The Intrinsic Motions of Matter

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Abstract

Intrinsic motions are the expression of conservation law and cosmic order in matter. The Universe, and everything in it, is always in some type of motion, whether absolute, relative, intrinsic, entropic, atomic, biological, or evolutionary.

Introduction

Intrinsic motions of any kind are expressions of the conservation laws (Energy and Symmetry conservation) and their corollaries (Entropy and Causality) (see: "The Tetrahedron Model"). While in the case of free energy, the intrinsic motion of light can be traced to Entropy and Symmetry conservation in the service of Energy Conservation, the intrinsic (dimensional) motions of matter (time, gravity) involve an additional principle, Causality, also serving Energy Conservation. Bound energy is asymmetric information, essentially the matter half of the information contained in light's particle-antiparticle form. This information is carried as charge, spin, mass, momentum, identity, location, quantum numbers, etc., conserved attributes of the

energy, entropy, symmetry, and dimensionality of the light which created the particle-antiparticle pairs. The purpose of the charge component of this information set is to ensure and facilitate the immediate annihilation of the particle-antiparticle pairs, conserving and protecting the symmetry of the light which created them. Although matter is isolated from antimatter during the Big Bang, this purpose remains unaltered through time, resulting in matter's eternal search for antimatter, and in the ultimate return of bound energy to light via gravitationally driven processes such as the conversion of mass to light in stars, quasars, and Hawking's "quantum radiance" of black holes; or via radioactivity, particle and proton decay.

The development of life and the Information Pathway is the probable outcome of the intersection of the negentropic gravitational drive and the 4x3 Fractal Algorithm of the material Cosmos. Not only does life allow the Universe self-awareness, self-knowledge, and self-appreciation, and a new creative possibility through the *abstraction of information,* but the information pathway also represents a parallel or biotic route for the conversion of bound to free energy, of which our development of the hydrogen bomb and the pursuit of solar fusion energy technology is only the most current and highly evolved of many examples.

Noether's Theorem

In 1918 the German mathematician Emmy Noether published a theorem which has become of pivotal importance in the attempt to formulate a Unified Field Theory. "Noether's Theorem" states that in a multicomponent field, such as the metric field of spacetime or the electromagnetic field of light, where one finds a symmetry, one finds an associated conservation law, and vice versa. In Nature, the conserved charges (and spin) of particles, and the inertial and gravitational forces of spacetime, are Noether's Theorem enforced and demonstrated.

Elsewhere in these pages I have made much of the intrinsic motion of light or massless free energy. Below I consider the various intrinsic motions (dimensional and otherwise) of atomic matter or massive bound energy.

The Dimensional Intrinsic Motions of Matter

(Conservation of the symmetric characteristics of light's wave form: light's "non-local" metric and distributional symmetry - light's spacetime "Interval" = zero. The "location" charge of gravitation and matter's search for a return pathway to symmetric light: *gravity is matter's memory it once was light*.)

G, T (gravitation, time): these are the dimensional intrinsic motions of matter, the primordial form of matter's Entropy drive (as required by the Conservation of Energy and Causality). (See: "A Description of Gravitation"; see also: "Spatial vs Temporal Entropy".)

1) Gravitation: *gravity is the spatial consequence of the intrinsic motion of time;* conversely, time is created by the gravitational annihilation of space. Time and gravity induce each other endlessly, much as electric and magnetic fields induce each other. *Implicit* time (in the form of "frequency") is the hidden spatial entropy drive of free energy ("intrinsic motion c"); *explicit* time is the primordial historical entropy drive of bound energy ("intrinsic motion T"). Time is the common factor between c and G. The magnitude of "G" (the universal gravitational constant) is determined by the energetic difference between implicit and explicit time, the energy required to create asymmetric explicit time from symmetric implicit time (in other words, G represents the energy required to create the entropy drive of matter (the intrinsic motion of time and history) from the entropy drive of light (the intrinsic motion of light and space)). (See: "The Conversion of

Space to Time", and "Gravity Diagram No. 2".)

The negative gravitational energy of matter is borrowed from the expansion of space (that is, borrowed from the positive spatial entropy drive of light), consequently decelerating the Cosmos. The negative gravitational energy of matter exactly equals the positive rest mass energy of matter, enabling the creation of bound energy from zero net energy during the process of symmetry-breaking in the Big Bang. Even so, matter is created with symmetry debts conserved as charges (Noether's Theorem). Gravitation "pays the entropy-interest" on matter's symmetry debts by converting space to the time dimension in which these debts must be conserved and paid. In the historical dimension, charge conservation has a significance (for Information and Causality) which goes beyond the immediate annihilations of particle-antiparticle pairs; in this, the role of the alternative charge carriers (electrons, neutrinos, mesons) is also crucial. (See: "The Origin of Matter and Information"; see also: "The Double Conservation Role of Gravitation".)

