

The 'Pit' and the Pendulum

Tom Ransom

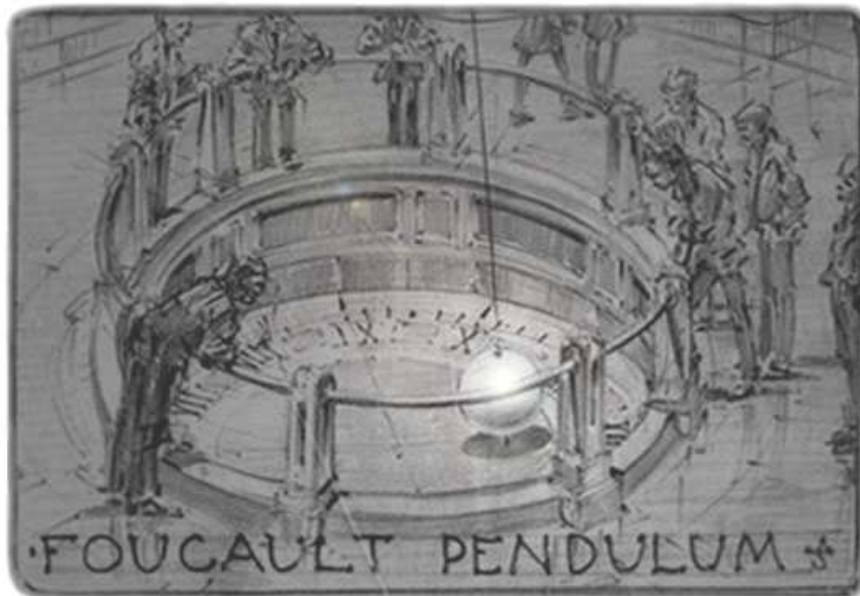
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Abstract

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

While mathematics, selectively applied, may be remarkably well suited to the modeling of natural law, at large, it remains an abundant abstract domain with an infinite host of objects and operators. As such it lends itself to endless possibility; new formulations will likely be found forever. But science, ever assiduous, seeks only those solutions bringing us closer to the 'final' theories, and when theoretical correspondence with natural law is lost any intended intellectual convergence with reality has digressed. I submit that gravity research directed toward a grand "unified field theory" is just such a digression; for if quanta and field are complementary counterparts of a dynamic *duality* then 'unification' efforts are mistaken.

To paraphrase Einstein/Infeld: "physics follows 'meta'physics".



The 'Pit' and the Pendulum

"A society which is uninterested in metaphysics will have no theoretical science." Mary Hesse (2a)

First off, I know I don't belong here; this forum is for theoretical physicists exploring frontier mathematics, peer reviewed academics – I am neither. I also know how informal papers of a 'meta'physical nature are generally received in this community. Therefore, this essay is imported with an ideal: once presented, ideas are released to wend their way in the world as free agents, equal contenders as it were, for a place among their fittest peers.

Imagine the swing of a giant pendulum, that grand sweeping arc through space – determined, continuous. With each accelerated pass is visibly marked the measure of a vanishing moment of time – *this* moment. Is it any wonder such a 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 precisely over the earth's "center-of-gravity".

Though more than 6000 kilometers away, remarkably, no sensitive instruments are required to locate the earth's gravitational origin – its "centroid". In fact, with perfect precision, any dumb plumb bob will forever point the way. So for thousands of years we've known for certain where the local source of gravity resides, and for centuries have calculated precisely what it does, but as to understanding what it actually *is*, most of the most informed, even to this day, confess uncertainty.

Consider the cord of our pendulum, a 'geometric vector' drawn taut to the center of the earth, not only invisibly drawn but endlessly extensible, its magnitude vanishing by the square of distance, forever vanishing but *never* vanishing entirely. And consider the nature of the 'geometric origin', the "center-of-mass" tensing the cord, for in the case that the pendulum bob is a hollow sphere this 'mass' is resident in *empty* space. Now imagine following our invisible vector all the way to the earth's core only to find the center-of-gravity has vanished there as well – the plumb bob now points toward the sun! Centers of gravity appear to be nothing more than mass proxies, stand-ins for the next nearest larger mass. In fact, all centroids are vanishing proxy in a magnitude hierarchy of mass attraction – atoms, elements, pendulums, planets, stars, galaxies, and then...? What's behind it all? What's at the 'pit' of the pendulum and what makes it swing?

