

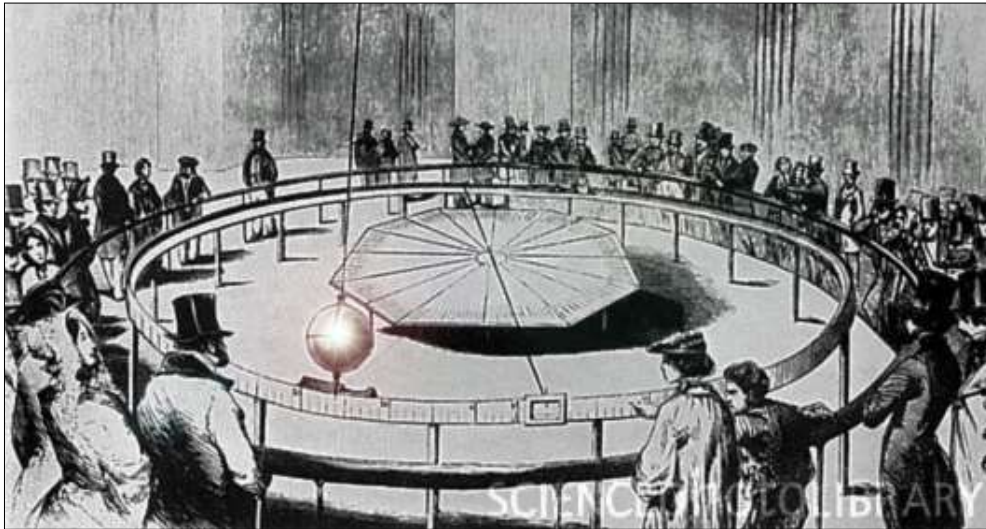
The Pit in the Pendulum

Tom Ransom 2010...

Abstract *

"Books on physics are full of complicated mathematical formulae. But thought and ideas, not formulae, are the beginning of every physical theory." Einstein/Infeld⁽¹⁾

While mathematics, selectively applied, may be remarkably well suited to the modeling of natural law, at large it remains an abstract domain with an infinite host of objects, operators, and outcomes, and thus, lends itself to endless possibility; applicable formulations will likely be found forever. But science, ever assiduous, seeks those solutions bringing us closer to the "final" theories, and when theoretical correspondence with natural law is lost, any intended convergence has digressed. I submit that quantum-gravity research directed toward a "unified field theory" is just such a digression.



Imagine the swing of a giant pendulum, that grand, sweeping, silent arc through space, determined, continuous. With each accelerated pass is visibly marked a vanishing moment of time. Is it any wonder such a phenomenal thing was instrumental in the development of our scientific theories regarding mass, motion, time and space, and gravitation—for if left to its own devices, the swinging pendulum is one day found profoundly motionless, stationed directly over the Earth's "center of gravity".

Though more than six thousand kilometers away, refined instruments are not required to locate the Earth's gravitational center—its "centroid". In fact, with perfect precision, any dumb plumb bob will forever point the way. So for millennia we've known for certain where the local source of gravity resides, and for centuries have calculated precisely what it does, but as for identifying what it *is*, most of the most informed, even to this day, confess uncertainty.

Consider the cord of our stationary pendulum, a "geometric vector" drawn taut to the center of the Earth, not only invisibly drawn, but endlessly extensible, its magnitude diminishing over distance but *never* vanishing entirely.⁽²⁾ Next consider the nature of the "geometric origin"—the 'pit', the center of mass tensing the cord, for if the pendulum bob is a hollow sphere, this 'mass' is resident in *empty* space. Now imagine following our invisible vector all the way down to the Earth's centroid only to find this mass is absent as well—the plumb bob now points toward the Sun! Centers of gravity are apparently nothing more than vanishing proxy in a magnitude continuum of mass attraction: pendulums to planets to stars to galaxies to... what exactly? How, and why?

Much of science has been directed to answering these questions, and those familiar with this quest know that the subjects of "matter" and "space" have been at odds the entire way. Isaac Newton was critical of how his contemporaries positioned celestial bodies relative to one another independent of any comprehensive context; ethereal "vortices" caused them to gravitate toward one another.^(3a) He postulated instead an "immovable space" and the "flow of time" *within* which massive objects attracted one another via a constant causal "force". Gravitation was thus most likely a "property" of matter—but of a 'nature unknown'.⁽⁵⁾ His critics accused him of resorting to the occult to explain his invisible, instantaneous, "action at a distance" across empty space.^(3b)

