



# 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,  $\Lambda$ .

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

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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  $\Lambda$  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  $\Lambda$ -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)

## Table of Contents

1. Introduction
  2. Motivation and the Problem Statement
  3. Clarifying Terms: Vacuum vs Quantum Vacuum vs CUWF Vacuum
  4. The Substrate — Fundamental Background Wave (FBW/FWB) and the Origin of Vacuum DOF
  5. CUWF Postulates for the Vacuum (Minimal Axioms)
  6. DOF Fluctuations: Mechanism and Formal Representation
  7. Finite Entropic Pressure: Definition and Derivation Path
  8. Zero-Point Energy: Reinterpretation Without Divergence
  9. Cosmological Constant ( $\Lambda$ ): A Structural Interpretation in CUWF
  10. Internal Consistency Checks
  11. Comparison to Standard Views (Positioning Section)
  12. Empirical Handles and Distinguishers (What Could Differ)
  13. Common Confusions & FAQ (Pre-empting Misreadings)
  14. Conclusion
- References
- Appendix A: Minimal Mathematical Skeleton
- Appendix B: Dimensional / Units Sanity Checks
- Appendix C: Glossary