Much of science has been directed to answering these questions, that's why the GRF forum exists, and anyone familiar with this quest recognizes that mass and space – something and nothing – have been at odds with one another the entire way. Isaac Newton was critical of how the prevailing natural philosophy of his time simply positioned objects in space relative to one another independent of any comprehensive context; ethereal "vortices" around celestial bodies were causing them to "gravitate" toward one another^(3a). He postulated instead the absolutes of an "immovable space" and the "flow of time"⁽⁴⁾ within which corporeal bodies were attracted to one another via a constant causal force. Gravitation was thus most

likely a 'property' of matter, but then again, of a nature unknown^(3b). His critics accused him of resorting to the "occult" in order to explain his invisible *instantaneous* "action-at-a-distance" across the vacua of empty space⁽⁵⁾.

The nature of gravitation made more sense in light of James Maxwell's theory of electrodynamics. His electromagnetic "field" was a dynamic global potential similar to gravity – causal yet invisible – and it wasn't long before Albert Einstein found that by adapting Maxwell's field to the effects of gravitation several observed discrepancies with Newton's theory could be explained. But what about instantaneity? Well, in Maxwell's equations light radiated at an invariant absolute velocity(c), and Einstein had earlier found the only way this could be the case for all observers was if variance was reintroduced into the equations of motion by making the coordinates of time and space subject to velocity. But then, as accelerations approached the speed of light, these values tended to infinity becoming "imaginary"^(6a). When these "transform" equations 'go singular at c ' a "null spacetime interval" suddenly separates all relative events indicating that locality has been lost and a state of absolute *simultaneity* prevails^{(7)(8a)(9)}. Because Einstein's proposed gravity waves spherically propagated at c ^(14a) the gravitational field must be instantaneous as well!

Whereas Newton's theory of gravity was derived from classical Euclidian geometry, Einstein's "Gaussian" field model was a geodesic stretch: the 4-D complex tensor-curvature of an energy-conformal "spacetime" continuum. Gravity wasn't a 'property' of matter, it was contextual – the shape of the universe itself, and soon the cosmological implications of general relativity began to shape the theoretical physics. Having no evidence that the universe as a whole was either 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.

Later, as astronomy extended and improved, cosmologists began finding evidence that the universe was indeed expanding apparently due to an intergalactic "dark energy", in effect a cosmological constant, but still of an unknown nature. Around stellar clusters observations began to implicate an invisible halo of gravitating "dark matter", and at the inner-extreme, galactic measurements pointed to a massive vanishing "black hole singularity" at the centroid of every galaxy – both of natures unknown! Why does the source of everything gravitational always appear to be a virtual *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 ^(10a)

I wish to submit that gravitational science implicates but cannot fathom its 'nature unknown' because there really is *nothing* there! Quantum mechanics and general relativity – matter and spacetime – are at theoretical odds with one another because in reality they are in requisite opposition. Radiant energy and its empty reciprocal counterpart are a dynamic duality on the grandest of scales and their elemental differential is the primal impetus driving the evolution of the universe. They form the essential Universal symmetry:

...the negative gravitational energy exactly cancels out the positive energy represented by matter, so the total energy of the universe is zero."

Stephen Hawking (11a)

If the subject energies of the quantum and gravity-field theories are thus absolutely inverse, then unification is not only mistaken, but one would hope, for the sake of mathematical empiricism – impossible. Matter presents as local and discontinuous – gravity as continuous_(2c) and global₍₁₂₎. Matter is the 'nature unknown' in gravity theories: Newton's centers-of-mass were infinitesimal "mathematical points"_(3c); Einstein's energy-densities were "field singularities"₍₁₃₎. Quantum 'particles' are uncertain "probability-wave amplitudes". The spacetime field, on the other hand, is a geometric *structure*_(14b), flexible but deterministic, and infinite: adjacent to and between any two "world points" another exists... ad infinitum. The endless systemic infinities generated by this cardinal incompatibility has sent physics spinning off into evermore abstract, remedial, "n-dimensional string" unification schemes. What is required, so quanta and gravity can theoretically co-exist as covariant reciprocal *counterparts*, is a *non-geometric* space-time correlate – continuous but *indeterminate*, and thus compatible with the probabilistic formulations_(14c) of an emergent Universe.