A better explanation appeared with James Maxwell's theory of light. His electromagnetic "field" was a dynamic potential similar to gravity—causal yet invisible, and Albert Einstein found that by adapting this concept to gravitation, several observations unexplained by Newton's theory could be explained, including instantaneity.^(6a) In Maxwell's equations light radiated at an invariant absolute velocity(c), and Einstein had discovered this would be the case for all observers only if variance was reintroduced into the equations of motion by making the coordinates of space and time subject to velocity. But then, at the speed of light, these values turned "imaginary"^(7a) and the equations faltered. When these transformation equations "go singular at c " a null interval subsumes the metric indicating locality has vanished and a state of *simultaneity* prevails.^(8a,9a,10) Therefore, because Einstein's proposed gravity waves propagated at lightspeed, the gravitational field, like Newton's force, appeared to be instantaneous.

Though both theories were derived geometrically, whereas Newton's force was a product of classical Euclidian geometry, Einstein's field-model was a contemporary geodesic stretch: the *four* dimensional, tensor curvature, of an energy conformal, "spacetime" continuum. Gravitation wasn't a property of matter, it was contextual, *within* the dynamic shape of space itself. Having no evidence that the Universe as

a whole was expanding or contracting, Einstein thought it necessary to balance the generally convergent tendencies of the gravitational constant, with a *divergent* "cosmological constant"—of a 'nature unknown'.^(7b)

As astronomy extended and improved, cosmologists determined that the observable Universe was apparently expanding due to a vacuous, cosmic-scale, "dark energy" unseen, in effect a cosmological constant, but still of an unknown nature. Around stellar clusters observations began to implicate invisible halos of gravitating "dark matter", and then, at the inner-extreme, photometric data began pointing to vanishing "black holes" at the centroid of every galaxy—all natures unknown! Why does the *source* of everything gravitational always appear to be a dark, invisible, anomalous unknown, in the act of vanishing?

"No machinery has ever been invented that 'explains' gravity without also predicting some other phenomenon that does *not* exist."

Richard Feynman⁽¹¹⁾

Perhaps it's time to reconsider a remedial thesis: Gravitational science implicates, but cannot fathom its 'nature unknown', because there really is nothing there! The radiant expansion of the "Big Bang" and an *empty reciprocal counterpart* are a dynamic duality on the grandest of scales and their symmetrical differential is the primal impetus driving the evolution of the Universe.

"As the universe expands... the positive matter energy is exactly balanced by the negative gravitational energy, so the total energy is zero."

Stephen Hawking^(12a)

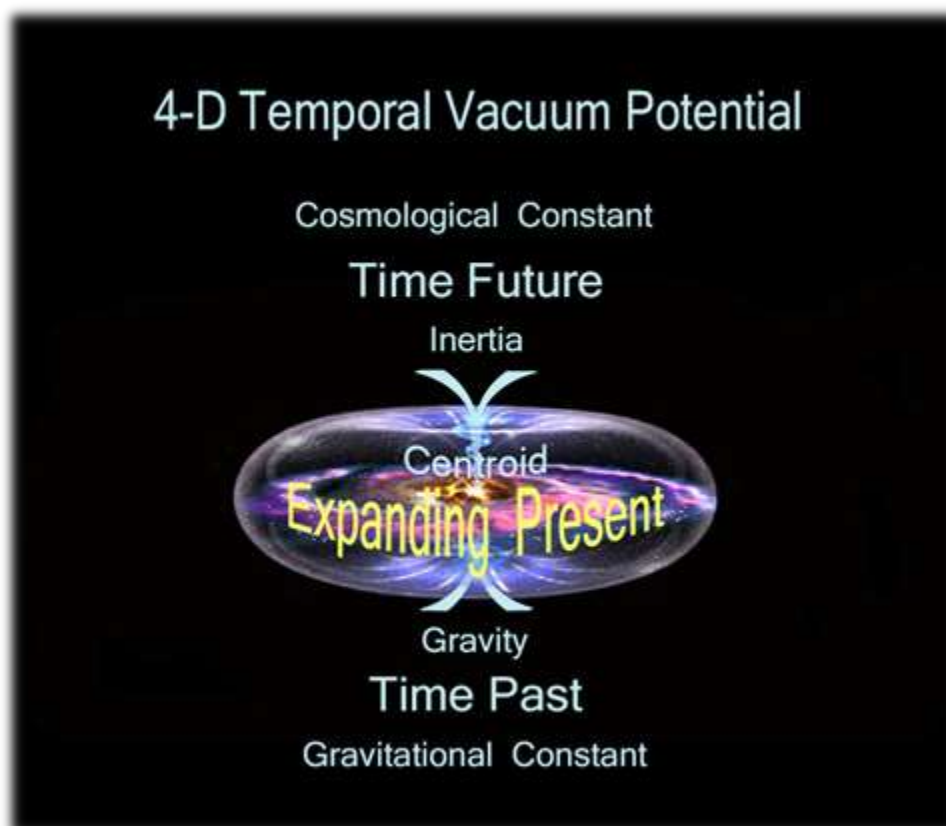
If the subject energies of the quantum and gravity field-theories, are indeed, diametrically opposed, then unification efforts are mistaken. Einstein spacetime can't be quantized because matter and gravity have absolutely nothing in common. Matter presents as local, discontinuous, and transitory—gravity as global,⁽¹³⁾ continuous,^(6b) and constant.⁽¹⁴⁾ Matter is the 'nature unknown' in gravity theories: Newton's centers of mass reduce to "mathematical points";^(3c) Einstein's energy densities are vanishing "field singularities".⁽¹⁵⁾ The quantum field exists in an uncertain state of probability potentials, while gravity, in field terms, has a certain geometric structure,⁽⁸⁾ is conformal but entirely deterministic, and unlike quanta, infinitely contiguous—between any two "world-points" another exists.

