SYNOPSIS OF UNIFICATION THEORY

The System of Spacetime

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John A. Gowan
home page
(see also: "A Synopsis of the System of Matter";)
The "Tetrahedron Model" vs the "Standard Model" of Physics: A Comparison.

What we see is not Nature, but Nature exposed to our method of questioning - W. C. Heisenberg

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Abstract

The conceptual basis of the Unified Field Theory, as presented in these pages, can be briefly sketched as follows:

"Noether's Theorem" states that in a multi-component field such as the electromagnetic field (or the metric field of spacetime), where one finds a symmetry one finds an associated conservation law, and vice versa. In matter, light's symmetries are conserved by charge and spin; in spacetime, by inertial and gravitational forces. Light's raw energy is conserved as mass and momentum; light's intrinsic motion or entropy drive is conserved as time and gravitation. All forms of energy, including the conservation/entropy domain of spacetime, originate as light. During the "Big Bang", the asymmetric interaction of primordial, high energy light with the metric structure of spacetime produces matter; matter carries charges which are the symmetry (and entropy) debts of the light which created it. Charge invariance is therefore an important corollary of charge and symmetry conservation, maintained in our temporal (gravitational) metric of relative motion by "local gauge symmetry currents" (compensating components of the field vectors, such as magnetism and time). The invariance of "velocity c", the "Interval", and causality (metric analogs of charge) are likewise important corollaries of energy conservation (the "Lorentz Invariance" of Special and General Relativity). Charges produce forces which act to return the material system toward its original symmetric state (light), paying (partially or completely) matter's symmetry/entropy debts. Repayment of matter's symmetry debt (partial and complete) is exampled by: 1) chemical reaction and matter-antimatter annihilation; 2) radioactivity and proton decay; 3) the nucleosynthetic pathway of stars 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 is the first step toward a conceptual unification of those forces. *The charges of matter are the symmetry debts of light*.

Introduction: Charge

Charge

The function of charge is to conserve light's various symmetries; charge conservation is one of several conservation principles which are necessary to allow symmetry-breaking during the "Big Bang", and the conversion of free energy to information. Charge and charge conservation are attributes of symmetry conservation, much as entropy and entropy conservation are attributes of energy conservation. Entropy and symmetry are explicitly related through velocity c, which gauges both light's symmetric energy state and primordial entropy drive, vanishing time and distance, maintaining metric (inertial) symmetry and the "non-local" character of light (resulting in the distributional symmetry of light's energy throughout spacetime), while simultaneously causing the expansion and cooling of space. It is because of this dual "gauge" (regulatory) role of c that entropy's primordial drive may be included with symmetry under the conservation umbrella of "Noether's Theorem", a consideration which also extends to both aspects of the gravitational "location" charge, whose active principle is time. (See: "Entropy, Gravitation, and Thermodynamics" and "The Double Conservation Role of Gravitation".)

For each of the four forces of physics I identify a charge and the symmetry debt it conserves (charge conservation = symmetry conservation - "Noether's Theorem"). Charge conservation is a temporal (local, material) form of symmetry conservation. (See: "Symmetry Principles of the Unified Field Theory" and "Global vs Local Gauge Symmetry in the Tetrahedron Model").

Electromagnetic Force

A) Electromagnetic Force: electric charge. Dimensional asymmetry: the symmetry of space vs the asymmetry of time.
Role: matter-antimatter annihilation - providing a spatial force of attraction between matter and antimatter (particle-antiparticle pairs) that will motivate annihilation reactions within the "Heisenberg Interval", the time limit imposed upon virtual reality by velocity c. Through annihilation reactions, electric charge prevents massless, non-local, atemporal, acausal, symmetric light from devolving into massive, local, causal, temporal, asymmetric matter with "real" charges, including gravitation. Since the photon is the field vector of electric charge, we see light protecting its own symmetry in particle-antiparticle annihilations. Magnetic forces protect the invariance of electric charges in relative motion. "Velocity c" (the intrinsic motion of light) is the metric gauge (regulator) of both the primordial entropy drive of light and the "non-local" symmetric energy state of light.

Magnetic forces are functional analogs of (and derived from) "Lorentz Invariance", the dimensional flexibility of space and time as formalized by Einstein in his theory of Special Relativity. Lorentz Invariance, in turn, is necessary to protect the invariance of "velocity c", the "Interval", and causality from the variable reference frames and perspectives of relative motion. Magnetic forces protect the invariance of moving electric charges; the Doppler effect is also a consequence of Lorentz Invariance protecting the constant velocity of light.

