(4 Conservation Laws Connected in Triplets)					
4 Forces of Physics --->		Electromagnetism	Gravitation	Strong	Weak
Comments on Rows		**FORCES**			
Free Energy: massless electromagnetic (EM) radiation; space; symmetric forms; virtual particles; "global" symmetric energy state followed by symmetry-breaking; invariance of the EM constant "c"'; (reprising the "Big Bang"); (row 1)	**ENERGY STATES**	Light: E = hν (Planck); Invariant Motion "c"; All Charges = 0; Symmetric Free Energy ("c" gauges light's entropy drive and "non-local" distributional symmetry); Non-local, A-causal, A-temporal Energy; virtual particle-antiparticle pairs	3-D Space; Suppression of Time by "Velocity c"; Space is Created by Light's Entropy Drive (intrinsic motion); Expansion and Cooling of Space; Conservation/Entropy Domain of Light; Light's "Interval" = 0; The Spatial Metric; Gravitational Negative Energy and Entropy; Total Energy = 0	(virtual) Composite and Sub-Elementary Particles; "Ylem"; Fractured Leptons; Quarks; Gluons; "Quark Soup"; Particle-Antiparticle pairs; Leptoquarks; Neutral Particles; 3 Energy "Families"; Particle Symmetry Total Charge = 0	(virtual) Elementary Particles; Neutrinos; Leptons; Leptoquarks; Particle Pairs; Higgs, "X" IVBs; 3 Families; Neutral Particles; Symmetry-Breaking: "Higgs Cascade"; Weak Force Asymmetric Decays; Real Particles (massive, temporal)
Bound Energy: matter; history; asymmetric energy; massive real particles (due to row 1 symmetry-breaking); raw energy conservation; ("money up front"), "pay now"; temporal energy forms; loss of antimatter; (row 2)		Immobile Mass: E = mcc; hν = mcc; (Einstein-deBroglie); Matter, Momentum; Asymmetric Bound Energy Carriers; Charges > 0; Local, Causal, Temporal Energy; "Lorentz Invariance" Invariant "Interval"; Relative Motion; Special Relativity	Gravity; Gravitational Creation of Time from Space; Historic Spacetime; Conservation/Entropy Domain of Information and bound energy; Mass Interval > 0; Metric Asymmetry Gauged by "G"; ("intrinsic motion T" is bound energy's entropy drive); General Relativity	Mass Carriers; Hadrons; Quarks, Mesons, Baryons, Nucleons; Atomic Nucleus; (elements); Whole Quantum Charge Units	Alternative Charge Carriers; Leptons, Neutrinos: Electron Shell; (atoms); Higgs and IVBs Mass Scale; Elementary Particle Invariance
Charges: quantized symmetry debts (carried by particles of row 2); symmetry (charge) conservation; (mortgage, credit), "pay later"; symmetry carriers; Noether's Theorem; Maintenance of Charge Invariance; (row 3)		Electric Charge: Asymmetry: Lost Antimatter (The Great Asymmetry); Magnetism; Electrodynamics; Charge Invariance; Quantum Mechanics; The Charges of Matter are Symmetry Debts of Light	Gravitational Charge = "Location" Charge; "Location" Asymmetry of Bound Energy; Warped Metric; Graviton = Time; Compound Conservation/Entropy Domain of Free and Bound Energy; ("G" is the entropy conversion gauge); Entropy/Symmetry Debt (loss of intrinsic motion and non-local gauge "c")	Fractional Charges: Color Charge (partial charge asymmetry); Asymptotic Freedom; Quark Confinement; Flavor Charge: (least bound energy, nucleon "isospin"); "Yukawa Mesons"	"Identity" Charge: Neutrinos; (neutrinos are "bare" identity charges); ("anonymity" asymmetry - distinguishable elementary particles); Neutrino Parity Asymmetry (lost antimatter)
Field Vectors (due to charges of row 3);		Photons; Exothermic Chemical Reactions;	Gravitons: Stars, Supernovas, Quasars;	Gluons, Mesons: Fusion, Nucleosynthesis;	Intermediate Vector Bosons (IVBs: W, Z, X);

(symmetry conservation via the conversion of bound to free energy); bosons; (retiring the debt); (row 4)	Matter-Antimatter Annihilation Reactions ("Big Bang" and Suppression of Virtual Particles)	Nucleosynthesis; Black Holes; Hawking's "Quantum Radiance"; Gravitational Conversion of Mass to Light	Proton Decay	Fission, Radioactivity; Particle and Proton Decay
John A. Gowan and August T. Jaccaci May, 2014				

(This article has been translated into French by Silvia Moraru. Many thanks, Silvia! See link below): http://www.reservedeler-online.co.no/education/table-simple-de-la-theorie-du-champ-unifie-mode-rationnel/

This table may be read like an English paragraph:

