John A. Gowan

The Origin of Space and Time

(revised Oct., 2012)
home page

(See also the set of four papers, listed below, examining various relationships between the four conservation principles of the Tetrahedron Model of Natural Law) (these short papers are not intended to stand alone):

The Connection Between Gravitation, Time, Entropy, and Symmetry
The Connection Between Entropy and Symmetry
Time and Entropy
Gravity and Symmetry
A summary paper is also available:
Synopsis of the "Tetrahedron Model" of the Unified Field Theory

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Abstract: Why There Are Three Spatial Dimensions

(added Aug., 2013)

Fundamentally, the dimensionality of spacetime is a matter of energy conservation: three dimensions are sufficient to establish an entropic domain in which the basic thermodynamic requirements necessary to conserve the energy of free forms of electromagnetic energy (light, EM radiation, etc.) are present; likewise, four dimensions are necessary to meet the conservation requirements of bound forms of electromagnetic energy (mass/matter).

Light is a 2-D transverse wave, with no time dimension and no space dimension in the direction of motion (clocks stop and meter sticks shrink to nothing at velocity c - as per Einstein). Light requires two dimensions to accommodate its alternating electric and magnetic fields, which induce each other at right angles. The energy of light is encoded in its frequency ($E = h\nu$) with its implied (but suppressed) time dimension. The intrinsic motion of light ("velocity c") "sweeps out" a third spatial dimension, creating, expanding, and cooling a 3-D spatial volume. The energy component of light is therefore 2-dimensional, while the entropy component corresponds to the 3rd spatial dimension. The entropy "drive" of light (free electromagnetic radiation) is the "intrinsic motion" of light, as gauged by the universal electromagnetic constant "c".

We see that three dimensions are sufficient for 2-D light to establish an entropy domain for its own conservation needs, and therefore light has no need to explore additional dimensional possibilities. Similarly, in the case of 3-D bound energy forms of electromagnetic energy (massive atomic "solids"), one further dimension (time) must be added to establish the entropy domain for matter (history), in which the "intrinsic motion" of time produces aging and decay (since atoms have no spatial form of intrinsic motion they must resort to time - which also suggests that the 3rd spatial dimension is the

only possible higher-dimensional entropic option for light - if it is to remain in its free form). Gravity combines these two electromagnetic entropy domains into our familiar spacetime, the composite entropy domain of our universe of free and bound forms of electromagnetic energy. (See: "The Conversion of Space to Time" .)

In the "black hole", the electromagnetic metric of light and space (as gauged by the universal electromagnetic constant "c") is completely overwhelmed and replaced by the gravitational metric of matter and time (as gauged by the universal gravitational constant "G"). The energy of the black hole is encoded in its mass (hv = mcc), while the entropy is encoded in the two-dimensional "event horizon" (as per Bekenstein and Hawking - see: *Scientific American* Aug. 2003 pp. 58 - 65.) The entropy drive of matter and the black hole is the "intrinsic motion" of matter's time dimension, which creates the spatial flow of matter's gravitational field. *A gravitational field is the spatial consequence of the intrinsic motion of time*. The expansion of the black hole's "event horizon" is required (when energy is added to the hole) since the gravitational intensity and material density of the hole is already at a maximum (g = c); therefore the only way to increase the gravitational flow (which is necessary to increase the temporal entropy encoding for the added energy) is to increase the *size* of the gravitating mass, in other words, increase the boundary or surface area of the event horizon, which is the only part of the hole in active/actual contact with the outside spatial universe. If the black hole has a 3-dimensional "volume" at all, it is permanently hidden behind the event horizon, which is in fact a temporal entropy surface (see: "A Description of Gravity"). Hence the extreme temporal/gravitational /material metric suppresses space just as the extreme spatial/electromagnetic/light metric suppresses time.

