

Symmetry Principles of the Unified Field Theory (a "Theory of Everything") - Part I (revised May, 2014)

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The Charges of Matter are Symmetry Debts of Light

Abstract:

The conceptual basis of the Unified Field Theory as presented in these pages may be deduced from "Noether's Theorem":

The charges of matter are symmetry debts of light.

The "Big Bang" origin of the cosmos is the conversion of pure, symmetric electromagnetic energy (light) into asymmetric atomic "information" (our "matter only" universe). "[Noether's Theorem](#)" states that in a multicomponent field such as the electromagnetic field (or the metric field of spacetime), symmetries are associated with conservation laws and vice-versa. Hence the symmetry of light (and spacetime) must be conserved. Noether's Theorem provides the key to Einstein's dream of a "Unified Field Theory" through the seminal concept that the symmetry of light, no less than its energy, must be conserved.

(Questions such as "What existed before the "Big Bang"?" (*probably the Multiverse*) and "Why is there something rather than nothing?" (*because of the possibility of life*) are questions for philosophy/religion, not science. In what follows, I conceive of the "Big Bang" as a "breakout" from the all-symmetric Multiverse into the [asymmetric realm of](#)

[atomic matter](#), information, time, causality, gravity, entropy, charge, etc.)

Our asymmetric "matter-only" Universe was created (in the "Big Bang") from all-symmetric free electromagnetic energy (light), [via an unknown asymmetric weak-force interaction](#), resulting in a loss of cosmic symmetry and a corresponding, compensating gain in symmetry-conserving (charge-conserving) bound energy states ("atomic matter"). For conservation reasons (energy/entropy/symmetry), matter is furthermore embedded in a secondary entropic and causal domain (historic spacetime), created by gravity from light's primary entropic and a-causal domain (space). The [negative energy of gravity](#) not only creates time from space, it also balances the positive energy of the "Big Bang" such that *no net energy is required to produce our cosmos*. Our "matter-only" Universe is the original "light-only" universe (still with us today as the universal spatial dimension with its 2.7 kelvin "cosmic background radiation"), plus a small portion which (following primordial symmetry-breaking) was "frozen" by symmetry conservation (charge conservation) into various familiar material forms (present today as atomic matter, gravity, and historic spacetime). Today's (low-energy) "matter" atom is exactly one-half of an original (high-energy) charge-balanced (neutral, symmetric) "matter-antimatter" particle-pair, which somehow escaped annihilation by its complementary member ([see: primordial symmetry-breaking by the weak force](#) during the "Big Bang"). Hence [the charges of matter, originally intended to conserve symmetry via matter-antimatter annihilations, remain, due to the absence of antimatter, as unbalanced symmetry debts of light](#). In matter, light's (broken) symmetries are conserved by charge and spin; in spacetime, light's metric symmetries are protected by the invariance of "velocity c", inertial/entropic forces, Einstein's "Interval", causality, "Lorentz Invariance" (phenomena associated with

the Special Theory of Relativity), and conserved (when broken) by gravitational forces associated with "local" mass ("Gm" - phenomena associated with the General Theory of Relativity).

All forms of energy originate (directly or indirectly) from light; *matter carries charges (including gravity) which are the symmetry debts of the light which created it*. Charges produce forces which act to return the material system to its original symmetric state (light), repaying matter's primordial symmetry debts. Repayment is exemplified by any spontaneous interaction producing net free energy, including: exothermic chemical reactions and matter-antimatter annihilation reactions; radioactivity, particle and proton decay; the nucleosynthetic pathway of stars, the gravitational conversion of bound to free energy (as in supernovas and quasars), and Hawking's "quantum radiance" of black holes. Identifying the broken symmetries of light associated with each of the 4 charges and forces of physics (see below) is the first step toward a conceptual "Unified Field Theory".

In weak [gravitational fields](#) (as on planet Earth), gravity only pays the entropy "interest" on the spatial symmetry debt of "local" matter (which is carried as "location charge": Gm), converting space to time, in effect producing an alternative entropic drive and dimension/domain (time/history) in which charge conservation (and causality) are serviced by an indefinitely extended temporal duration and consequential ("karmic") significance. In stronger fields (as in our Sun), gravity additionally pays down the "principal" of matter's spatial symmetry debt, converting asymmetric "local" mass to symmetric "non-local" light. This latter conversion continues in supernovas and quasars, and finally goes to completion via Hawking's "quantum radiance" of black holes. The [conversion of mass to light](#) reduces the total gravitational field of the cosmos, resulting in the apparent "acceleration" of cosmic expansion, recently observed (see:

Science 7 Oct. 2011 Vol. 334 Page 30). (See: "[A Description of Gravity](#)".)

The symmetry-conserving requirement of *charge invariance*, through time, despite entropy, and despite relative, variable, and contingent forces of motion/acceleration, is the key to understanding the rationale for the *local* action of the "4 forces" ("[global/local gauge forces](#)"), including quantization of charge and the "Lorentz Invariance" and magnetism of Special Relativity. In the mathematical terms of Evariste Galois' "Group Theory", our "[Tetrahedron Model](#)" is a description of the [symmetry group of light](#), including its destruction by [asymmetric weak force decays](#) (resulting in our asymmetric "matter-only" Cosmos), and the on-going spontaneous restoration of cosmic symmetry in obedience to [Noether's Theorem of symmetry conservation](#) (as in the conversion of bound to free energy in stars). (See: Neuenschwander, Dwight E. *Emmy Noether's Wonderful Theorem*. 2011. The Johns Hopkins University Press.)