Row one: recapitulates the the creation of matter in the "Big Bang". The universe begins with light, free electromagnetic energy - a perfectly symmetric form of energy. The role of gravity at this stage is to provide sufficient negative energy to counterbalance the positive energy of the "Creation Event", such that the Cosmos is born from a state of zero net energy and charge. The intrinsic motion of light (which serves as both the entropy drive and the symmetry gauge of light) creates space, the expanding and cooling entropy/conservation domain of free energy. The interaction of (very) high-energy light with the metric structure of spacetime creates virtual particle-antiparticle pairs of primordial leptoquarks (leptoquarks are primordial leptons broken into three subunits, the quarks). (See: "The Particle Table".) Symmetry is maintained so long as there are equal numbers of particles vs antiparticles. Row one ends with symmetry-breaking of the primordial leptoquark pairs and the production of single (matter) baryons and leptons by the action of the Higgs boson and the weak force Intermediate Vector Bosons (IVBs). (See: "Table of the Higgs Cascade".) (Although leptoquark particle-antiparticle pairs are produced in equal numbers, electrically neutral antimatter leptoquarks apparently decay at a slightly faster rate than their matter counterparts.) The sub-elementary quarks carry fractional charges necessary to the production of electrically neutral leptoquarks, allowing the neutrals to live long enough to undergo asymmetric weak force decays. These decays should also produce leptoquark neutrinos, which are "dark matter" candidates. (See: "The Origin of Matter and Information".)

We note here that the necessary connection between the leptons and hadrons is through the leptoquarks - the heaviest member of the leptonic spectrum - so heavy, in fact, that it splits into 3 parts under the self-repulsion of its own electric charge, finding a lower energy state in 3 partial charges of lesser magnitude (hence terminating the leptonic spectrum). From the perspective of the "Anthropic Principle" (the universe must be so constructed as to allow the existence of our life form), we need the fractional charges of the quarks to provide electrically neutral mass carriers (heavy analogs of the neutron), that can live long enough to undergo asymmetric weak force decays, and we need three families of quarks to generate sufficient numbers of these neutral combinations so that asymmetric decays will be generated with sufficient probability to produce our matter-only universe - the "Great Asymmetry" to which we we owe our existence. Ours is an electromagnetic universe of free and bound forms of electromagnetic energy (matter and light - as we learn from annihilation reactions), and hence to the "Great Asymmetry" of stand-alone matter we may add the "Great Gauge" of the invariant electromagnetic constant "c", and the "Great Charge" of the invariant electric charge. In this regard, it should be noted that light itself (in the form of virtual photons) is the field vector or force carrier of electric charge. We therefore see light protecting its own symmetric energy state through electric charge and matter-antimatter annihilation reactions - especially including annihilations between virtual particle-antiparticle pairs.

Row two: here we find the massive matter products of row-one symmetry-breaking. Row two conserves the raw energy of row one. Atomic matter is an alternative, asymmetric, local, temporal, causal, bound form of electromagnetic energy. Mass is the conserved form of light's raw energy ($h\nu = mcc$); time is the conserved form of light's entropy drive (intrinsic motion); charge (of various types) is the conserved form of light's various symmetries. "Velocity c" gauges the invariance of the "Interval" and causality, including "Lorentz Invariance", the covariance of space and time in Einstein's Special Relativity. Gravity creates time by the annihilation of space and the extraction of a metrically equivalent temporal residue (General Relativity); the intrinsic motion of time goes on to produce historic spacetime. (See: "The Conversion of Space to Time".) Time is a necessary dimensional parameter for massive objects because of their relative motion and causal relations. (See: "Entropy, Gravitation, and Thermodynamics".) Atoms are composed of two classes of particles, the mass-carrying quarks and the charge-carrying leptons. Gluons are necessary to confine the fractionally charged quarks to whole quantum unit charge combinations. (See: "The Strong Force: Two Expressions".) Leptons are necessary as alternative charge carriers for the massive quarks, balancing their charges in place of antiparticles, thus avoiding annihilation reactions. Electrons are alternative carriers of electric charge, neutrinos are alternative carriers of the weak force "identity" charge. Mesons are alternative carriers of quark partial charges. The elaborate weak force Higgs and IVB mechanism is necessary to reproduce *single,* invariant elementary particles anytime, anywhere. Elementary particles created today must be the same in every respect as those created eons ago during the "Big Bang". It is the creation of *single* invariant elementary particles that is the difficulty posed to and overcome by the massive mechanism of the weak force. (See: "The Higgs Boson and the Weak Force Mechanism".) (See also: "Identity Charge and the Weak Force".)