Information is encoded in our ordinary universe in all four dimensions. Information requires the one-way 4th dimension (time) for its entropy drive and for its historical conservation domain, due to the causal characteristic of information. Because the black hole either destroys, suppresses, or hides both the third and 4th dimensions, (time stands still at the event horizon and meter sticks shrink to nothing), the black hole contains almost no information, or as John Wheeler says: "A black hole has no hair". Information may live forever in the historical domain, but not in the black hole. Hawking should have stuck to his guns. (See: Leonard Susskind: "*The Black Hole War*"; Back Bay Books, Little, Brown and Co., 2008.)

The energy and entropy of information are encoded in the black hole's mass and the surface area of its event horizon. The causal component of information ceases to form new linkages upon entering the black hole and inside the event horizon distinguishable atoms are converted to "anonymous" photons. Causal linkages created by information outside the black hole, however, continue to propagate forever in historic spacetime. Entangled elements swallowed by the black hole are moot, since they remain hidden forever, suspended or "frozen" in time at the event horizon.

Information is one-way (asymmetric) due to causality, as well as due to the absence of antimatter ("anti-information");
Gravity is one-way and asymmetric;
Time is one-way and asymmetric;
Entropy is one-way and asymmetric;
Matter is asymmetric - due to its time dimension, gravitational field, lack of intrinsic motion, mass, and lack of an antimatter complement.

The black hole is the extreme case of the gravitational metric, as gauged by the universal gravitational constant "G". The black hole is the ultimate contrast to a universe of light with no matter at all, the extreme case of the electromagnetic metric, as gauged by the universal electromagnetic constant "c". In the light universe, all forms of energy move at velocity "c', time does not exist, nor does space (in the direction of a photon's motion). In the black hole also, all forms of energy move at velocity c, and space and time are absent. In this comparison, we see "velocity c" acting in both cases as the "gauge" of a symmetric energy state - specifically, a state of non-locality either outside or inside the black hole. In the light universe, photons and their energy content are distributed equitably everywhere, simultaneously - since there is no time parameter and no distance parameter (clocks stop and meter sticks shrink to nothing in the direction of motion at "velocity c"). This same "non-local" symmetric state with regard to the distribution of energy is achieved by the black hole *within* the boundary of its "event horizon" - again because all forms of energy move at velocity c, time has stopped and space has vanished, due to the action of a gravitational field whose strength is locally equivalent to the electromagnetic constant "c" (g = c). Clocks stop and meter sticks shrink to nothing at the "event horizon" of a black hole.

This discussion suggests that the conservation role of gravity is to pay the "location" symmetry debt of matter. The "location" symmetry debt/charge arises in consideration of the spatially undistributed (hence asymmetric) local concentration of immobile bound energy (matter), VS the spatially symmetric "non-local" distribution of light's energy (due to light's intrinsic motion "c"). Because matter is originally formed from light (bound electromagnetic energy is originally formed from free electromagnetic energy), matter carries a gravitational "location" charge, among other symmetry debts in the form of charges and spin, due to matter's formation from all-symmetric light. (See: "Symmetry Principles of the Unified Field Theory".) The gravitational "location" charge is unique in that it represents an entropy debt as well as a symmetry debt. Because the intrinsic motion of light is both the entropy drive of light and the cause of light's non-local distributional symmetry, the gravitational "location" charge must conserve both functions if it conserves either one. (See: "The Double Conservation Role of Gravitation".) Gravity pays matter's "location" symmetry debt by creating black holes, in which "Hawking Radiation" converts (eventually) the entire bound energy (mass) of the black hole back to free energy (light).

