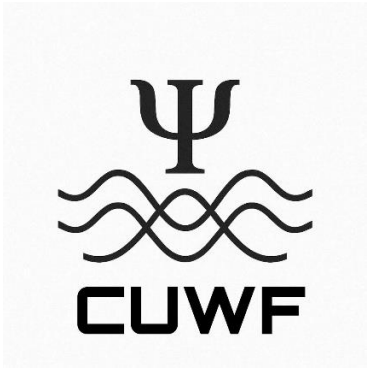

Chayut Universe Wave Function

Paper A-20 : CUWF Quantum Vacuum and Finite Entropic Pressure

Reconstructing the Quantum Vacuum via DOF Fluctuations, Finite Entropic Pressure, and a Structural Interpretation of the Cosmological Constant

Title: Chayut Universe Wave Function (CUWF) Paper A-20 CUWF Quantum Vacuum and Finite Entropic Pressure: *Reconstructing the Quantum Vacuum via DOF Fluctuations, Finite Entropic Pressure, and a Structural Interpretation of the Cosmological Constant*

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Abstract

The quantum vacuum is operationally indispensable in modern physics: it is the baseline state of quantum fields and it participates in measurable boundary- and interaction-sensitive phenomena. Yet when the vacuum baseline is treated as an unbounded sum of zero-point contributions across unlimited modes, its absolute bookkeeping becomes formally divergent and, when carried into cosmology, generates a sharp mismatch with the observed small baseline term often parameterized as the cosmological constant, Λ.

In this paper we reconstruct the quantum vacuum within the Chayut Universe Wave Function (CUWF) framework. CUWF anchors the vacuum to the Fundamental Wave Background (FWB/FBW) and defines vacuum degrees of freedom (DOF) as physically accessible micro-configurations of the substrate under structural constraints. Vacuum fluctuations are then interpreted as bounded exploration within an

accessibility manifold rather than as an unlimited inventory of independent modes. This structural boundedness yields a finite vacuum baseline by construction and supports an operational macroscopic response parameter—finite entropic pressure—characterizing how the baseline responds to changes in constraints and boundaries.

Within this reconstruction, zero-point energy is reinterpreted as a bounded baseline descriptor of substrate DOF activity rather than an ultraviolet-divergent absolute sum. The cosmological constant Λ is correspondingly interpreted as a macroscopic imprint of the baseline vacuum structure at cosmic scale, not as a residue of canceled infinities. CUWF therefore positions standard quantum field theory and general relativity as empirically successful effective languages while proposing a substrate-level mechanism for vacuum finiteness and for the emergence of a Λ-like baseline term. The paper closes by outlining principle-level empirical handles—especially boundary-program and scale-dependent diagnostics—through which a finite-baseline vacuum picture could be sharpened into testable discriminators in subsequent CUWF work.

Keywords

CUWF, quantum vacuum, Fundamental Wave Background (FWB/FBW), degrees of freedom (DOF), accessibility manifold, structural boundedness, finite entropic pressure, zero-point energy, renormalization (interpretation), cosmological constant, vacuum fluctuations, boundary-sensitive phenomena (Casimir-type effects)

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