Row three: exhibits the charges carried by the massive matter particles produced by symmetry-breaking in row one. Whereas row 2 conserves the raw energy of row 1, row three conserves the symmetry of row 1. *The charges of matter are the symmetry debts of light*. Noether's Theorem states that the symmetry of light must be conserved, no less than the raw energy of light; the quality of light is conserved no less than its quantity. Charge conservation = symmetry conservation. Charge conservation allows the symmetry of light to be carried into the time dimension where it can be stored in an alternative form (charge) and repaid at any future time through annihilation with an appropriate anticharge - thus returning the material system to the symmetric state of light which originally created it. Gravity pays the entropy-"interest" on the symmetry debt of matter by creating a time dimension (via the annihilation of space) in which matter's charges can be stored and eventually repaid. (Gravity pays the energy-"principle" on matter's symmetry debt in row 4.) The spatial expansion of the cosmos is reduced as gravity annihilates space and converts the spatial entropy drive of light into the historical entropy drive of matter. Time and history function for causal matter as alternative forms of light's entropy conservation domain (space), just as mass is an alternative form of light's energy, and charge is an alternative form of light's symmetry.

Each of the four forces of physics is produced by a charge which can be traced to a broken symmetry - a "symmetry debt" of light. This is the conceptual unification of the forces: they all represent symmetry debts of light (including gravity, which is both a symmetry and an entropy debt of light). (See: "The Double Conservation Role of Gravity".) Electric charge is due to the absence of antimatter (the "Great Asymmetry" - itself due to a rate-of-decay asymmetry in the weak force), and to light's broken dimensional symmetry (2- and 3-dimensional symmetric space vs 4-dimensional asymmetric spacetime). Gravity is due to light's broken spatial distribution symmetry (light's broken "non-local" symmetric energy state), plus light's broken symmetric entropy drive (light's intrinsic motion), both gauged by "velocity c", and both broken by the local, immobile, undistributed mass-energy of matter. The strong force color charge is due to the fractional charges of the quarks, which threaten the quantum currency

(whole quantum charge units) of the symmetry debts themselves. The weak force is due to light's broken "anonymity": all photons are alike, but elementary particles are not and therefore have an "identity" charge (AKA "number" charge) (neutrinos are "bare" identity charges which carry a "parity asymmetry" due to the absence of antimatter: all neutrinos have "left-handed" spin, all anti-neutrinos have "right-handed" spin). Magnetism is a "local gauge symmetry" expression of the electromagnetic force which protects the invariance of electric charge in relative motion. Analogs of magnetism's local gauge function in the other forces include the covariance of time and space ("Lorentz Invariance") protecting causality, velocity c, and the "Interval" (Special and General Relativity); quark confinement by gluons, protecting unitary quantum charges (strong force); and the massive weak force IVBs, protecting the invariance of elementary particle "singlets", whenever or wherever they are produced. Maintaining the invariance of matter's various charges (symmetry debts) in 4-dimensional spacetime (against relative motion, variable gravitational metrics, and the erosion of entropy) is the daily task of the field vectors of the four forces - in addition to actually repaying the debts (as in matter-antimatter annihilations). (See: "The Tetrahedron Model of the Unified Field Theory".) (See also: "Local vs Global Gauge Symmetry in the Tetrahedron Model".)

Row 4: in this row we list the payment modes of light's symmetry debts by the 4 forces - forces are the demand for payment of the symmetry debts held by the charges of matter. Row four repays all the symmetry, energy, and entropy debts incurred by symmetry-breaking in row one. Payments include partial as well as complete payments. In the electrical force we have exothermic chemical reactions and matter-antimatter annihilation reactions; in the gravitational force we find numerous astrophysical forces converting bound to free energy, (nucleosynthesis, supernovas, quasars) culminating in Hawking's "quantum radiance" of black holes. As high-energy gravity repays its symmetry debt (converting mass to light), gravity reverses the effect of its own low-energy reaction, which paid matter's entropy debt (by the conversion of space to time). This reversal reduces the total cosmic gravitational field (due to mass reduction), allowing the spatial expansion to recover a portion of its original acceleration (observed recently as the "acceleration" of the cosmos due to "dark energy"). Gravity pays the energy-"principle" of light's symmetry debt through the conversion of bound to free energy, as in the stars. The vanishing of gravity as mass is converted to light is the vital clue regarding gravity's symmetry-conserving role in the natural economy of today's universe - the force vanishes only when its conservation role is accomplished. In the strong force we have fusion and the nucleosynthetic pathway of stars, and ultimately proton decay; and in the weak force we find fission, radioactivity, contributions to the nucleosynthetic pathway, and particle and proton decay. Presumably "dark matter" also participates in some type of symmetry conservation cycle. "Dark matter" may consist of leptoquark anti-neutrinos, or some type of "metric particle" produced during the "Big Bang". For more details, see: "Symmetry Principles of the Unified Field Theory".

email:
jag8@cornell.edu
johngowan@earthlink.net

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