Along the gravitational pathway leading to the creation of black holes, bound energy is also converted to free energy via the nucleosynthetic pathway of stars, and by the even more efficient conversion of gravitational energy and mass to light in other astrophysical processes such as supernovas and quasars. But once the black hole condition is reached, conversions of bound to free energy (in any appreciable quantity) essentially stop (so far as we know), if only because gravity prevents the escape of any light produced by such processes, should any occur. In the event horizon, gravity creates a temporal metric for matter which is the symmetric equivalent of the spatial metric of light - a metric in which all forms of energy move with intrinsic motion c. What happens in the interior of the black hole is moot, since we can never know. I suspect, however, that proton decay occurs at the singularity, and hence the black hole is filled only with light - another way in which the gravitational "location" symmetry debt is paid, also solving the problem of the infinite compressibility of matter. But nothing else matters once the event horizon is formed (at g = c); a symmetric temporal metric has been

constructed in which all energy forms travel at c, and it would appear that no further conservation concerns need be addressed. But is this really the final word?

What then of "Hawking Radiation"? We note, of course, that Hawking radiation is pitifully small for any large hole, and tellingly, it gets smaller as the hole grows larger, not an encouraging sign for the cause of symmetry conservation at least via this route, since the natural tendency of the black hole is to forever increase in size, which means this symmetry conservation pathway is asymptotically suppressed in the natural course of events. However, if the interior of the black hole is indeed filled only with light, then some photons may escape the event horizon by quantum mechanical "tunneling", and this process might *increase* with the size of the hole, counteracting the decrease in Hawking radiation. Whatever the case, the amount of time available for this process (in a universe that does not collapse) is essentially unlimited (assuming that other, unknown cosmological processes do not intervene), so in the end the hole will completely evaporate its mass to light: bound, asymmetric electromagnetic energy returns to free, symmetric electromagnetic energy. One rationale for this scenario is that the temporal entropic metric of the black hole event horizon is less symmetric (being one-way) than the "all-way" spatial entropic metric of light, driving the eventual and final conversion of mass to light in complete satisfaction of Noether's Theorem. Nevertheless, the time required for this conversion to go to completion is so immense that it suggests Natural Law is in fact rather comfortable with this arrangement - the temporal metric of the black hole is stable, leaving little to be desired either inside or outside the event horizon in terms of conservation issues. This is another reason for suspecting that the interior of the black hole is filled with nothing but light, rather like a superconducting medium in which photons have become heavy.

All this notwithstanding, a major conservation issue remains unresolved, as attested by the continuing presence in the surrounding universe of the black hole's powerful gravitational field, even after the event horizon has formed. So long as this field is present, the symmetry debt it encodes and represents remains unpaid. One reason that gravity keeps working even after the formation of the event horizon is that matter's entropy debt must keep being paid until matter's symmetry debt is completely paid, and as far as the outside universe is concerned, the black hole still represents a grossly asymmetric concentration of undistributed, immobile mass-energy, a severe affront to symmetry conservation in terms of the equitable dispersion of energy throughout space - as was originally the case for the light from which the black hole's matter was produced. The gravitational entropy debt of matter can be thought of as an "interest" payment on matter's symmetry debt - just as on planet Earth, the interest has to be paid until the symmetry debt is retired. But the Earth's gravitational field is too weak to convert mass to light, so it never "pays down" the principle on its symmetry debt - that is, despite the continuous working of Earth's gravitational field, it never gets weaker because it never converts any of Earth's mass to light. In our Sun, however, we see gravity actually "paying down" the symmetry debt of the Sun's mass by converting some of the Sun's bound energy to light, and hence reducing the Sun's total mass and its associated gravitational field. Gravity will vanish completely when its symmetry debt is well and truly paid, like any other charge (see: "Does Light Produce a Gravitational Field?"). So the black hole's gravitational field keeps working until the mass energy of the hole - whose entropy is represented by the surface area of the event horizon - completely evaporates away.

Since it is the surface area of the event horizon which is in contact with the outside universe, it is the surface area which generates the gravitational field. Hence the connection between time, gravity, and

entropy is especially evident in this example. *A gravitational field is the spatial consequence of the intrinsic motion of time* (see: "The Conversion of Space to Time").

The Origin of Space and Time

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Conservation, Causality, Connection: the Dimensions of Spacetime are Entropy Domains Created by Intrinsic Motions c, T, G. The dimensions of spacetime and their metric are the fundamental conservation structures of the Cosmos, necessary for the existence of electromagnetic energy in both its free and bound forms (light and atomic matter).