Biology is included in our physical unification scheme through the notion of "information": information charts a "lawful" (charge-conserved) pathway for matter's return to light's symmetry, while simultaneously producing a way for the universe to achieve localized consciousness, know itself in part as well as in whole, and diversify its experience and creativity through a multitude of evolutionary forms. *Life is the rationale for the existence of the universe*. While atomic nuclei promote symmetry conservation through high-energy, exothermic nucleosynthetic pathways in stars, their associated electron shells create life through low-energy, neg-entropic chemical pathways on planets. Using energy and heavy elements ultimately provided by gravity, stars, and the galaxy, the "[Information Pathway](#)" of planetary biology is the means whereby the universe comes to life, awakens to itself, [achieves consciousness](#), experiences and elaborates itself, explores new modes of creativity (including

abstract/symbolic modes), and evolves new forms of beauty and symmetry. [Carbon's electron shell is the crucial link](#) between the abiotic and biotic information systems of the Cosmos; the concepts of Information and the Multiverse are crucial links between our [scientific and religious world views](#). "We come trailing clouds of glory..." (See also: "[The Higgs Boson and the Alternative Charge Carriers](#)".) (See also: "[The Information Pathway](#)".)

Addendum to Abstract:

Two outstanding (and connected) characteristics distinguish our universe: 1) it is asymmetric, composed of matter only, lacking its original, balancing complement of antimatter; 2) it contains Life.

The connection between these two asymmetric states of energy is Information. The atomic realm of matter left from the "[Big Bang](#)" origin of our universe is a domain of material information from which the biological realm (characterized (so far as we know) only by molecular information chains of RNA/DNA), arises by an [unknown chemical concatenation, crucially involving the carbon atom](#).

In essence, Life is a specialized state of information that can, in "friendly" environments, reproduce and maintain itself, and evolve new living forms. The dreaded "computer apocalypse" (in which computers become capable of creating and informing themselves) in fact has already happened naturally eons ago in the form of the biologic genetic material. Earth-life and humanity are the local consequence of that original "information apocalypse", a natural catastrophe foreseen by God (as recorded in Genesis in the story of the "forbidden fruit"). We are witnessing a fractal iteration of this story in humanities' control of evolution, and control of abstract information itself through the computer revolution. (The "zombie apocalypse" is also upon us; they

are walking the streets everywhere, staring into their "smart phones". Who controls them?)

Equally mysterious as the [journey from atoms to life](#) is the transition from "[nothing to something](#)", from the "all-symmetric void" (the "Multiverse"), to the asymmetric domain of atomic matter (absent antimatter) during the "Big Bang". The transition apparently passes through several energy levels regulated by "[Higgs"-type "gauge" bosons and their associated "intermediate vector boson"](#) families (all necessary for purposes of conservation). These transitions begin with the creation (from high energy photons) of heavy particle-antiparticle pairs of elementary leptons, followed by the creation of electrically neutral leptoquarks (heavy leptons subdivided into three quarks), and finally the asymmetric weak force decay of electrically neutral leptoquarks into a residue of familiar matter-only hyperons (heavy baryons) and nucleons (protons and neutrons). Heavy higgs-like bosons and their associated IVBs [gauge and regulate all steps in the transformation](#), ensuring the eventual possibility of conservation (as via the creation of specific antiparticles). The utility/necessity of "identity" charges for conservation purposes ([as carried in explicit form by neutrinos](#)) becomes evident when keeping track of all the possible particles and antiparticles in these transformations. This is also where the vital role of [alternative charge carriers](#) (leptons, mesons, neutrinos) becomes evident, in that they allow charge conservation despite the absence of anti-matter.

The "break-out" of our asymmetric universe from the all-symmetric "Multiverse" is (apparently) possible only because electromagnetic energy exists in two equivalent forms, waves vs particle-antiparticle pairs (light vs virtual particle-pairs); positive electromagnetic energy is exactly balanced by negative gravitational energy; alternative charge carriers exist to allow charge conservation despite the

absence of anti-matter; the subdivision of leptons into quarks makes electrically neutral leptons ("leptoquarks") possible; the weak force provides a slight but essential asymmetry in the decay rate of electrically neutral leptoquarks vs antileptoquarks (such that following the matter-antimatter annihilations of the "Big Bang", sufficient electrically neutral leptoquarks remain to produce (via their decay) the baryons ([hyperons, protons, and neutrons](#)) comprising our current universe. The significance of the Higgs boson is that this type of "gauge" particle ([apparently more than one](#) exists) offers a conserved pathway of escape from the all-symmetric Multiverse into the manifest, asymmetric, 4-D realm of time and gravity. [The Higgs boson appears to be strictly analogous to Eve's apple](#). If not the "God particle" itself, the Higgs is at least the "creativity particle".

(Abstract revised Nov., 2018.)

See:

[The "Tetrahedron Model"](#) (diagram)

["The Fractal Organization of the Universe"](#) (text)