Currents of Entropy and Symmetry

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The Sun is the archetypical example of a completed circuit of symmetry conservation. (See: "The Sun Archetype".)

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Abstract: Currents of Magnetism and Gravity

As magnetism is the invisible, projective, electrically active ("electro-motive") force of the loadstone, so gravity is the invisible, projective, dimensionally active ("inertio-motive") force of the ordinary rock. In the case of magnetism, we trace the force back to the moving (and aligned) electrical charges of electrons in the loadstone; in the case of gravity, we trace the force back to the moving (and one-way) temporal charges of matter 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. Both relations are reciprocal: moving magnetic and spatial (gravitational) fields create electric and temporal currents. Magnetism and time are both "local gauge symmetry currents", the variable magnetic current protecting the invariance of electric charge, the variable temporal current protecting the invariance of causality and energy conservation. Finally, time and gravity induce each other endlessly, as do the components of an electromagnetic field. This is the (inexact) analogy between electromagnetism and gravitation which so intrigued Einstein. (See: "The Conversion of Space to Time".)

Introduction

Can we extend the analogy between magnetism and gravitation further, to include the north-south magnetic poles that provide a closed conservation loop for the field lines of a typical bar magnet, such that its force remains unquenched through time? The Earth's gravitational force likewise remains unquenched through time, but it has the appearance of a symmetric, unidirectional monopole, rather than a magnetic dipole. But how can the Earth's gravitational field be indefinitely sustained, unless a conservation loop of some sort exists to "recycle" this force? (The short answer is that magnetic forces are indefinitely sustained by charge and symmetry conservation, while gravitational forces are indefinitely sustained by entropy and the intrinsic motion of time - in addition to charge and symmetry conservation. But in any case, we wish to pursue the conservation-loop analogy for heuristic purposes.)

Currents of Entropy and Symmetry

The long answer to the question posed above (How far can we push the admittedly inexact analogy

between magnetism and gravitation?) involves two primordial entropy forms (for free and bound energy - light and matter - respectively) which act as source and sink, while gravitation provides the connection between. It is therefore the principle of entropy that sustains gravitation - entropy as manifest spatially through the intrinsic motion of light and historically as the steady march of time. The conservation loop exists in the gravitational connection between the primary spatial form of entropy, the intrinsic motion of light (the entropy drive of free energy), and the secondary historical form of entropy, the intrinsic motion of time (the entropy drive of bound energy). Gravitation is the force which effects the conversion of one type of entropy to the other, either by the conversion of space to time (as in the case for all bound energy forms, including our planet Earth), or additionally and simultaneously by the conversion of bound to free energy (as in the case of the Sun and stars). The connection is demonstrated in the first instance by the gravitational deceleration of the cosmic spatial expansion - that is, the historical entropy drive (the intrinsic motion of time) is funded by gravitationally siphoning energy from the spatial entropy drive (the intrinsic motion of light). Conversely, in the second case, the reduction of total cosmic gravitational force consequent upon the conversion of bound to free energy (as in the stars), has, as an inevitable result, the "acceleration" of the cosmic expansion. (See: "The Double Conservation Role of Gravitation".) (See Also: "Dark Energy": Does Light Produce a Gravitational Field?)

The expansion of history (historic spacetime) takes place at the expense of, instead of, and indeed is funded by, the expansion of space. The historical entropy drive (the intrinsic motion of time), is funded by the spatial entropy drive (the intrinsic motion of light). And conversely, the conversion of matter to light (in stars) converts matter's historical entropy drive to light's spatial entropy drive, since light, as Einstein discovered, has no time dimension. (See: "Entropy, Gravitation, and Thermodynamics".)

While the two entropies appear to be distinct superficially, fundamentally they are intimately related, two sides of the same electromagnetic entropy "coin", the implicit vs the explicit form of time, the entropy drives of free and bound forms of electromagnetic energy. (see: "The Conversion of Space to Time" and "Gravity Diagram No. 2"). Both types of entropy converge upon the same goal - the conservation of energy, causality, and the symmetry of energy (Noether's Theorem).