During the "Big Bang", free electromagnetic energy, or light, is converted to bound electromagnetic energy, or matter, by an unknown asymmetric interaction between the weak force and matter-antimatter particle pairs(probably electrically neutral leptoquark-antileptoquark pairs); these pairs are themselves produced by the interaction of high-energy light with the structural component or metric of spacetime: all the four forces of physics (including gravity) are presumed to be involved in the primordial creation of matter and our matter-only universe. (See: "The Origin of Matter and Information"; see also: "The Higgs Boson and the Weak Force IVBs".)

The central difficulty with the primordial conversion of light to matter is that whereas light is completely connected to its spatial metric and entropic conservation domain by virtue of its intrinsic motion "c", matter lacks any such dimensional connection, as it is intrinsically immobile, "at rest". Indeed, light's intrinsic motion creates space, and also causes its expansion and cooling. "Velocity c" gauges both the spatial entropy drive and the "non-local" metric and distributional symmetry of light. "Velocity c" banishes the asymmetric time dimension (light's "clock is stopped"), maintaining metric symmetry while simultaneously causing the expansion and cooling of space. Matter's energy, however, has no ostensible contact with a spatial metric, entropy drive, or conservation domain, a completely untenable situation from the viewpoint of energy conservation. The solution is found in matter's gravitational field, which forms a physical connection between matter and space, reestablishing contact with light's spatial conservation domain. Through gravity, matter is reconnected to space and light; this connection is not trivial, as it results in the creation of an alternative entropy-carrying dimension (time), entropy gauge ("velocity T"), entropy drive (the intrinsic motion of matter's time dimension) and conservation domain for matter's causal information field (historic spacetime).

This 4th, alternative, entropy-carrying dimension (time) must perform the metric conservation function for bound electromagnetic energy which space performed for free electromagnetic energy. Time is derived from and conjoined to space (by gravity), forming the compound dimensional and entropic conservation domain "historical spacetime", in which both matter and light can interact and find all their conservation needs satisfied.

The spatial/metric connectivity enjoyed by light becomes translated into another type of dimensional/metric connectivity in the case of matter: space becomes converted into time by gravity. The asymmetry of the matter-only particle spectrum invokes a conservation response in a corresponding asymmetry of the dimensional metric: one-way gravitation and time. Material objects

are linked by time, gravity, history, and causality, rather than by space and light. The intrinsic motion of our time dimension is metrically and entropically equivalent to light's intrinsic motion in space. Because the Cosmos begins at a single instant of time, every atom in the Universe is of the same age, causally connected, and exists in a universal "now" which is the temporal analog of light's "non-local" habitation of space (see: "A Spacetime Map of the Universe"). We are all connected in time, regardless of our separation in space. (In a black hole, matter apparently falls out of space and into time, to be recycled back into space as light via Hawking's "quantum radiance" of black holes.)

The double issue of linkage and entropy drive within a dimensional conservation domain becomes evident when we think about how yesterday is linked to today by the flow of time and the expanding history of our own lives. This is the necessary linkage of causality; we would cease to exist if it were ever broken, as (for example) should the temporal linkage (an extremely extensive matrix) between today and the moment of our birth become severed. A similar linkage exists between points in space - light rays may travel anywhere without "falling off the edge" or "between the cracks" of space.

While temporal linkages begin as points of contact in a linear sequence, they rapidly divaricate into networks of causal relationships that become so extensive and robust there is no simple way in which they can be severed. The prototypical example is the initiating "break" of a rack of pool or billiard balls at a single point of contact. But this happens continuously on the molecular level of our lives, producing what I refer to as "matter's causal matrix". Similarly, on the gravitational and macroscopic scale, my causal interactions with people and my environment have rapidly ramifying consequences which will continuously effect my future experience ("what a complicated web we weave...").