The systemic infinities generated by the canonical incommensurability of these two theories has sent contemporary unification schemes spinning off into evermore abstract digressions. A way forward is required—a post-geometric, expanded theory of gravity able to not only reciprocate the expansion of the Universe, but also reconcile its various 'nature unknowns'. It so happens an apposite field analogue is prescient in theoretical physics: a "scalar vacuum potential".^(12c,16,17a)

So here's the proposal: This radiant Universe is a positive expansion *within* its contra-conformal counterpart, a negative 'vacuum plenum'.^(18a) Though this may look like just one more gravitational 'nature unknown', it isn't—this one you know.

When Einstein's spacetime equations go singular at c , while the spatial coordinates vanish, the "complex" temporal coordinates of *time* remain continuous.⁽¹⁹⁾ This means that in the final analysis, space is just a conceptual construct,^(7b) and time the actual 'spatial' dimension.^{a)} "Imaginary Time",^(12b) as such, is a universal identity with axiomatic import—a ready candidate for gravity's 'nature's unknown'. By substituting a scalar "temporal vacuum potential" for imaginary Time, the resulting action principle becomes uniformly global, and therefore—as with Newton's force and Einstein's field, instantaneous. All of which means our swinging pendulum actually *is* marking the measure of Time!

In this proposal the "present" is an omni-radiant energy expansion within an eternally extant fourth dimension of vacuum potential—Time.^(17b) Advancing this expansion is the cosmological constant "dark energy" of the temporal future. The action of the temporal past, by which the present is vacuum tensioned, is that of the gravitational constant. These seemingly opposed manifolds of past and future, however, are really one and the same dynamic void—a temporal *continuum*. Their actions appear opposed because the cosmological future presents *globally* as the inertial component of the *locally* point-sourced gravitational constant.^{b)}



The Present—an instantaneous energy pulse, omni-expanding at lightspeed, simultaneously, everywhere at once. Hence, from the 4-D 'view' of Time, there's always only *one* centroid, the singular Origin. From our 3-D view on the surface of the expanding Present, however, this centroid has been apportioned to every

center of mass, so while the action dynamic of gravity-past presents everywhere locally, inertial time-future, in a global "Machian" sense,^(18b) is everywhere else. Time-future is the mass-conformal dynamic required to reconcile the "dark matter" effect. Time's theoretical "reversibility" is a characteristic of the proposed "block time" temporal continuum. The scalar nature of its vacuum potential means any perceived "flow" must reference the motion of the expanding Present.

In the Einstein field-model, because the cosmic energy expansion has been shaping conformal spacetime continuously ever since its Origin, a common evolute is conserved at the locus of every gravitational geodesic. In terms of vacuum potential this common Origin is the vanishing 'black hole' at the centroid of every center of mass. Either way, by spacetime or vacuum plenum, in both these continua of the fourth dimension, the 'pit' of every centroid is a proximity proxy for every other because they're all *one* and the same.^(9b) No wonder the theoretical action attribute of gravitation has always been instantaneous!

