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The Cosmological Constant Problem as Transitioning Multi-Space

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Abstract

Resolution of the Cosmological Constant Λ must maintain the mathematics of wavefunction, as well as Einsteins field equations. However, a fundamental break from convention is justified, in order to cancel the mathematical discrepancy that exists between the vacuum energy density in General Relativity (GR) and the much greater zero-point energy value, as calculated in quantum field theory (QFT).

This article does maintain conventional models. The paradigm shift is from the conventional idea of a constant $\mathbb{R}^4$ spacetime at every scale (from microspace to macrospace). Instead, proposing that dimensions approaching quantum scales increase to a higher dimensional $\mathbb{R}^5$ space, and that dimensions approaching the cosmic event horizon decrease to a lower dimensional $\mathbb{R}^3$ space ($\mathbb{R}^4$ spacetime is just one phase of this transitioning multispace). This is only suppositional, yet it explains so many mysteries of cosmology in the simplest and most parsimonious format (in fact in one single sentence). In wavefunction, superposition can be alternatively interpreted as a transition (or divergence) of $\mathbb{R}^n$, as observed from a $\mathbb{R}^4$ spacetime onto a higher dimensional $\mathbb{R}^5$ space at scales approaching QFT. Time, position, energy and momentum become plural, and a **range** of $\mathbb{R}^5$ space is viewed as a single instant until "collapsed" (mapped) onto our familiar classic $\mathbb{R}^4$ space. In GR, $\mathbb{R}^4$ spacetime transitions (or converges) to a point at the cosmic event horizon, to a diminished $\mathbb{R}^3$ space. This converging affect appears equivalent to acceleration, as units of time in velocity are decreasing with larger scales. Thus, Λ in GR is only illusional and therefore cancelled.

1. INTRODUCTION

A transtioning multi-space, from quantum scale to the cosmic event horizon, is suppositional. However as diminishing degrees of freedom (d.o.f.) and increasing entropy become propagated within the higgs field, it seems reasonable to consider that parameters of information are correspondingly diminished within transitioning $\mathbb{R}^n$ vector fields. These effects can be modeled as partial mapping with consideration to reduced parameters in the image range, as compared with the codomain.

$$F : \mathbb{R}^n \to /\mathbb{R}^{n-1}$$

In section 5, I describe the mechanism which delineates between each phase of $\mathbb{R}^n$ space as "Parametric Validation Reinforcement Loops" (PVRL). An iterated process of conscious binary gnomonic mapping of higher dimensional topology onto biased eigenstates. (and subsequent propagation within the higgs field). At each iteration, symmetry becomes more broken, and geometric parameters become more constrained.

2. TRANSITIONING MULTISPACE, FROM QFT TO GR

This theory propose that scales approaching QFT increase to a higher dimensional $\mathbb{R}^5$ space, and that scales approaching the cosmic event horizon decrease to a lower dimensional $\mathbb{R}^3$ space ($\mathbb{R}^4$ spacetime is just one phase of this transitioning multispace).

In the wavefunction, superposition can be alternatively interpreted as a dimensional divergence of $\mathbb{R}^n$, as viewed from a $\mathbb{R}^4$ space to a $\mathbb{R}^5$ space. In GR, $\mathbb{R}^4$ spacetime is decreasing (or converging) to a point at the cosmic event horizon (at a diminished $\mathbb{R}^3$ space). See figure 1

Thus, Scale magnitude is inversely proportionate to dimensionality:

$$||x||_2 \propto \mathbb{R}^{-n} \tag{1}$$

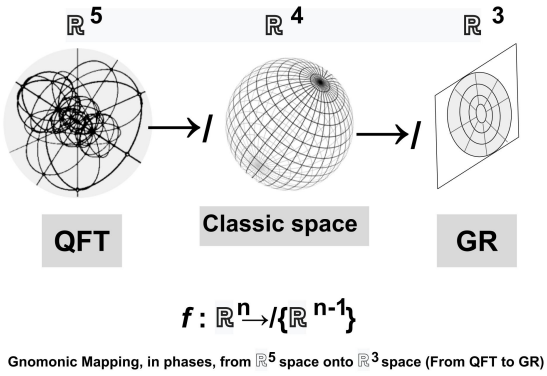

FIG. 1: Gnomonic Mapping, in phases, from QFT (at $\mathbb{R}^5$ space) onto GR (at $\mathbb{R}^3$ space), with classic$\mathbb{R}^4$ spacetime intermediately