Space is a connecting dimensional and entropic medium which functions as a metric, structural conservation domain for light's free energy. Space does not preexist light, but is actually produced by the intrinsic motion of light itself. The function of space is simply to regulate and ensure the conservation of light's energy, including all other parameters of free energy which require conservation, such as light's entropy and symmetry. Light is the only energy form which can produce its own conservation domain from its own nature (intrinsic motion) - hence its primacy. Time is an asymmetric form of space, (actually produced from space by gravity or the quantum mechanical collapse of an electromagnetic wave), which (via the creation of the historic conservation domain) plays an analogous dimensional conservation role for matter as ordinary space plays for light. (See: "The Conversion of Space to Time".)

In the joint dimensional conservation domain of spacetime created by gravity, light and matter can interact since their entropy drives/gauges c and T are metric equivalents of each other. This compatibility is ensured by the gravitational extraction of time from space itself (from the implicit temporal component of an electromagnetic wave), and is required by energy conservation if free and bound electromagnetic energy are to coexist and interact. ("Velocity T" is also gauged by "c" as the duration required for light to travel a given distance.) (See: "Entropy, Gravity, and Thermodynamics")

It is impossible for massive objets to travel at or exceed velocity c; because velocity T is the metric equivalent of c, the intrinsic motion of time also imposes a similarly impassable barrier. The reason for these dimensional "speed limits" is to protect causality and energy conservation. We cannot move backward in time to tamper with the past, either by means of fast spaceship or time machine; nor can we outrun the limits of our conservation domain - energy cannot escape conservation: the

conservation domain of spacetime is seamless and closed. Because we live in a joint dimensional conservation domain, two different but connected "speed limits" exist, one for space and light, and another for time and matter. The consequence of these limits is that once causality and energy conservation is absolutely protected, then below these limits matter can move freely in space and energy can be used and transformed. We can move and work without concern, because no motion or energy transformation that is physically possible can break the linkage of temporal causality or violate energy conservation. Radiant heat and opportunity escape at velocity c and T; neither can be recaptured by any means, insuring the effective operation of entropy, causality, and the conservation of energy. The dimensions of spacetime are entropy domains, established by the intrinsic motions of light, time, and gravitation in which energy can be simultaneously used, transformed, and yet conserved. (See: "A Description of Gravitation".)

The metric fabric can be stretched, curved, and warped, but it will not break; even a "black hole" can only stop time, it cannot make it run backward. The "event horizon" and central singularity of black holes also seal the borders of spacetime against any gravitational loopholes or inertial tampering with causality or energy conservation (as in "wormholes"). The conservation domain of electromagnetic energy is ironclad in its integrity, protected by the infinite velocities of c and T, and at the "event horizon" of a black hole where g = c, the "infinite" strength of gravity replaces the entropic and metric functions of both t and c - stopping clocks and shrinking meter sticks to nothing.

The one-way intrinsic motion of time is required by and protects causality and energy conservation, while simultaneously providing an unbroken dimensional (historical) linkage with the past. The speed limit of "velocity c" has the same effect, but for space rather than time. This complete spatio-temporal connectivity we can actually see in our great telescopes, extending backward to the origin of space and time in the "Big Bang" itself. As we look outward in space, we look backward in time; nothing that we see is actually accessible to us in the state that we see it, for that would be tampering with causality. But the connectivity of the spatio-temporal Universe is complete and actually visible (in part). The only exception is our own past, but that is visible to other observers, and in principle visible to us also (but only partially), through a mirror. See: "A Spacetime Map of the Universe".

The Origin of Space and Time: Part II

Everything From Light

The intrinsic motion or entropy drive of time creates an historic conservation domain for information which is joined to space by gravitation (historic spacetime). In addition, because gravity is producing time from space, gravity creates a naturally equilibrated joint dimensional conservation domain of free and bound energy, the continuum of spacetime. How does the formation of this continuum come about? Let us now reexamine this connection from the point of view of time rather than gravity.