1a) Gravity:

.) Provides the negative energy which balances the positive energy of the Cosmos (allowing creation of the universe from zero net energy);
.) Creates time via the annihilation of space and the extraction of a metrically equivalent temporal residue (entropy conservation role); this reaction is reversed by the gravitational conversion of bound to free energy in stars (symmetry conservation role);
.) Pays the entropy-interest on the symmetry debt of matter by creating a time dimension in which charge conservation can have an extended functional (historical) significance;
.) Is the spatial consequence of the intrinsic motion of time;
.) Causes the deceleration of the spatial expansion of the Cosmos;
.) Provides the connection between bound energy and the conservation domain of light and space;
.) Converts bound to free energy in stars, quasars, and Hawking's "quantum radiance" of black holes (complete repayment of the distributional and entropic symmetry debts of matter);
.) Causes the accretion and creation of planets, stars, galaxies;
.) Is the abiotic source of negative entropy driving biological evolution;
.) Creates stellar life histories and final states: supernovas, white dwarfs, neutron stars, black holes, quasars, etc.;
.) Produces the orbital motions of planetary and galactic systems;
.) Is matter's memory it once was light;
.) See: "Gravity, Entropy, and Thermodynamics"; "A Rationale for Gravity"; "The Double Conservation Role of Gravitation".

2) Time: the intrinsic motion of bound energy's time dimension (which causes the expansion of history) is derived from the intrinsic motion of free energy (which causes the expansion of space). The entropy drive of matter (explicit time) is derived from the entropy drive of light (implicit time), which causes the gravitational deceleration of the spatial expansion of the Cosmos. Similarly, the raw energy content of matter is derived from the raw energy content of light ($h\nu = mcc$), and the charges, spin, inertial and gravitational state of matter represent conserved debts of light's symmetric energy state (Noether's Theorem). Both light and matter are entropic forms of energy, but the dimensional entropy drive and conservation domain of matter (the intrinsic motion of time, history) is at "right angles" to matter's spatial dimensions, whereas light's entropy drive and conservation domain (the intrinsic motion of light, space) is completely conjoined with light's spatial dimensions. Hence we can see all the way to the "Big Bang" but not at all into history. (See: "The Time Train", and: "The Half-life of Proton Decay and the 'Heat Death' of the Universe".)

Matter is distinct from its entropy domain (history, historic spacetime - the conservation domain of information and matter's "causal matrix"), whereas light is identified with its entropy domain (space - the conservation domain of free energy and light's regulatory metric). Gravitation is a complex dimensional symmetry debt or energy penalty (involving both Entropy and Symmetry), which matter must pay for this separation from its entropy/conservation domain (and for which we, as sentient beings, also pay psychologically). Gravitation creates matter's separate time dimension via the annihilation of space and the extraction of a metrically equivalent temporal residue (light's implicit temporal entropy drive converted to matter's explicit temporal entropy drive). The separate time dimension created by gravity is necessary to allow matter to move in time as fast as light moves in space, in other words, the entropy drives of matter and light are metrically equilibrated by the gravitational extraction/conversion of time from space (or the reverse - as in the gravitational conversion of mass/time to light/space in stars, quasars, Hawking's "quantum radiance" of black holes, etc.). Matter cannot move in space as fast as light, but it can do so in metrically equivalent time, which is the conservation rationale for the gravitational conversion of space to time. Matter's symmetry debts are quantized as charges which are payable (via matter-antimatter annihilation) in undiminished magnitude at some indeterminate, contingent, future position in the historical dimension. The Cosmos is a "buy-now pay-later" charge-conserved 4-dimensional entropic domain in which gravity pays the entropy-"interest" on the symmetry debt of matter, creating historic spacetime, a compound conservation/entropic domain simultaneously accommodating both free and bound forms of electromagnetic energy. (See: "Entropy, Gravitation, and Thermodynamics".)

2a) Time - Causality:

.) Time is the implicit and explicit entropy drive of both free and bound energy, creating the dimensions of spacetime;
.) Gravity creates time from space, paying the entropy-interest on matter's symmetry debt (charge) by decelerating the Cosmos; matter's time dimension or temporal entropy drive is therefore funded by debiting light's spatial entropy drive;
.) Time is the necessary dimension for keeping and updating the energy accounts of matter in relative motion;
.) The one-way character of time and gravitation is due to the one-way linkage of Causality;
.) Time is the necessary dimension for contracting and paying the symmetry debts (charges) of matter;
.) Time is the local gauge symmetry current of "Lorentz Invariance", co-varying with space to maintain the invariance of velocity c, the "Interval", and causality for matter in relative motion or gravitational fields - the "warped" spacetime of Special and General Relativity;
.) Time is the necessary dimension for the evolution of the abiotic and biotic Cosmos;
.) The intrinsic motion of time creates history just as the intrinsic motion of light creates space: history is the analog of space. History (historic spacetime) is the conservation domain of matter's causal information matrix (see: "A Spacetime Map of the Universe");
.) Gravity is the spatial consequence of the intrinsic motion of time; time and gravity induce each other in an endless cycle;
.) Matter is connected through time; light is connected through space; gravity connects all;
.) Atoms do not age because matter is only tangentially connected to its historic conservation/entropy domain via the ephemeral "present moment"; this is also the reason why gravity is weak. Matter's tangential connection to history is necessary to protect bound energy's symmetry debts (quantized charges) from enervation by matter's entropy drive, and accords massive objects a certain degree of freedom of motion, and (in our case), action and intent (see: "The Half-Life of Proton Decay and the 'Heat Death' of the Cosmos");

.) Matter is local, temporal, causal, producing a gravitational field; light is non-local, atemporal, acausal, and in free space does not produce a gravitational field (hence the conversion of bound to free energy in astrophysical processes causes, over time, a reduction of gravitational energy in the Cosmos, producing the observational impression of an "accelerating" Universe).
.) See: "The Time Train".

Abiotic Non-Dimensional Intrinsic Motions of Matter

(Conservation of the symmetric characteristics of light's particle form: light's particle-antiparticle symmetry - particle number = zero. Matter's search for antimatter: *the charges of matter are the symmetry debts of light*. See: "Symmetry Principles of the Unified Field Theory".)

The non-dimensional intrinsic motions of matter include, but are not limited to:

3) Electromagnetic Force:

.) Electron shell orbital motion;
.) Electron spin;
.) Exchange of virtual photons, magnetic and electric fields between all electrically charged particles;
.) Electrons, electrons shells, and electrical forces are carriers of charge, energy, and Information;
.) Matter's search for antimatter is carried out via the long-range electromagnetic force;
.) The leptons (electrons, neutrinos) function as alternative charge carriers for the baryons, allowing charge conservation and balance without causing antimatter annihilations.

4) Strong Force:

.) Gluons - color field exchange between quarks (at velocity c);
.) Quark orbital motions (in the atomic nucleus);
.) Quark spin;
.) Quarks are chiefly carriers of mass, fractional charges, momentum, and concentrated energy (E = mcc);
.) The principle of "Asymptotic Freedom" makes possible proton decay;
.) Mesons also function as alternative fractional charge carriers for quark color, flavor, and charge, in baryon decays and transformations, and as the field vectors of the "Yukawa strong force", converting protons and neutrons into "nucleons" in compound atomic nuclei.

5) Weak Force:

.) elementary particle creation, destruction, and transformation; particle and proton decay, radioactivity, fission, the creation of matter in the Big Bang, all mediated by the "Intermediate Vector Bosons" (IVBs) (see: "The Particle Table");
.) The "identity" charge of elementary particles - carrying the potential for existential reality (in 4-D "real time");
.) Neutrinos are the "bare" or explicit form of "identity" charge, which is also carried in implicit form by the massive leptons (and perhaps by the "leptoquark");
.) Neutrinos have a unique and poorly understood type of intrinsic motion, which causes them to travel at very nearly (but not quite) velocity c. Neutrinos apparently have such a tiny mass (perhaps 500,000 electron neutrinos equal an electron's mass) that:
a) in any process that produces neutrinos they are ejected with nearly light speed, and simply keep

moving until they interact via the weak force, which is almost never;
b) neutrinos are so light that DeBroglie "matter waves" completely dominate their character, making neutrinos more wave-like than particle-like;
c) much about these "wavicles" remains a mystery, including their apparently spontaneous "oscillations" from one type of neutrino to another (quantum mechanical "superpositions");
.) The weak force IVBs (Intermediate Vector Bosons) form a bridge between today's 4-D "real" spacetime world of asymmetric manifest particles, and the primordial 2-D "virtual" vacuum world of the symmetric unmanifest particle-antiparticle "sea";
.) The vacuum particle-antiparticle "sea" cannot ordinarily manifest because of symmetry conservation. The weak force IVBs are the symmetry-breaking bridge to manifestation (for single elementary particles) in the "real" asymmetric world of time - hence their exotic and massive character. (See: "Identity Charge and the Weak Force"; "Introduction to the Weak Force"; "The 'W' IVB and the Weak Force Mechanism"; "The Higgs Boson and the Weak Force IVBs".)