3. WAVEFUNCTION IN HIGHER DIMENSIONS

A wave function in higher dimensions is proposed, as an alternative to Superposition. Observations from $\mathbb{R}^4$ spacetime to quantum scales in $\mathbb{R}^5$ hyperspace would appear as a **range** of energy, momentum, position and time. A divergence in the time dimension $div\, t$ can be expressed as:

$$div\, t = \frac{\partial t_1}{\partial x_1} + \frac{\partial t_2}{\partial x_2} + \dots \frac{\partial t_n}{\partial x_n} \tag{2}$$

Particles in multiple time and positions would be observed simultaneously such that: A range of position and time would appear as a dense mass in a single moment (Like an orbital), similar to observing a time lapsed photographed image.

Imagine a $\mathbb{R}^2$ disk observing an $\mathbb{R}^3$ sphere: An $\mathbb{R}^3$ curve is of x, y, z coordinates. However when this $\mathbb{R}^3$ geometry becomes gnomically projected / mapped onto the disk, it collapses to an $\mathbb{R}^2$ parametric reduced curve of x, y coordinates.

To view $\mathbb{R}^n$ divergence in the time dimension is to view the past, present and future in a single instant (along with it's associated positions, energies, and plural momentum) appearing as a semi dense solid. So, a projectile will be viewed as an arc. By extension, an orbit will appear as a circle.

Note that this theory correctly predicts that orbital scattering to be more dense toward the center, as the orbit paths are more frequent, which increases the probability density function. (PDF).

By further extension, consider observations from $\mathbb{R}^5$ geometry of x_1, x_2, x_3, x_4, x_5 collapsed (Gnomically mapped) onto $\mathbb{R}4$ geometry of x_1, x_2, x_3, x_4: An $\mathbb{R}^5$ projectile might appear as a partial torus, and so $\mathbb{R}^5$ Ψ_0 might appear as an s-orbit (With density increasing toward the center). See figure 2

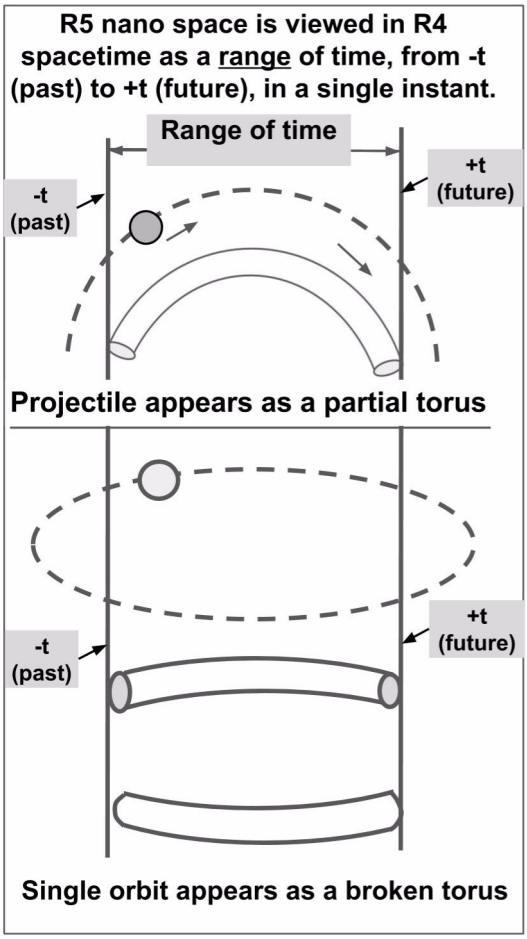

FIG. 2: $\mathbb{R}^5$ nano space is viewed in $\mathbb{R}^4$ spacetime, as a range of time from -t (past) to +t (future), in a single instant.

