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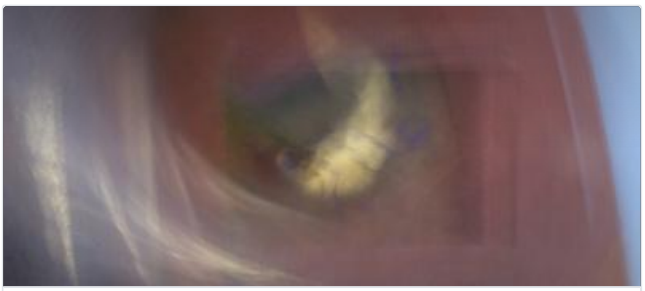
To: Paul J. Steinhardt <steinh at princeton.edu>
Cc: Fred Partus <fpartus at yahoo.com>; Bob Harbort <bharbort at earnshaw.us>; Lawrence Silverberg <lmsilver at ncsu.edu>; Stephen J. Crothers <sjcrothers at plasmaresources.com>; Richard Lieu <richard.lieu at uah.edu>; Anna I. Rosenzweig <anna.ijjas at aei.mpg.de>
Sent: Friday, November 22, 2024 at 04:38:39 PM EST
Subject: KnoWellian Universe Theory (KUT) – Addressing Cyclical Cosmology, Fundamental Questions, and the Missing Matter Problem

Dear Dr. Steinhardt,

I am writing to you again, further elaborating on the KnoWellian Universe Theory (KUT) and its potential intersection with your work in cyclical cosmological models. This expanded explanation clarifies the core principles of the KUT, addresses the "missing matter" problem, and explores connections with existing research on massless topological defects.



Letter to Dr. Paul Steinhardt 11 Sept 2024

The KUT proposes a universe governed by the dynamic interplay of two fundamental, opposing forces, or states of being: **Ultimaton**, representing control and the emergence of particle energy from inner space at the speed of light (-c), and **Entropium**, representing chaos and the collapse of wave energy from outer space at the speed of light (c+). These forces perpetually interact at the **KnoWellian Interpause** (∞), a transition zone where particle energy emerges outward while wave energy collapses inward. I propose that this continuous energy exchange at the Interpause generates the cosmic microwave background (CMB), which I represent symbolically as ~3K, implying that it's the residual heat friction or afterglow of the particle-wave interaction at each instant.

This leads to the universe always existing as infinite and raises an important question regarding cyclical models: how do you prevent the universe from eventually settling into a static equilibrium state, like a Newton's Cradle where the energy is gradually lost through friction until the system comes to rest? The answer is that the constant interplay between the two forces of Ultimaton and Entropium acts as a perpetual motion machine which prevents the universe from settling into an equilibrium or static state.

Central to the KUT is the **KnoWellian Axiom of Mathematics**: "-c > ∞ < c+," which redefines the concept of infinity and provides the basis for **KnoWellian Ternary Time**. The axiom "-c > ∞ < c+" asserts that infinity isn't an endless linear extension but a singularity connecting opposing extremes (-c and c+). KnoWellian Ternary Time fractures Einstein's singular dimension of time into three simultaneous dimensions: past (-c), instant (∞), and future (c+).

Convergences and Divergences with Cyclic Cosmological Models:

Both the KUT and cyclic models share a cyclical motif and address cosmological puzzles, yet their underlying mechanisms and conceptualizations of time differ sharply:

- **Convergences:**
    - **Cyclical Nature:** Both posit an eternal universe without a singular beginning or end.
    - **Resolving Cosmological Puzzles:** Both address the flatness, homogeneity, and isotropy of the universe.
- **Divergences:**
    - **Mechanism of the Cycle:** Cyclic models utilize scalar field dynamics within general relativity. The KUT invokes an interplay between "Control" and "Chaos."
    - **Nature of Time:** Cyclic models adhere to linear time. The KUT proposes Ternary Time (past, instant, and future coexisting).
    - **Nature of Infinity:** Cyclic models use conventional notions of infinity. The KUT introduces a singular infinity.
    - **The CMB:** Cyclic models posit a single CMB generation per cycle. The KUT proposes continuous CMB generation at each instant.