6) Nuclear Compounding:

.) nucleosynthetic pathway, fusion;
.) nucleon orbits and spin;
.) Heavy element building in stars and supernovas - creation of the Periodic Table elements.
.) The nucleosynthetic pathway; the life cycle and final states of stars. .) The "Yukawa strong force": virtual meson exchange between nucleons in compound atomic nuclei.

7) Chemical Compounding:

.) electron shell bonding; spin; orbitals; virtual photon exchange between charged particles; magnetic interactions;
.) inorganic and organic molecules, compounds, and crystals.

Biological and Emergent States of Intrinsic Motion in the Information Realm

8) Life and Evolution (driven by negentropic gravitational energy and the 4x3 Fractal Algorithm of the material Cosmos). Creation of information domain of biology by gravity, the nucleosynthetic pathway, chemistry, and evolutionary forces.
See: "The Information Pathway", "The Fractal Organization of Nature", "Newton, Darwin, and the Origin and Abundance of Life in the Cosmos".

.) Reproduction, genetic recombination, mutation, Natural Selection;
.) Higher order intrinsic motions of complex interacting systems (evolution of least-energy and most efficient ecosystems; symbiosis, mutualisms, etc.).

9) The Information or Self-Awareness Drive of the Biological Cosmos (the search for life and consciousness via the information pathway and the fractal algorithm of the cosmos:

.) Identity, individuality, consciousness, self awareness, intelligence, curiosity;
.) Emergent properties of higher multicellular organisms: drives, motivations, instincts, desires, emotions (survival, hunger, reproduction, fear, joy, love, hate, etc.).

10) Evolution toward identity, awareness, intelligence, spirituality, and aesthetic appreciation (the reprise or

conservation of Cosmic Connectedness, Unity, Wholeness, and the higher system expressions of Noether's Theorem of symmetry conservation and the 4x3 Fractal Algorithm):

.) Creativity, inspiration, revelation, the Muse, genius, art, the intrinsic motion of the Muse or Spirit;
.) Science, Art, "Truth and Beauty";
.) Evolution of Society and Civilization;
.) Gaia; (world ecosystems or planetary life form).

11) Return of matter to light via all forces - proton decay, gravity, and matter-antimatter annihilations, including the technological, spiritual, artistic, and intellectual Information Pathway - via fusion energy, fast spaceships, "Enlightenment", aesthetics, and formulation of the "Unified Field Theory":

.) The dispersal of humans to space, the return to the intrinsic motion of the photon via light-speed spaceships; this (and the black hole "event horizon") is the ultimate return of atomic matter to the intrinsic motion of light.

12) Chardin's "Omega Point" of total, universal self-awareness and self-knowledge:

.) "Cosmic Consciousness", or the Cosmos everywhere awakening to itself, to its information potential, to its potential for experience, and to new creative modalities and experience. (See: "Chardin: Prophet of the Information Age".)

The Motions of Time and Space

Readers may suppose that the intrinsic motion of space, time, and spacetime referred to in these pages is simply metaphorical or a mathematical formalism rather than literal motion, but these are actual motions, usually in the sense or form of expansions or contractions of spacetime. Below I list examples of (or evidence for) these metrical or spacetime motions (which usually serve some type of entropy function) that are either familiar or a commonplace of physics.

1) Einstein's "Equivalence Principle": the physical acceleration of an observer is indistinguishable from the action of a gravitational field (gravitation is the actual accelerated motion of spacetime).

2) Inflation; the inflationary expansion of spacetime during the "Big Bang" (?)

3) The cosmic expansion of spacetime (the "Hubble flow" - cosmological red shift) - including the acceleration and deceleration of the cosmic expansion by gravitation.

4) Entropy - the intrinsic motions of time, light, and gravitation (c, T, G), and the creation of dimensionality (space, history, historic spacetime); the "infinite velocities" of time and light (and of gravity or spacetime in black holes).

5) Causality - time; the one-way march of time and the temporal ordering and linkage of material events ("karma"); the expansion of history and historic spacetime.

6) Gravity and the effects of General Relativity - the warpage or "curvature" of spacetime by gravitational acceleration. The gravitational bending of light rays. All things (including light) fall with the same velocity in a gravitational field due to the uniform accelerated flow of

spacetime (which is the spatial consequence of time's intrinsic motion into history).

7) Black holes - spacetime moves at velocity c, time stands still in the "event horizon", where g = c.

8) "Frame dragging" by rotating black holes.

9) Gravity waves.

Related Papers on the Website

Links

Entropy

- Section VII: Introduction to Entropy
- Entropy, Gravitation, and Thermodynamics
- Spatial vs Temporal Entropy
- Currents of Symmetry and Entropy
- The Time Train
- The Halflife of Proton Decay and the 'Heat Death' of the Cosmos

The Fractal Organization of Nature

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