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Transformation between Kinetic and Inertial States in Mechanics and Electrodynamics

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Abstract:
It is postulated that the conduit for capture, emission, and transfer of the relativistic increase in sub-atomic particles is the intrinsic spin/magnetic dipole moment of the electron. An experiment was performed in order to test whether there was a change in the field of a rotating magnet that would point to energy transfer.

Introduction:
Early in the 20th century, experiments involving the interaction of electrons with the electromagnetic field were performed, showing an increase in the electron's inertia. There was no indication of its cause, its composition or accommodation. The assumption was made that it was an increase in the electron's mass. This interpretation was carried through special relativity theory, culminating in the Compton effect.

Fundamental units and the CGS system is used throughout. The following equations apply specifically to electrodynamics. (note that mass times space/time, ms^3/t^2 = charge e^2 (Bohr equivalence)

Special Relativity
The basis for the relativistic transformation equations is the simultaneous emission of light in opposite directions from a moving source, as calculated by a fixed observer.

$$(c - v_m)(c + v_m), \qquad (1)$$

where c = light speed and v_m is the velocity of the object.

The product applies, not to the direction of travel but to axes perpendicular to it[i], suggestive of torque. Equation *(1)* translates to,

$$1 - v_m^2/c^2 \qquad (2)$$

the square root of which, is the ratio between rest and relativistic mass, m_o/m and the basis for relativistic momentum[ii]. The following equation is the relativistic expression for kinetic energy[iii],

$$(m - m_o)c^2 = mv_k^2/2 \qquad (3)$$

where v_k = kinetic velocity

The inertial component is obviously the rest mass, m_o and Equation *(3)* takes on the standard form: kinetic minus potential equals total energy.

$$m_o/m = 1- v_k^2/2c^2 \qquad (4)$$

Equation *(4)* is obviously equivalent to the square root of Equation *(2)*.

A thorough review of the equations of special relativity revealed that they implicitly contain a Newtonian velocity, v_n as an integral part of the theory A classical one-dimensional elastic collision between an electron and a mass-equivalent photon, $m_{ph} = m_o$ would result in a Newtonian velocity, v_n of[iv],

$$2m_{ph}\, c/(m_o + m_{ph}) = v_n = c \qquad (5)$$

A similar configuration in a Compton collision gives[v],

$$cv_m = v_k^2 \, . \qquad (6)$$

If the mass ratio is modified and/or a two dimensional collision is introduced[vi],

$$2m_{ph}cv_m \, Cos\, \phi \,/(m_{ph} + m_o) = v_n\, v_m = v_k^2 \qquad (7)$$

Rather than representing time dilation and space contraction in the direction of travel, the presumed modification to space is perpendicular to the X axis, indicative of rotation. Time is unaffected.

Source of Relativistic Increase

In an inelastic collision between a photon and an electron, the total kinetic energy is supplied by the former. We express the collision in mass-equivalents as[vii]:

$$m_i + m_o - m_f = m \qquad (8)$$

Where m_i, m_f are the initial mass-equivalent and that of subsequent emission

The dimensions of the Compton wavelength are[viii],

$$h/m_oc = 2\pi vr/4\pi c. \qquad (9)$$

Planck's constant, *h* is the quantum of electromagnetic angular momentum which replicates all aspects of an electron in the first Bohr orbit. Since it is directly related to subsequent photon emission, it is evident that the relativistic increase is coupled with the spin magnetic moment of the photon. In both instances, photon and electron, the formula is,

$$h/4\pi tc = 2\pi m_o vr/4\pi tc \qquad (10)$$

where the denominator is the inverse of the Rydberg constant.

Since the dimensions are the same, the spins can be added and the emission subtracted from the total energy. The addition of the magnetic moment of the photon and spin magnetic moment of the electron, may resolve the difference of the $q = 2$ (sans anomaly) factor between the spin and orbital magnetic moments of the electron. A parallel argument would also explain the absence of angular momentum as a counterbalance of electromagnetic and mechanical spins in the first Bohr orbit; a bound system. It is also probable that a photon with opposite spin would not be absorbed by the electron, since the electron spin would be nullified or reversed. This would explain the existence of elastic collisions in the Compton scatter of radiation. It is contended that Equation *(5)* is invariant; variations in t being due to relative motion. The appearance of an induced magnetic field at the electron is the result of a displacement between the kinetic and inertial fields. With respect to mechanics, it is the angular momentum that is modified by the addition of mechanical spin and equation 7.

Magnetic Spin

An experiment was performed to measure the change in induction of a rotating magnet with speeds up 3000 rpm. Data is given for three different distances of the Hall sensor from the magnet.

Rotation Speeds, rpm:	10	1500	3000
Output Voltage	1.522	1.516	1.478
	1.342	1.316	1.285
	.750	.735	.694

While the rotation is extremely low in comparison to electron spin, the figures show a reduction in field strength with increased rotational speeds. Given the conservation of energy law, the inertial effect must increase as compensation.

Summary

The vectorial direction of the relativistic transformation equations and the existence of a superfluous speed, v_k, (which is the geometric mean of the mechanical and electromagnetic velocities,) are strong indications that they are magnetic spin components. Equation *(7)* shows total mechanical energy equal to that of the electromagnetic. It is contended that the energy transfer for both is simultaneous and that the photon exhibits the same dual aspect as the electron! However, in the case of mechanical total energy, it is the inertia that is increased, the opposite of the electrodynamic result. The reason for this will be given in my next paper. Sufficient to say that v_k is raised to the 4th power and the relativistic equation comparing momentum and kinetic energy,

$$(Pc)^2 + (m_o c^2)^2 = (K + m_o c^2)^2 \qquad (11)$$

becomes the expression for total mechanical and electrodynamic energies.,

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i The Synthesis of Quantum Electrodynamics, Special Relativity and Classical Mechanics, W. Babin, July 2002, **https://www.gsjournal.net/Science-Journals/Research%20Papers-Unification%20Theories/Download/3727**
ii On the Electrodynamics of Moving Bodies, A. Einstein, Principle of Relativity, Dover Press, 1952
iii Ibid ii
iv Ibid i
v The Compton Effect and Special Relativity, W. Babin, May 2015, https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/5546
vi Ibid i
vii Ibid v
viii The Compton Effect, A. Compton ,1923, Quantum Physics, P37