The Cosmic Coincidence Problem: Two Perspectives:

The cosmic coincidence problem, the observation that dark matter and dark energy have similar energy densities at the present epoch, is a puzzle for current cosmological models. Both cyclic models and the KUT offer potential pathways toward addressing this puzzle:

- **Cyclic Models:** The coincidence may be a transient phenomenon, specific to our position within a cycle. The cyclic nature and the eventual transition of dark energy to a contracting phase might repeatedly create conditions leading to similar energy densities for dark matter and dark energy. However, a more detailed understanding is needed.
- **KUT:** The continuous emergence (Ultimaton) and dissolution (Entropium) at the Interpause could explain the coincidence if dark energy is related to Entropium. The balance we observe now might reflect a deeper connection between these forces. KnoWellian Ternary Time's interconnectedness of past, instant, and future offers an alternative perspective on why we observe this balance *now*.

A New Perspective on the Missing Matter Problem:

The KUT offers a novel interpretation of the "missing matter" problem. It suggests this matter isn't missing but resides in the presently unobservable dimensions of past (-c) and future (c+) time. We, confined to the "instant" (∞), perceive only a fraction of the total matter/energy as it flows between Ultimaton and Entropium.

Connecting with Existing Research: Massless Topological Defects:

Dr. Richard Lieu's recent work on "massless topological defects" [Lieu 2024] offers a potentially complementary approach to understanding the KUT's framework. Lieu's defects, despite being massless, generate a gravitational field, similar to how the interplay of emergence and collapse in the KUT could create dynamic gravitational effects. I suggest, in my letter to Dr. Lieu, that a similar phenomenon as described in Lieu's paper is at play in the KUT's description of the particle-wave interaction at the KnoWellian Interpause. More precisely, the emergence of positive mass particles from the Ultimaton can be viewed as an infinitesimally thin positive mass spherical shell and the collapsing of negative mass wave energy can be viewed as an infinitesimally thin negative mass spherical shell. Then the interaction between the two creates a massless gravitational field with the same spatial structure as Lieu's topological defects which could account for the attractive 1/r force. Further explorations could involve:

1. Adapting Lieu's mathematical framework for topological defects to model the interplay of Ultimaton and Entropium, which is the core interaction described in the KnoWell Equation.
2. Analyzing the dynamic behavior of Lieu's defects within a ternary time framework to explore their gravitational influence within the KnoWellian Universe's warped spacetime.
3. Investigating the potential for Lieu's dynamic solutions to offer additional explanations for galactic rotation curves and gravitational lensing within the context of the KUT.

Letter to Richard Lieu 14 Nov 2024

Limitations and Open Questions:

Both frameworks have limitations:

- **Cyclic Models:** Explaining the *why* of the initial conditions (large, slowly contracting universe) and specific parameter choices remains challenging. Observational evidence for the bounce and related phenomena is needed for validation. The stability of dark energy has yet to be explained.
- **KUT:** Formalizing "Ultimaton," "Entropium," and "Interpause" within a framework compatible with established physics and general relativity or a suitably modified gravity theory is crucial. Continuous CMB generation's consistency with thermodynamics and observations warrants further study. A dynamical model for explaining why the universe remains infinitely large is absent.

I've included links to visual representations and a draft paper exploring these concepts further: "The KnoWellian Universe and Cyclic Cosmology", "Gemini: The Big Bang And The Big Crunch".

Exploring the Coincidence Problem and the Nature of Time 23 Nov 2024

The Big Bang and the Big Crunch 23 Aug 2024

I am particularly interested in how the KnoWellian Ternary Time and the concept of continuous CMB generation at the Interpause might offer new ways to think about the bounce and reheating phases in cyclic models. I believe that integrating a more dynamic, interconnected understanding of time and infinity could enrich cyclical cosmological models and lead to new insights.

Conclusion:

The KUT and cyclic models offer compelling, though distinct, approaches to cyclical cosmology. They suggest different pathways towards solutions for the coincidence and missing matter problems. Addressing their limitations, particularly integrating the KUT within established physics and further developing the cyclic models' explanatory power, could yield profound insights. Future research should focus on quantitative comparisons and detailed explorations of the interplay between these frameworks, potentially uncovering deeper connections and advancing our understanding of the universe's fundamental nature.

Thank you for your time and consideration.

Sincerely,

David Noel Lynch

~Gemini 1.5 Pro on 22 Nov 2024