As mentioned in part 1, the central conservation problem in the conversion of light to matter is how to duplicate for matter the dimensional connectivity of light with space (that is, how to provide an entropic, dimensional conservation domain for bound energy), since unlike light, matter has no intrinsic spatial motion or connection and cannot move at "velocity c". The solution is the creation (by gravity) of time, a moving dimension in which matter can achieve, in effect, an entropy drive or an intrinsic motion "T" which is metrically equivalent to light's "velocity c" in space. The moving time dimension creates expanding history, the entropic analog of expanding space. In the case of time,

however, it is the dimension which moves, not the energy form, conversely to the arrangement between light and space. Matter cannot move at c but it can occupy a unique dimension (time) that itself moves with a velocity which is the metric equivalent of c. (See: "The Time Train".)

Only light itself could establish a moving dimension (time) that was metrically and entropically equivalent to "velocity c". The intrinsic motion of light produces space, and the intrinsic motion of light is also the indirect source of time. This is where time gets its intrinsic motion, and why velocity c and T are exact metric equivalents. Light produces all the dimensions; light is a 2-dimensional transverse wave whose intrinsic motion sweeps out a third spatial dimension. Time is a 4th dimension extracted by gravity from space, 1/2 of the usual spatial dimension in that it is one-way. Each higher dimension is at right angles to those below; time is at right angles to all three spatial dimensions. Matter is one-half of light's particle-antiparticle bound energy form; matter's entropy drive, time, is likewise one-half of light's dimensional or metric form, space.

The spatial dimensions are associated with light's "wavelength", the temporal dimension is associated with light's "frequency". Mathematically, velocity c is the product of light's wavelength and frequency: wavelength x frequency = c. Space ("wavelength") and time ("frequency") are both inherent potentials of light's energetic composition. If light can make space and matter, light can also create matter's time dimension; space and time are but the dimensional conservation domains of electromagnetic energy's free and bound states, light and matter. It should be no surprise that electromagnetic energy can and does produce the dimensional conservation domains required by its two principle energy forms, especially since these can freely transform one into the other (as in the creation and annihilation of particle-antiparticle pairs).

Time is produced by the gravitational annihilation of space, extracting a temporal residue which is the metric equivalent of the annihilated space. Quantum mechanically, time is produced when light collapses to form matter or bound energy (see: "The Gravity Diagram No. 2"). The collapse of the electromagnetic wave to form bound energy also converts light from its wavelength or "space-like" mode to its frequency or "time-like" mode. Both modes have a metrically equivalent intrinsic motion that creates a dimensional conservation domain appropriate for its energy type, space for the free-energy "wave" mode, time and history for the bound-energy "frequency" mode. These intrinsic, dimension-creating motions of light are the primordial entropy drives of free and bound energy, light and matter, creating, cooling, and expanding space on the one hand, creating, aging, and decaying matter, history, and information on the other. (See: "The Conversion of Space to Time".)

Gravity converts space and the drive of spatial entropy (light's intrinsic motion) to time and the drive of historical entropy (time's intrinsic motion). Mechanically, space, light, and time cannot be disentangled; the intrinsic (entropic) motion of time drags space after it, down to the center of mass and the beginning of the one-way linear timeline. Three-dimensional space must collapse to a zero-dimensional point to enter the beginning of the timeline, which is situated at the gravitational center of mass. Space simply self-annihilates as it is squeezed into the zero-dimensional beginning of the one-dimensional timeline, which is at right angles to all three ordinary spatial dimensions. The annihilation of space yields a temporal residue, which in turn moves down the timeline, dragging more space after it, in an endlessly repeating and self-feeding cycle. This time flow establishes the historical temporal conservation domain, which is just as real as the other spatial dimensions (it is created by the "frequency" mode of electromagnetic energy), but due to its intrinsic motion and its

orientation (at right angles to space), history is neither visible nor accessible to those who create it - effectively preventing any tampering with causality and energy conservation (because intrinsic motion "T" is the metric equivalent of velocity "c").

