action of the de Broglie pilot wave on its particle = 10^{-27} erg-sec.

H = Hubble's constant for the cosmological red shift where

$1/H$ = 12 billion years = 10^{17} sec

The rest mass m* of the photon locally is from a superconducting vacuum order parameter describing a Bose-Einstein condensate of virtual electron-positron Cooper pairs. The longitudinal wave attraction may be from the self-consistent J_3 electromagnetic component of the massive photon that bootstraps itself into existence to form a more stable vacuum with spontaneous U(1) phase symmetry breakdown.

In Bohm's causal quantum theory, the classical massive light field has a guiding de Broglie quantum pilot wave. Under certain conditions, we can imagine a self-consistent self-trapped solution of the nonlinear quantum field equations in which the massive classical field of light is constrained to move as a ring of light in its own super-quantum potential formed from its quantum pilot wave.

The ring of massive light corresponding to a single quantum of mass m* has radius r. We need to use the special relativistic gamma factor. Equation (1) then becomes,

$$e = G^{½}m^*/[1 - (\omega r/c)^2]^{1/2} \qquad (7a)$$

$$e = G^{½}hH/c^2[1 - (\omega r/c)^2]^{1/2} \qquad \textbf{(7b)}$$

where e is the charge on the electron since we wish to model the electron as an extended object formed as a quantum ring of massive light using

Blackett's gravimagnetic conjecture that I reinterpret as "charge without charge". This is not in the same sense that John Archibald Wheeler used the same phrase in his "geometrodynamics" program which never came to much when all was said and done.

We then apply the deBroglie phase match condition that the internal clock frequency of the particle locks to the frequency of its pilot wave. That is

$mc2 = h\omega$ (8)

Where m is the rest mass of the electron 10^{-27} gm.

Substitute (8) into (7)

$e = G^{½}hH/c^{2}[1 – (mcr/h)^{2}]^{1/2}$ **(**9**)**

Where r is a free parameter.

$h/mc = 10^{-11}$ cm

$e^{2}/hc = 1/137 = GhH^{2}/c^{5}[1 – (mcr/h)^{2}]$ (10)

GhH^{2}/c^{5} is a very small number. Therefore,

$r = h/mc$ (11)

to incredible accuracy of "fine-tuning". This is consistent with Sidharth's quantum geometrodynamics in which elementary particles are extended objects that are naked ring singularities at the Compton wave length.

$[1 – (mcr/h)^{2}] = G(hH)^{2}/c^{4}e^{2} = Gm^{*2}/e^{2}$ (12a)

$(mcr/h)^{2} = 1 - Gm^{*2}/e^{2}$ (12b)

$mcr/h = 1 - Gm^{*2}/2e^{2}$ (12c)

$Gm^{*2}/2e^{2} = (6.6x10^{-8})(10^{-65})^{2}/2(4.8x10^{-10})^{2} = O(10^{–128})$ (12d)