

## 12 Summary Points Concerning Gravity

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### Abstract

"Local gauge symmetry currents" are forces that maintain the local invariance of universal constants, charges, and other conserved parameters (such as causality and the "Interval") despite the hostile environment of a variable gravitational (or inertial) metric, relative rather than absolute motion, entropy, partial charges, etc. These compensatory forces are due to the activity of the field vectors of the four forces, which not only act (in the long term) to return these asymmetric material systems to their original symmetric state (light), but also act (in the short term) to protect and maintain the invariant values of their symmetry debts (charges), while awaiting a final repayment via antimatter annihilation, proton decay, the "quantum radiance" of black holes, or a universal "Big Crunch". Gravity pays the entropy-interest on the symmetry debt of matter by creating matter's time dimension via the annihilation of space, providing a historical domain within which charge conservation can have significance. Gravitation eventually also pays the energy-principle on matter's symmetry debt, converting bound energy to free energy in stars and via Hawking's "quantum radiance" of black holes.

### Preface

#### Conservation/Entropy Domains of Free and Bound Energy

##### The Dimensions of Spacetime

The dimensions of spacetime are conservation/entropy domains, created by the entropic, "intrinsic" motions ("drives") of free and bound electromagnetic energy: the intrinsic motions of light, time, and gravity, creating space, history, and historic spacetime. Gravity is the conversion force between spatial and temporal entropy drives, converting the intrinsic motion of light to the intrinsic motion of time. Dimensional entropy domains function as arenas of action, where energy in all its forms can be simultaneously used, transformed, and conserved. This is the major connection between the 1st and 2nd laws of thermodynamics. See: ["Entropy, Gravitation, and Thermodynamics"](#).

### **The Universal Electromagnetic Constant "c"**

1) The universal electromagnetic constant "c", the velocity of light, gauges the spatial entropy drive and the metric and distributional symmetry of free energy - creating, regulating, expanding, and cooling space, the conservation domain of light. "c" gauges the metric equivalency between space, time, and light, and the energetic equivalency between free and bound energy ( $E = mc^2$ ). The universal gravitational constant "G" gauges the entropic equivalency between space, time, and mass: the magnitude of "G" determines how much space must be annihilated to produce the temporal entropy drive of any given mass. G is related to c as entropy is related to energy. The magnitude of G is determined by the small energetic difference between the symmetric entropy drive of free energy (S) (the intrinsic motion of light as gauged by "velocity c"), and the asymmetric entropy drive of bound energy (T) (the intrinsic motion of time as gauged by "velocity T"):  $S - T = -G$ . This is equivalent to the energetic difference between implicit vs explicit time. "Velocity T" is also ultimately gauged by c, as the duration required by light to travel a given distance. (See: "[The Conversion of Space to Time](#)".)

### **The Intrinsic Motion of Time**

2) The intrinsic motion of time ("velocity T") is the entropy drive of matter, information, and history, aging matter, and creating, aging, and decaying history, the conservation domain of information and matter's "causal matrix"; history is the temporal analog of space. Gravitation welds space and time into historic spacetime. The intrinsic motions of time and light are metric equivalents and both are effectively infinite velocities. These "infinite" velocities are necessary attributes of their roles as entropy drives, guaranteeing the conservation of energy and protecting causality in an expanding Universe. (See: "[The Time Train](#)".)

### **The Universal Gravitational Constant "G"**

3) The universal gravitational constant (G) is an entropy conversion/conservation gauge, regulating the conversion of space and the drive of spatial entropy to time and the drive of temporal entropy. Gravity creates spacetime, the joint dimensional conservation domain of free and bound energy. In its entropy conservation role, gravity converts space and the drive of spatial entropy to time and the drive of temporal entropy, creating an entropically equilibrated spacetime, just as light creates a metrically equilibrated spacetime. In its symmetry conservation role, gravity reverses the reaction, converting bound energy and time to free energy and space (as in our Sun).