Gravity

B) Gravitational Force: "location" charge (time). Gravity conserves both metric gauge functions of "velocity c": entropy and symmetry.
1) Entropy drive: converting the intrinsic motion of light to the intrinsic motion of time - by annihilating space and extracting a metrically equivalent temporal residue. (See: "The Conversion of Space to Time".)

2) Spatial distribution of light's energy: the "non-local", symmetric spatial distribution of light's energy (due to intrinsic motion c - Einstein's "Interval" = zero) vs the local spatial concentration of bound energy (due to the intrinsic "rest" of matter - Einstein's "Interval" > zero). Gravity converts bound to free energy in stars (and other gravitationally driven astrophysical processes).

Role 1) (entropy debt): creating matter's time dimension (the primordial entropy drive of bound energy), and the joint dimensional conservation domain of free and bound energy, spacetime; time marches on to create the conservation domain of information and matter's "causal matrix", history (historic spacetime). Time is necessary to balance the energy accounts of matter in relative motion, provide matter's primordial entropy drive, and to conserve the invariance of causality, velocity c, and the "Interval" (via the dimensional flexibility or "Lorentz Invariance" of Special Relativity). Time also provides the dimensional arena in which charge conservation has meaning, and in its own turn, induces the gravitational force: *a gravitational field is the spatial consequence of the intrinsic motion of time*. Hence through gravity, time also conserves symmetry (see Role 2) below).

Role 2) (symmetry debt): converting bound to free energy in stars (via the nucleosynthetic pathway), quasars (releasing gravitational potential energy), and black holes (through Hawking's "quantum radiance") - this conversion pays all the entropy and symmetry debts of bound energy. The conservation role of entropy and symmetry in the creation of the gravitational force is paradigmatic of the relationship between Quantum Mechanics (entropy) and General Relativity (symmetry). The two theories join in the "entropic charge" of gravitation, "time". Gravitation serves energy conservation and entropy, and protects the invariance of causality and the "Interval", despite the relative motion and the immobile, local, asymmetric energy state of matter, creating time from space in order to do so. A local metric is required to conserve the energy of a local energy form; gravity provides the gauge (the universal gravitational constant "G") for that local, temporal metric. The creation of time from space is the single rationale for gravitation; it is because time is such a multitasking workhorse with so many conservation roles after it is produced that gravity appears to be such a complex and confusing force.

Both of gravity's (and all of matter's) entropy and symmetry debts are paid by the gravitational conversion of mass to light, since light is massless, non-local, atemporal, and produces no gravitational field. The recently observed "acceleration" of the Universe is the evidence that light produces no gravitational field. As mass is converted to light by various astrophysical processes, and by particle and proton decay (including analogous conversion processes in "dark matter"), the total gravitational field of the Cosmos is reduced, resulting in a relative "acceleration". (See: "A Spacetime Map of the Universe.")

Gravity is weak because gravity is the energy required to produce matter's time dimension, the temporal entropy-energy of a given mass. In the case of the Earth, the gravitational energy Gm (where m is the mass of the Earth) is the energy required to produce Earth's time dimension (via the gravitational annihilation of space). The weakness of gravity tells us that creating Earth's time dimension does not require much energy, nor (equivalently) the conversion of much space to time. This is because matter, unlike light, is only tangentially connected to its historic entropy domain (via the "present moment"). (See: "The Half-Life of Proton Decay and the 'Heat Death' of the Cosmos".)

Black holes provide the physical demonstration of the gravitational conversion of space and the drive of spatial entropy (the intrinsic motion of light) to time and the drive of historical entropy (the intrinsic motion of time). The event horizon of a black hole is a temporal entropy surface (the Hawking-Bekenstein theorem). (See: "A Description of Gravitation".)

Strong Force

C) Strong Force: color charge, "gluon" field vectors. Partial charge asymmetry: the fractional charges of the sub-elementary quarks vs whole quantum unit charges. The strong force protects the invariance of whole quantum charge units despite the partial charges of the quarks. An internal symmetry debt peculiar to particles composed of quarks ("hadrons" = baryons and mesons).
Role: permanent confinement of quarks to whole quantum unit charge combinations (so their charges can be neutralized, canceled, annihilated, or carried by the alternative charge carriers (leptons and mesons)). A related symmetry of color charge is known as "asymptotic freedom", the self-annihilation of color charge necessary for proton decay and the creation of heavy baryons (hyperons) from neutral leptoquarks (via the hypothetical "X" IVB?) during the "Big Bang". (See: "The Particle Table".)