Finally, this proposal lends itself to considerations regarding entropy^{c)}, the "arrow of time", cosmogenesis and destiny, for if the radiant energy density and the temporal vacuum density are conversely equivalent,⁽²⁰⁾ and symmetrically conformal, then a universal 'inflation' corresponds to a 'deflation' of temporal potential. Therefore, as they encounter ever *less* time, cosmic spectra exhibit dilating frequencies—red-shifting wavelengths, relative to *time* distant.⁽²¹⁾ This means rather than space expanding ever faster, its complementary inverse is in evidence: The expanding Universe is slowly running out of Time. Big Inflection^{d)} anyone?

"... it is necessary, in the interest of science, to call the fundamental concepts again and again into question so that we are not governed by them without realizing it."

Albert Einstein⁽²²⁾

Everything is atoms and the void. Democritus [400 bc]

Everywhere it's quanta in time.

- a) The standard measure of the spatial dimension is now defined as the *time* it takes for light to travel a one "meter" length.
- b) The basis of Newton's third law and Einstein's equivalence principle: The gravitational pull of time-past and the inertial pull of time-future are opposite and equal. Likewise for the centripetal and centrifugal "pseudo forces".
- c) In fact, this proposal provides entropy with an actual ontological residence: an energy-reciprocate dimension of empty *potential*.
- d) Energy conservation: entropy inflection at unity frequency—infinite wavelength.

* Versions of this essay were submitted to the Gravity Research Foundation 2010 and 2018 essay competitions.

References

- 1) Einstein, A; Infeld, L *The Evolution of Physics* (Simon & Schuster: 1966) 277
- 2) Bergmann, Peter *The Riddle of Gravitation* (Dover Pub: 1992) 82-3
- 3) Newton, Isaac *Newton - Philosophical Writings* (Janiak; Cambridge U.Press: 2004)
a:14-15 b:137 c:124
- 4) Newton, Isaac *The Principia* (Prometheus Books: 1995) 314-15
- 5) <http://plato.stanford.edu/entries/newton-philosophy/> 2006 #4
- 6) Hesse, Mary *Forces and Fields* (Philosophical Library: 1961) a:137 b:260
- 7) Einstein, Albert *Relativity* (Crown Publishing: 1961) a:41-42 b:176
b: "There is no such thing as an empty space... space-time does not claim existence on its own, but only as a structural quality of the field."
- 8) Schrodinger, Erwin *Space-Time Structure* (Cambridge U.Press: 1950) a:80
- 9) Rucker, Rudolf *Geometry, Relativity and the Fourth Dimension*
(Dover Publications: 1977) a:93 b:113-14
a: "For someone going at the speed of light, every event... happens at the same time—and in the same place!"
- 10) Redhead, Michael *From Physics to Metaphysics* (Cambridge U.Press: 1996) 74
- 11) Feynman, Richard *Six Easy Pieces* (Addison-Wesley: 1995) 109
- 12) Hawking, Stephen *The Universe in a Nutshell* (Bantam: 2001) a:91 b:59-63 c:96
b: "A mathematical model involving imaginary time predicts not only effects we have already observed but also effects we have not been able to measure."
- 13) Dirac, P.A.M. *General Theory of Relativity* (Princeton U. Press: 1996) 62
- 14) Fuller, Buckminster *Synergetics* (Macmillan: 1975) 306
"Gravity... is never partial, but always whole. Radiation is always packaged. Gravity is the inside-outness of energy-as-matter... the sum of all the no-points embracing all the points."
- 15) Einstein, Albert *On the Generalized Theory of Gravitation*
(Scientific American, Nobel Prize Authors - Volume I 2009) 29
- 16) Guth, Alan *Inflationary Universe: A Possible solution...* (Physical Review D, 1981)
- 17) Prigogine, Ilya *The End of Certainty* (Free Press: 1997) a:178-9 b:6
b: "The big bang was an event... *within* the medium that produced our universe. It marked the start of our universe but not the start of time. Although our universe has an age...this medium has none. Time has no beginning and probably no end."
- 18) Moffat, John *Reinventing Gravity* (HarperCollins: 2008) a:201,209 b:37
- 19) Hawking, Stephen *A Brief History of Time* (Bantam: 1998) 144
"In real time, the universe has a beginning and an end at singularities that form a boundary to space-time and at which the laws of science break down. But in imaginary time, there are no singularities or boundaries. So maybe what we call imaginary time is really more basic."
- 20) <https://briankoberlein.com/2016/09/13/the-constant-of-time/>
"The vacuum energy density (as determined by the Hubble constant) and the matter energy density are about equal, known as the coincidence problem."
- 21) Powell, Corey *God in the Equation* (Free Press: 2002) The "de Sitter universe": 84
- 22) From: *Philosophy, Mathematics and Modern Physics*
(Rudolph & Stamatescu; Springer-Verlag: 1994) 111