$\mathbb{R}^n$ Time divergence in QFT challenges the particle mass in DeBroglie's λ by substituting a unit of length, such as r_e (electron radius) or r_0 (atomic radius), instead of mass:

Hydrogen atom wave function in summation form:

$$\Psi_{\vec{k}(\vec{r})} = e^{i\vec{k}\cdot\vec{r}} \tag{3}$$

Using $p = \hbar k$ for momentum, the dominate wave function $Psi_{\vec{k_0}}$ includes wave vector $\vec{k_0}$:

$$k_0 = \frac{2\pi}{\lambda_0} \tag{4}$$

This use of scale, instead of mass, for λ resolves the following with greater parsimony:

- The use of scale, in massless photons
- Electron decay, by understanding electron shells as $\mathbb{R}^5$ topology mapped onto $\mathbb{R}^4$ spacetime
- Quantum "time travel" interaction with past and future, as divergence in the time dimension (viewed from $\mathbb{R}^4$ to $\mathbb{R}^5$.
- Backward causation.
- Gaps between orbitals.

See figure: 3

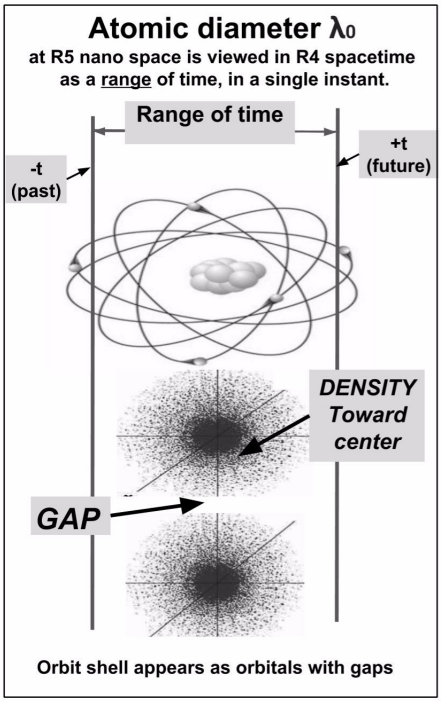

FIG. 3: Atomic diameter viewed in time divergence

Resolution to The Cosmological Constant Problem in QFT

In equation 1, scale (from QFT to GR) is shown with a corresponding inverse dimensionality:

$$||x||_2 \propto \mathbb{R}^{-n}$$

Similarly, in equation 4, atomic or particle radius is used in λ instead of mass. Thus, λ is inversely proportionate to scale:

$$\lambda \propto r^{-e}$$

Thus, Λ is also inversely proportionate to scale; Measuring with increasing values (range), as volume decreases.

To reiterate, a transition from $\mathbb{R}^4$ to $\mathbb{R}^5$ space, at quantum scales is proposed. Thus, A range of time, energy, position and momentum are viewed in a single instant (Alternative to superposition)

If this supposition that quantum scales exist in higher dimensions than the observer is correct, then a **range of energy, time, momentum, time and position are observed and measured (at $\mathbb{R}^5$), as a single event (from $\mathbb{R}^4$) to the observer's perspective. Thus, the total energy in a volume of empty space is significantly less than the sum of it's measured units of energy!** This is due to overlapping of units (range) represented in each measurement (Each measurement is a sum of multiple time and positions, viewed in a single flash, in higher dimensional space) (See figure 4 left).

Since the measurements of energy e in each unit represents a sum of n units, the total energy E_0 is equal to the sum of individual volume measurements divided by n:

$$E_0 = \frac{1}{n} \sum_{i=1} e_i \tag{5}$$

A test to demonstrate this "E_0 range theory" would be to construct multiple points of virtual photons, using two disks with spiral grooves, aligned in opposite amplitudes, (space at at min nanometers) to function as Casimir plates. Validation would be the result of energy e_n that is greater than the mean of it's local neighbors within x range on nanospace:

$$S' = \{[e_{n-x}, \dots e_{n+x}]\}, \tag{6}$$

$$x = range\ of\ local\ vacuum\ states\ (undetermined) \tag{7}$$

$$e_n > \overline{S'} \tag{8}$$

See figure 4(right)