Gravity creates the time dimension of matter by the annihilation of space and the extraction of a metrically (and entropically) equivalent temporal residue (entropy conversion/conservation role). Gravity converts the drive of spatial entropy to the drive of temporal entropy, and vice versa. In the reverse reaction, gravity causes the conversion of mass to light, as in the stars and Hawking's "quantum radiance" of black holes (symmetry conservation role). Through "quantum radiance", gravity completely converts bound to free energy, vanishing mass, time, and gravity itself, completely repaying both the symmetry and entropy debt of bound energy.

The Bekenstein-Hawking theorem relates the entropy of a black hole to its surface area. The surface area of a black hole is a time surface, displacing space. Black holes are the physical demonstration and proof that gravity converts space and the drive of spatial entropy to time and the drive of temporal entropy. "Quantum radiance", on the other hand, demonstrates gravity's

ultimate symmetry conservation role, completely converting bound energy and the drive of temporal entropy (the intrinsic motion of time) to free energy and the drive of spatial entropy (the intrinsic motion of light) - the ultimate obedience to "Noether's Theorem". *The charges of matter are the symmetry debts of light.*

The rationale for gravitation involves both symmetry and entropy conservation, the conversion of bound to free energy (and vice versa), and the creation of matter's time dimension, entropy drive, and causal relations, including matter's historic causal matrix (information), conserved in spacetime. Symmetry and entropy are both gauged by velocity  $c$  in free energy, and both are conserved by gravitation in bound energy; gravity acts to conserve light's "non-local" metric and dimensional symmetry (for example, converting bound to free energy in stars), while simultaneously creating the entropy drive of matter (time). (See: "[The Double Conservation Role of Gravity](#)".)

Gravity "pays the interest" on the charge-conserved symmetry debt of matter through the creation of the time dimension, causing the deceleration of the cosmic spatial expansion. Gravity binds the Universe together, integrating matter with spacetime, connecting matter's "Universal Present Moment" with matter's historic causal matrix (information conserved in spacetime). Light is connected by space; matter is connected by time; all are connected by gravity. (See: "[The Tetrahedron Model of Energy and Conservation Law](#)".)

Gravity creates time by the annihilation of space and the extraction of a metrically equivalent temporal residue. It should therefore be no surprise that there is a temporal analog of "big G" and "little g": "big T" (Newton's universal time) and "little t" (Einstein's relative time). "Big T" is the gauge magnitude, determining the universal base clock rate, derived from  $c$  in that it is defined as the time required by light to travel a given distance (say one meter) in vacuum. "Little t" was discovered by Einstein as relative time, which varies with motion and gravitational fields, in accordance with his theories of Special and General Relativity. "Big T" (like  $G$  and  $c$ ) is invariant, but "little t" varies with  $g$  and with relative or absolute motion. (See: "[The Paradox of the Traveling Twin](#)".)

### **The Gravitational Annihilation of Space**

4) When gravity annihilates space, a metrically equivalent asymmetric temporal residue remains, whose intrinsic motion perpetuates the gravitational field. The march of time into history drags space after it, creating gravity. *Gravity is the spatial consequence of (and the physical evidence for) the intrinsic motion of time.* Gravity and time induce each other in an endless cycle. Gravity converts space to time, creating spacetime, the joint dimensional conservation domain of free and bound energy. The one-way flow of gravity is caused by the one-way march of time; time is one-way in the service of causality, entropy, and energy conservation. Thinking of gravity as the actual convergent, accelerated collapse of spacetime is perfectly in accord with Einstein's "[Equivalence Principle](#)".

### **Frequency and Wavelength**

5) Frequency multiplied by wavelength =  $c$ , the intrinsic motion of light. Both time ("frequency") and space ("wavelength") are potential dimensional expressions of light, but "velocity  $c$ " suppresses time to an implicit condition ("wavelength" dominates "frequency"). This suppression is reversed when light is converted to matter and bound energy: light loses its intrinsic spatial motion but matter gains intrinsic temporal motion ("frequency" dominates "wavelength"). Light's spatial entropy drive (intrinsic motion  $c$ ) is conserved, transferred to

matter's temporal entropy drive (intrinsic motion T). (See: "[Gravity Diagram No. 2](#)".) The conversion is accomplished both quantum mechanically ("primary process") and gravitationally ("secondary process"). Time therefore appears to be a dimensionally conserved form of light's entropy drive or intrinsic motion, while gravity appears to be an energetically conserved form of the same. Matter is a temporally conserved form of light's energy; charge is a temporally conserved form of light's symmetry. See: "[A Description of Gravitation](#)".