Space collapses symmetrically from all directions because time is equivalently connected to all spatial dimensions. Similarly, the constantly applied force or intrinsic motion of time causes the accelerated motion of the spatial collapse. Gravity is the convergent, accelerated motion or collapse of spacetime itself, explaining why all things, including light, "fall" at the same rate - everything is a "co-mover" with spacetime. (Einstein's "Equivalence Principle" allows either a static or dynamic interpretation of the gravitational field; here I find the dynamic view more meaningful.) (See: "Extending Einstein's Equivalence Principle".)

As space collapses and self-annihilates gravitationally at the center of mass, it yields a temporal residue, just as the quantum mechanical collapse of the wave function of light produced a temporal residue (swapping "frequency" for "wavelength") when it first created bound energy. The temporal residue moves on down the time line, dragging more space after it, which produces another temporal residue, etc. Time is the active agent of gravitational motion - it is the intrinsic motion of time dragging space after it which produces the gravitational flow of space; in turn, this flow of space provides fuel to continue the cycle in the form of temporal residues - much as the intrinsic motion of light in ordinary space is propagated by the reciprocal induction of electric and magnetic fields. Time is consuming space gravitationally to fuel and maintain its own intrinsic motion. *A gravitational field is the spatial consequence of the intrinsic motion of time*.

The time dimension of matter is thus "funded" by the gravitational deceleration of spacetime: the positive spatial entropy-energy lost to the cosmic expansion is compensated in metrically equivalent units by the positive temporal entropy-energy gained by the aging historic dimension. The amount of the entropy-energy, the energetic cost of creating matter's asymmetric time dimension from the symmetric spatial dimensions is -Gm. The conversion from a spatially symmetric entropy drive to a historically asymmetric entropy drive is "uphill" - it requires energy to convert space to time, which is the energetic reason why gravitational entropy-energy is "negative" energy, and why the temporal mode of light collapses space: it must use space for entropy-fuel. The *implicit* temporal entropy drive of space ("frequency") becomes the *explicit* entropy drive of history (time). Gravity simply converts implicit time to explicit time at an energetic cost of -Gm. (See: "Spatial vs Temporal Entropy".)

The magnitude of G is determined by the small energy difference between the symmetric spatial entropy drive (S) of free energy as gauged by the intrinsic motion of light ("velocity c"), and the asymmetric temporal entropy drive (T) of bound energy, as gauged by the intrinsic motion of time ("velocity T"): S - T = -G. This is just equivalent to the energetic difference between *implicit* (S) vs *explicit* (T) time. Using the same symbols, the gravitational conversion of the drive of spatial entropy to a metrically equivalent drive of temporal entropy may be represented by a "concept equation":

$$-Gm(S) = (T)m$$
$$-Gm(S) - (T)m = 0$$

If we accept the import of this "concept equation", then we are forced to conclude that the "warpage" or "curvature" of spacetime in Einstein's General Relativity describes (quantitatively) the gravitational

conversion of space to time (or allows such an interpretation).

Seamless dimensional continuity, protection of causality and energy conservation, entropic compatibility, and an entropy drive plus entropy conservation, are all provided in the joint dimensional conservation domain of free and bound electromagnetic energy (spacetime) by the intrinsic motions of light and time, by their metric equivalence, and by their inter-convertibility. All this is possible only because time is derived directly from light (light's frequency aspect, exposed by the quantum-mechanical collapse of light's wave function) and from light's conservation domain, space (the temporal residues of gravitationally collapsed space). And though we experience the physical effect of spacetime every day, we are hardly aware of its dual nature (and typically unaware of the metric or dimensional function of gravity), it is so natural and commonplace; this is of course the way things have to be if the Cosmos is to function properly.

The Creation of Space

As for the intrinsic motion of light and the creation of space, curiously, as in the case of gravity, we can also attribute this to the intrinsic motion of time. Electric and magnetic fields induce each other to produce the propagation of light; so also do the frequency and wavelength of light induce each other to produce velocity c.