A secondary expression of the strong force (between baryons rather than within baryons) involves the binding of protons and neutrons ("nucleons") into compound atomic nuclei via a "Yukawa" exchange field of mesons. These fusion reactions result in the release of bound nuclear energy as light in the nucleosynthetic pathway of our Sun and the stars.

Weak Force

D) Weak Force: "number", or "identity" charge. "Anonymity" asymmetry: all photons are alike but the elementary particles are distinguishable from photons and from each other.
Roles: provides the basic asymmetry which allows the creation of matter. Identifies the correct antimatter partner in annihilation reactions; provides alternative charge carriers (the leptons) and metric catalysts (the "Intermediate Vector Bosons" (IVBs)) to enable the creation, destruction, and transformation of single elementary particles of matter (leptons and quarks). (Charges can be balanced by leptonic alternative charge carriers rather than antiparticles; the latter would only cause annihilation reactions.) The large mass of the weak force Intermediate Vector Bosons (IVBs) (as scaled by the Higgs boson), recreates the primordial electroweak force unification symmetric energy state of the "Big Bang". The weak force mechanism for the creation of elementary particles is essentially a "mini-Big Bang", recreating the original conditions in which the reactions it now mediates first took place, thereby guaranteeing the invariance of elementary particle mass, charge, and identity across eons of time and despite the entropic expansion of the Cosmos. (See: "The Origin of Matter and Information"; "Identity Charge and the Weak Force"; "The 'W' IVB and the Weak Force Mechanism"; "Global-Local Gauge Symmetries in the Weak Force"; "The Higgs Boson and the Weak Force IVBs".)

The Dimensions

The Dimensions of Spacetime are Entropic Conservation Domains

> The dimensions of spacetime are conservation/entropy domains, created by the entropic, "intrinsic" motions of free and bound electromagnetic energy. The intrinsic motion of light, gauged by "velocity c", creates space; the intrinsic motion of matter's time dimension, gauged by "velocity T", creates history. Gravity, gauged by "velocity G", converts space to time, welding space and time together to create spacetime, the joint conservation/entropy domain of free and bound energy. These dimensional domains function as arenas of action, where energy in all its forms can be simultaneously used and transformed, but nevertheless conserved. This is the major connection between the 1st and 2nd laws of thermodynamics. (See: "Entropy, Gravitation, and Thermodynamics".)
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> Time is implicit in free energy as "frequency", and is the actual driver of light's intrinsic motion: symmetric space ("wavelength") flees asymmetric time ("frequency"), which is an embedded characteristic of light's own nature (frequency multiplied by wavelength = c). Time (the proverbial "bur under the saddle") is the implicit, hidden, internal motivator

of light's perpetual, "intrinsic" (self-motivated) motion, velocity c. "Velocity c" is actually a symmetry condition of free energy, which, in obedience to Noether's Theorem, forever moves in such a way as to prevent the explicit appearance of time, with its inevitable companions: mass, charge, and gravitation - the asymmetric "Gang of Four".

Spacetime is a closed, conserved, and protected domain of free and bound electromagnetic energy; c and T are (and must be) essentially "infinite" velocities which seal its borders, preventing causality tampering by either "time machine" or "superluminal" space travel; similarly, any possible metric or inertial loopholes ("wormholes") are closed gravitationally by the "event horizons" and central "singularities" of black holes. The invariance of velocity c also protects the invariance of causality and Einstein's "Interval", and is in turn protected (in massive systems) by the "Lorentz Invariance" of Special Relativity, the flexibility of the dimensions between observers in relative motion ("moving clocks run slow", etc.). The entropic gauges c, T, and G create and defend dimensional conservation domains for free and bound electromagnetic energy: space, history, and historic spacetime. See: "Spatial vs Temporal Entropy".

The historical expansion of the cosmos is funded by the gravitational deceleration of the spatial expansion of the cosmos. This is physically accomplished by the gravitational annihilation and conversion of space into metrically equivalent temporal units. Gravity pays the entropy-interest on the symmetry debt of matter, creating time and hence the historical dimension in which charge conservation can have meaning. When mass is converted to light in stars, the entropy conservation loop is completed, the total gravitational energy of the cosmos is reduced, and the spatial expansion increases again in consequence - as recently observed.

For an equivalent synoptic statement regarding matter, see: "Synopsis of the System of Matter" and "The Intrinsic Motions of Matter".
For text to the "Tetrahedron Model of Light and Conservation Law", see : "Synopsis of the Unified Field Theory: a Tetrahedral Model".

Links:

Unified Field Theory

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Gravitation

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