The intrinsic (self-motivated) motion of light is caused by the implicit presence of time ("frequency"): the symmetric spatial or "wavelength" component of the electromagnetic wave "flees" the asymmetric temporal or "frequency" component, which is an embedded potential of its own nature, the proverbial "bur" under the saddle. Only by moving forever at velocity  $c$  is light's asymmetric temporal component suppressed: light's "clock is stopped", light has no time dimension. Entropy, and metric symmetry conservation (in the service of energy conservation), as well as the implicit presence of time, all combine to cause light's intrinsic motion; "velocity  $c$ " gauges the metric and distributional symmetry of light, as well as the entropy drive of free energy and the spatial metric. Time, whether implicit in "velocity  $c$ " or explicit as "velocity T", is the universal entropy driver of the Cosmos. (See: "[The Conversion of Space to Time](#)".)

The "negative energy" characteristic of gravity ( $-Gm$ ) is caused by:

A) The energetic difference between the symmetric entropy drive (S) of free energy (the intrinsic motion of light as gauged by "velocity  $c$ "), and the asymmetric entropy drive (T) of bound energy (the intrinsic motion of time as gauged by "velocity T"):  $S - T = -G$ . When free energy is converted to bound energy, the implicit temporal entropy drive of light simply switches to the explicit temporal entropy drive of matter - the flipping of the electromagnetic "entropy coin" from "velocity  $c$ " to "velocity T". (See: "[Gravity Diagram No. 2](#)".)

However, this conversion of spatial entropy drive to temporal entropy drive occurs with a deficit of energy, because the implicit time of free energy is in a symmetric state, whereas the same temporal component is asymmetric when "flipped" to the explicit time of bound energy. The energy deficit arises because it requires energy to create an asymmetric state from a symmetric one. The implicit and explicit temporal components are opposite sides of the same "entropy coin"; in both cases, the entropy drive is time. From the point of view of the self-contained entropy "coin" (or corresponding quantum unit of spacetime), it is evident that there cannot be sufficient energy within the quantum limits of the collapses wave itself to create the asymmetric temporal component from the selfsame symmetric spatial component. This energy deficit is gauged by  $-G$  and will have to be satisfied by importing more entropy "coins" (spatial entropy-energy units, or quantum units of spacetime), creating the "negative energy" characteristic of the inward gravitational flow of space.

B) The intrinsic motion of time redresses its entropy-energy deficit by importing more space, dragging space to the gravitational center of mass where it is annihilated to extract its entropy-energy content (strangely reminiscent of an Aztec sacrificial rite). Gravity is the spatial consequence of the intrinsic motion of time.

C) Because time continuously marches off to create the historic spacetime domain of information and matter's "causal matrix", taking with it any imported energy (which is used to create and expand historic spacetime), the temporal entropy-

energy debt of bound energy is never paid, but remains as a permanent characteristic of matter (-Gm). The creation of matter's time dimension and the historic component of spacetime is ultimately funded by the intrinsic motion of light, as reflected in the gravitational deceleration of cosmic spatial expansion. The spatial entropy drive of free energy ultimately funds the temporal entropy drive of bound energy.

### **Time and Gravity**

6) Time is the active, entropic principle of gravity's "location" charge, carried by any form of bound energy in the amount Gm. Bound energy is energy whose "Interval" is greater than zero - "local" massive energy whose spacetime position can be specified. Light is "non-local" massless energy which has no time dimension and therefore cannot produce a gravitational field in free flight. Light's lack of a time dimension is the major symmetry consequence of velocity  $c$ , resulting in light's hallmark "non-locality", and [light's lack of a gravitational field](#). Bound energy is local, temporal, causal; free energy is non-local, atemporal, and acausal. See: ["Symmetry Principles of the Unified Field Theory"](#).