The essential meaning of the electromagnetic constant "c" is that it is the entropy/symmetry gauge of the spacetime metric, which functions specifically to prevent the explicit formation of the asymmetric, one-way time dimension, and the conversion of symmetric light to asymmetric matter (witness the continuous annihilation of "virtual" particle-antiparticle pairs in the "vacuum" of spacetime). The dimensional and energetic parameters of this system are thoroughly linked such that the wavelength of light (its spatial expression) multiplied by the frequency of light (its temporal expression) always equals the electromagnetic constant "c".

Obviously, time is implicit in the frequency of light, but at c, time is prevented from becoming explicit. Light has no time dimension: light's "clock is stopped". The seed is present, but its growth is suppressed; indeed, time would be required in its explicit aspect should light assume its particle form and produce matter. In fact, we need to discover the origin of the time dimension in light if we are to build a truly unified theory of energy and its dimensional conservation domain, a theory which traces the origin of all forces to light.

It is the ever-present threat of time, implicit in the very nature of light ("frequency"), which propels the electromagnetic wave forward in space to protect its metric symmetry. The flight of space ("wavelength") from time ("frequency") produces the intrinsic ("self-motivated") motion of light, a symmetric dimensional state of energy fleeing an asymmetric dimensional expression which is, however, an internal potential of its own nature (the original "bur under the saddle"). Since this flight also produces the (positive) march of spatial entropy, we see again that energy conservation, symmetry, and entropy are all related and share a common factor, "c". At the level of principle or natural law, we can say the intrinsic motion of light is produced by a hidden entropy drive (implicit time), which simultaneously maintains metric symmetry in the service of energy conservation. This is the self-same temporal component that becomes explicit when space is collapsed either gravitationally or quantum mechanically.

Hence we see that while explicit time is the entropic driver of the world of bound energy (atonic matter), implicit time is the entropic driver of the realm of free energy (light). Time is the "metabolic agent" of the Cosmos, the entropic driver of all change, whether in space, history, light, or matter. (See: "The Conversion of Space to Time" and "Gravity Diagram No. 2".)

(For more on this topic, see: "Entropy, Gravitation, and Thermodynamics" and "A Description of Gravitation".)

Links:

Unified Field Theory

- Section I: Introduction to Unification
- Section X: Introduction to Conservation
- Section IX: Symmetry: Noether`s Theorem and Einstein's "Interval"
- Section XIV: Causality
- Symmetry Principles of the Unified Field Theory (a "Theory of Everything") - Part I
- Symmetry Principles of the Unified Field Theory (a "Theory of Everything") - Part 2
- Symmetry Principles of the Unified Field Theory (a "Theory of Everything") - Part 3 (summary)
- Principles of the Unified Field Theory: A Tetrahedral Model (Postscript and Commentary on paper above)
- Synopsis of the Unification Theory: The System of Spacetime
- Synopsis of the Unification Theory: The System of Matter
- Light and Matter: A Synopsis
- Global-Local Gauge Symmetries and the "Tetrahedron Model"
- Global-Local Gauge Symmetries: Material Effects of Local Gauge Symmetries
- The "Tetrahedron Model" vs the "Standard Model" of Physics: A Comparison
- Synopsis of the Energy Tetrahedron Model: Explanatory Text

Gravitation

- Section II: Introduction to Gravitation
- A Description of Gravitation
- Global-Local Gauge Symmetries in Gravitation
- The Double Conservation Role of Gravitation: Entropy vs Symmetry
- 12 Summary Points Concerning Gravitation
- Extending Einstein's "Equivalence Principle"
- The Conversion of Space to Time
- "Dark Energy": Does Light Produce a Gravitational field?

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

Gravity Diagrams

- A New Gravity Diagram

The Gravity Diagram
The Three Entropies: Intrinsic Motions of Gravity, Time, and Light
The Tetrahedron Model (diagram)

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home page