There exists a candidate field analogue that is already well integrated into theoretical physics – that of a "scalar vacuum potential"₍₁₅₎₍₁₆₎. Consider a cosmic-scale, 'negative' vacuum plenum, inversely conformal to energy density. This dynamic manifold must assume a *temporal* identity because the only defining reciprocity in the Einstein field is that distinguishing the local 3-D spatial (corporeal) from the complex 4-D (temporal) coordinates. "Imaginary time", as such, is a global entity_(11b) with axiomatic import: while the relativistic transform equations go singular at the speed of light and the spatial values vanish, imaginary Time remains *continuous*₍₁₇₎. In the final analysis, Time is the eternal dimensional absolute, and "space" a vanished conceptual utility having no fundamental cosmic correspondence; Einstein had rejected the idea of an actual physical space preferring the notion of "corporeal extension"_(6b,c). Most notably, the dynamic action principle of a continuous, scalar, "temporal vacuum potential" would be non-local, and therefore – instantaneous.

Radiating 'into' this eternally extant temporal dimension is the evanescent Present, a globally expanding energy wavefront – a "Universal wavefunction". All that exists before and behind this emergent moment is an eternal temporal void, for without *vacancy*, there would be no expansion. The radiant "now" is the genesis engine, a Universal reality-projector omni-oscillating some sixteen orders of magnitude within, and because this energy projection is an electromagnetic propagation_(10b) it purports simultaneity at c ₍₁₈₎ meaning the radiant Universe is *omnipresent*:

"Eternally and always there is only now, one and the same now;
the present is the only thing that has no end." Erwin Schrodinger (19)

In this proposal the causal effect of the temporal "future", by which the radiant Present is vacuum advanced, is that of a *divergent* "cosmological constant" because from the 'field-of-view' of Time-future the Universal wavefunction presents only a global "superposition" – undifferentiated energy *potential*.

The action of the temporal "past", by which the Present is vacuum tensioned, is that of a *convergent* "gravitational constant" because from the 'field-of-view' of Time-past particulate matter has locally materialized and conserved in the inertial history of every differentiating mass is their common singular Origin. These seemingly converse manifolds of past and future, however, are actually the same temporal continuum – a single dynamic vacancy moving matter... meaning that the 'nature unknown' that makes the pendulum swing is *Time!*

Reasoning back by way of the Einstein field curvature, because the radiant cosmic expansion has been shaping conformal spacetime ever since its singular Origin, a common evolute is conserved at the locus of every gravitational geodesic. In terms of vacuum potential this evolute is the Original "black hole" Singularity at the 'bottom' of the temporal vacuum plenum. Either way, every centroid is a proximity proxy for every other because in a continua of the 4th dimension they're all the *same* 'point'!_(8b) No wonder the theoretical action attribute of gravitation has always been instantaneous.

If this *Temporal Continuum Hypothesis* is correct the gravitational constant(G) of Time-Past and the cosmological constant(C) of Time-Future are resultants of the same temporal vacuum potential. The value for G and the approximation of C (the expansion rate of the universe, i.e., the accelerations produced by 'dark energy'₍₂₀₎) are appearing to be within an order of magnitude of one another. The requisite proof would show that if the causality of C were mathematically transposed – from being global-mass divergent to being point-mass convergent – it would indeed be *identical* to G.

Additionally, the Pioneer spacecraft "anomaly" is nearly equivalent to the value of C ₍₂₁₎. Consider that the effect gradient of a cosmologic Future vacuum potential would first and only appear regionally in a solar-*radial* velocity measurement. It would have gone undetected in previous solar system observations because, in a "Machian" sense, it's an indistinguishable component of orbital angular momentum. Because this Future resultant expansively scales, however, it has a vast observable effect on the rotation of galaxies and their aggregate interaction.

Lastly, this proposal lends intelligibility to the concepts of entropy, the "arrow of time", and cosmic destiny. For if the total 'positive' energy and the 'negative' vacuum potential(C+G) are inversely and symmetrically conserving then an inflating Universe with a singular Origin radiates into an ever 'deflating' temporal potential. Thus, in this "deSitter universe" scenario, as they encounter ever 'less' Time, cosmic spectra exhibit retarding frequencies and redshifting wavelengths relative to time distant₍₂₂₎. This means rather than space expanding ever faster, the complementary inverse is being evidenced: the radiant Universe is slowly running out of Time.

"... 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 ₍₂₃₎

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