Black Holes

Symmetry conservation in the case of gravitation is easy to observe, as seen in the universal drive toward the conversion and return of bound to free energy in our Sun and the stars (through the nucleosynthetic pathway), and finally (and completely) through Hawking's "quantum radiance" of black holes. Symmetry conservation in the case of light itself involves the maintenance of metric (inertial) symmetry (as gauged by "velocity c", for one example), and the suppression of time, mass, charge, and gravitation (via electrically motivated matter-antimatter annihilations, for another example). But the temporal entropy drive also works toward the conversion of bound to free energy, first through the "half-life" of particle and radioactive decay, and finally though "proton decay". Indeed, these three pathways meet in black holes, where proton decay is commonplace in the interior. (See: "The Half-life of Proton Decay and the 'Heat Death' of the Cosmos".) In a remarkable convergence, Einstein's "Equivalence Principle" is also brought into play, since at the event horizon, where $g = c$ and time stands still, matter is returned to an equivalent "velocity c", at least partially returning mass to the timeless energetic symmetry state of light.

Thus in the black hole, where "the extremes meet", we find an interior containing nothing but gravitationally bound light (due to the annihilation of matter by gravitationally induced proton decay); an event horizon where $g = c$, time stands still, and bound energy moves equivalently at velocity c; and an exterior of Hawking radiation where Noether's theorem is completely satisfied by the return of

asymmetric matter and historical entropy to the symmetric energy state of light and spatial entropy (via gravitationally induced matter-antimatter annihilation reactions).

Of course the game is up if the conservation loop is broken - a true monopole (without a return loop) cannot exist. In the case of temporal entropy, if gravitation runs out of space to convert to time - the means by which it regenerates and sustains its confining force (as for example in the final moments of the "Big Crunch") - then we get an instant "flash over" or conversion of all residual bound energy to free energy in the "rebound" of a new "Big Bang". (See: "The Connection Between "Inflation" and the "Big Crunch".) The conversion occurs because light is the only energy form which by its own intrinsic motion (entropy drive) can create its own conservation domain (space).

The Universe is ruled by Energy Conservation, but it manifests through Entropy and Symmetry Conservation, which together allow the transformation of free energy to work, information, and causally regulated matter (including historic spacetime). (See: "The Tetrahedron Model".) (See also: "The 'Tetrahedron Model' vs the 'Standard Model' of Physics: A Comparison".)

The Energy Debt of Asymmetric Temporal Entropy

There is an overall seamless circularity in the cause of time's intrinsic motion and the gravitational field, beginning with the flow of time into the historic causal domain (historic spacetime), pulling space after it - a self-feeding flow which continuously creates more time by the annihilation of space. The flow of time establishes the causal linkage and entropy drive of matter, and continuously renews bound energy's "location" charge and the gravitational flow of space. This connected, circular flow of space and time has the aspect of an electric circuit, as the temporal flow into expanding history provides an exit ("ground") for the spatial (gravitational) current, which flows to "bulk" historic spacetime, decelerating the cosmic expansion which is its energy source (via the actual conversion of space to time by gravity). Similarly, the causal linkages of historic spacetime connect back to the "universal present moment" to complete their circuit ("karma" and the infinite range of the gravitational force). We could say that the freely expanding possibilities of the "present moment" are "decelerated" (constrained, limited) by the causal chains of karmic consequence.

Thus the intrinsic motion of light (the entropy drive of free energy, causing the expansion and cooling of space) is the ultimate energy source for the intrinsic motion of time (the entropy drive of bound energy, causing the expansion and aging of history), in which gravitation provides the connection between the "bulk ground" of historic spacetime, the "time charge" of the present moment (the "location" charge of mass and gravitation), and the intrinsic motion of light, decelerating the spatial expansion of the Cosmos in consequence. This "braking energy" subtracted from the spatial expansion provides the energy for the growth of matter's historic domain. The entropy balance of the universe, gravitationally divided between an expanding spatial domain (S) driven by light's intrinsic motion, and an expanding historical domain (T) driven by time's intrinsic motion, may be symbolically represented by a "concept equation" as:

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

(See: "A Description of Gravitation".)

At the microscopic quantum mechanical scale of local action, the conversion of space and the drive of spatial entropy to time and the drive of historical entropy is accomplished by the simple switch or "flip" of the electromagnetic entropy "coin" from implicit time to explicit time. The implicit form of time causes the intrinsic motion of light and the expansion of space, while the explicit form of time

causes the gravitational annihilation of space and the expansion of history.

While the perfect symmetry of light is also seen in the "all-way" spatial character of light's entropy drive or intrinsic motion, the "one-way" historical character of matter's entropy drive (time's intrinsic motion) tells us that it is "goal oriented" with a symmetry conservation task to perform - the final return of bound to free energy.

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