### **Noether's Theorem**

7) *The Charges of matter are the symmetry debts of light* ("Noether's Theorem"). Noether's Theorem states that in a multicomponent field, such as the electromagnetic field (or the metric field of spacetime), where one finds a symmetry one will find an associated conservation law, and vice versa. Gravity is unusual in that it is both a symmetry and an entropy debt of light (see no. 3 above). Bound energy is created from light, and gravity arises in matter as the symmetry debt of light's lost "non-local" character (light's lost metric and distributional symmetry). But since "velocity  $c$ " gauges both the symmetric energy state and the entropy drive of free energy, gravity cannot conserve one function of the gauge without conserving the other. This dual role is also seen in the gravitational "location" charge, of which time is the active principle. Time is an entropic charge, a charge with intrinsic dimensional motion, which also "locates" or specifies the 4-dimensional position, quantity, and density of bound energy, identifying exactly the mass parameters most relevant to light's broken distributional symmetry. (See: ["The Double Conservation Role of Gravitation"](#).)

### **Gravity and Entropy**

8) Gravity conserves entropy; for example, in the (hypothetical) cosmic gravitational collapse of the "Big Crunch", the total heat loss and entropy of the Universe is reversed. In such a case, the total entropy of the Universe sums to zero. Gravity replaces space and the drive of spatial entropy with a metrically equivalent time and drive of historical entropy. The spatial expansion of the Cosmos is gravitationally decelerated to fund the historical component of the total entropy equation. The magnitude of  $G$  is determined by the small energy difference between the symmetric spatial entropy drive ( $S$ ) of light (the intrinsic motion of light, as gauged by "velocity  $c$ "), and the asymmetric temporal entropy drive ( $T$ ) of matter (the intrinsic motion of matter's time dimension, as gauged by "velocity  $T$ "):  $S - T = -G$ . This is equivalent to the small energy difference between implicit ( $S$ ) and explicit ( $T$ ) time. (See: ["Gravity Diagram No. 2"](#).) (See also: ["The Conversion of Space to Time"](#).)

The concept of the gravitational conversion of space and the drive of spatial entropy ( $S$ ) to time and the drive of historical entropy ( $T$ ), can be symbolically represented as:



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

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

For the metric interpretation of our "concept equation", a more complete mathematical representation might be obtained by substituting for (S) an appropriate expression for space. The effect of the multiplier (Gm) must be to collapse (or transform) the spatial component of this representation (S) and replace it with a metrically equivalent temporal component (T) whose magnitude varies with m. But Einstein has already done this with the metric tensors of General Relativity. Einstein's complex metric tensor is capable of directly representing the dimensional transformation of space to time, whereas our simple "concept equation" of course cannot. The intrinsic, entropic motion of the time dimension so produced provides the accelerating gravitational force which collapses more space in an endless self-feeding cycle (see: "[A Description of Gravitation](#)").

We realize that time has intrinsic motion (the entropy drive of matter - see: "[The Time Train](#)"), but we don't usually think of space in the same way. But space also has intrinsic motion - supplied by the intrinsic motion of light (the expansive entropy drive of free energy), and if matter is present, also by gravitation (the contractile entropy conversion drive, converting space to time). Space is created by the intrinsic motion of light, and does not exist without light: no energy form exists without an associated entropy drive and conservation domain (space, history, or historic spacetime). Einstein discovered this expansive (entropic) characteristic of space in his gravitational equations, which would not allow a static solution; he suppressed this intrinsic motion with his infamous "cosmological constant". The reason we are not aware of the intrinsic, expansive motion of ordinary space is due to the size of the Cosmos and the "non-local" character of light. The expansion of space proceeds over the scale of the entire Cosmos (and is actually visible as the cosmological "red shift", or recessional velocity of the distant galaxies), but is locally so small that it is typically both insensible and overcome by gravity in the presence of large amounts of matter. Conversely, it is due to the local character of matter that we are aware of the intrinsic motions of both time and gravitation.

There should be nothing new in all this, other than our interpretation of the effects of Einstein's gravitational equations as converting space into time (I obviously assume his equations are essentially correct). Black holes provide observational and theoretical evidence that this conversion actually happens; and our dynamic perspective with respect to the gravitational collapse of spacetime is allowed by Einstein's own "Equivalence Principle". Our only quarrel with Einstein's theory (at least as it is currently interpreted by the physics "establishment") is whether or not light moving freely in spacetime produces a gravitational field: I believe it does not, the "establishment" believes it does. The recently observed "acceleration" of the cosmic expansion is evidence favoring my view. See: "[Does Light Produce a Gravitational Field?](#)"

### **Spatial vs Temporal Entropy Drives**

9) Light or free energy is a completely entropic form of energy, whereas matter is not (which, from the "anthropic" point of view, is a major rationale for the conversion of free to bound energy during the "Big Bang"). Light fully occupies its expanding spatial domain, but matter does not; matter maintains a tangential position in the "Universal Present Moment" with respect to its expanding historic domain, which is occupied instead by information (matter's "causal matrix") (see: "[The Time Train](#)"). Consequently, the energy content of atoms is not diminished as history expands, and the temporal entropy-energy component of bound energy is tiny - as measured by Gm. Matter's entropy drive is time, created by matter's gravitational field; the attrition of matter's stored energy by temporal entropy consists mainly in the gravitational

conversion of mass to free energy (in stars and black holes), and/or radioactivity, particle and proton decay. This difference in the dimensional/inertial status of the two entropy drives accounts for gravity's weakness: matter's tiny temporal entropy requirement is readily extracted from the annihilation of a small amount of space. (See: "[The Half-life of Proton Decay and the 'Heat Death' of the Cosmos](#)".)

### **Magnetism and Time**

10) As magnetism is the invisible, "intrinsic" projective electrical force ("electro-motive" force) of the loadstone, so gravity is the invisible, "intrinsic" projective dimensional force ("inertio-motive" force) of the ordinary rock. In the case of magnetism, we trace the force back to the moving (and aligned) electric charges of the atoms in the loadstone; in the case of gravity, we trace the force back to the moving (and one-way) temporal charges of the bound energy in the rock. A moving electric charge creates a magnetic field; a moving temporal charge creates a gravitational field. In both cases the field is produced at right angles to the current. The relation is reciprocal as well: moving magnetic and spatial fields (gravity) create electric and temporal currents (time). Finally, time, magnetism, and gravity are all phenomena associated with "[local gauge symmetry currents](#)" in their respective forces, and an "[equivalence principle](#)" can be formulated for each in which the force vanishes for a "co-moving" observer. This is the analogy between gravitation and electromagnetism which so intrigued Einstein.

### **The "Big Bang"**

11) The total negative gravitational energy of matter is equal to its positive rest mass energy - as demonstrated by "quantum radiance" and black hole theory. This concept (apparently originally due to Pascual Jordan) helps us understand the creation of matter (or bound energy generally) as a zero-sum enterprise requiring no net energy. The original ("Big Bang") annihilation of matter-antimatter produced the energy of light from the mass component ( $E = mc^2$ ), and the intrinsic motion of light from the gravitational component (mass transformed to light's raw energy, gravitation transformed to light's entropy - a form of "[repulsive gravity](#)"?). (See: "[The Higgs Boson and the Weak Force IVBs](#)".)

### **Inertia**

12) The inertial mass of a particle is wholly due to its gravitational field. The inertial resistance to acceleration by a massive particle is a result of the interaction between the particle's gravitational field and the metric field of spacetime. This is also why a particle's inertial mass increases without limit as its velocity approaches  $c$  - the unlimited metric field becomes an increasingly larger part of the particle's gravitational field. The interaction of these two metric fields explains also the effects of relativistic motion on the particle's shape and clock. This is a further example of the connection between light, particles, and the spacetime metric, of which gravitation is a direct expression.

There is a simple way to understand gravitation: time is the active, entropic principle of gravity's "location" charge; *the familiar gravitational field is the spatial consequence of, and evidence for, time's intrinsic motion*. For a more complete discussion of the gravitational charge and its mechanism, see: "[Entropy, Gravitation, and Thermodynamics](#)", and "[A Description of Gravitation](#)"

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