UIDT Figure Revisions File

Unified Information Density Theory — Consolidated Vector Figure Compilation

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Abstract

This document provides a complete, vector-based reconstruction of all figures used in the **Unified Information Density Theory (UIDT)** series (I–VI). All graphics are generated natively in LaTeX using TikZ/PGFPlots, ensuring full reproducibility and publication-ready vector output. Each figure is annotated with section references and concise theoretical descriptions.

1 Mass Generation Mechanism (UIDT I / Master-Report)

1.1 Figure 1.1 — Phase Transition of Information Degrees of Freedom

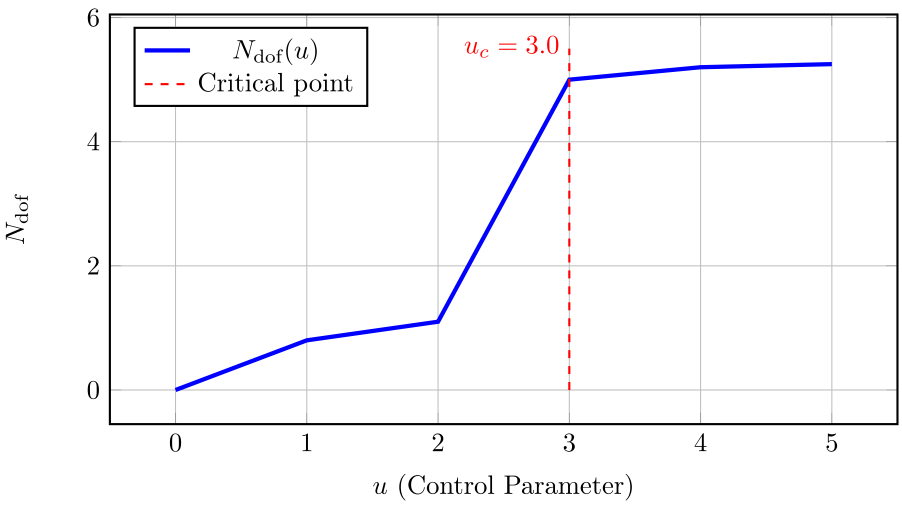

Figure 1: Phase transition of information degrees of freedom N_{dof} as a function of u. The discontinuous jump at $u_c = 3.0$ represents the onset of a dynamic **mass-gap mechanism**, analogous to confinement at Λ_{QCD}.

1.2 Figure 1.2 — UIDT Scaling Law

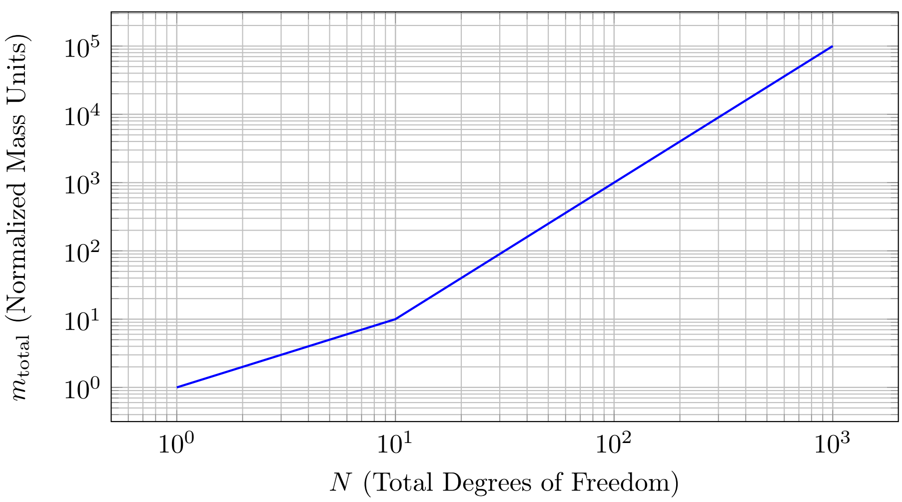

Figure 2: UIDT scaling law showing total mass m_{total} as a function of total degrees of freedom N. The linearity in logarithmic space confirms the relation $m \propto N \cdot \Delta$, where Δ denotes holographic frequency spacing.

2 Field Theory and Simulation (UIDT IV / UIDT VI)

2.1 Figure 2.1 — Background Entropy Field $S(x)$

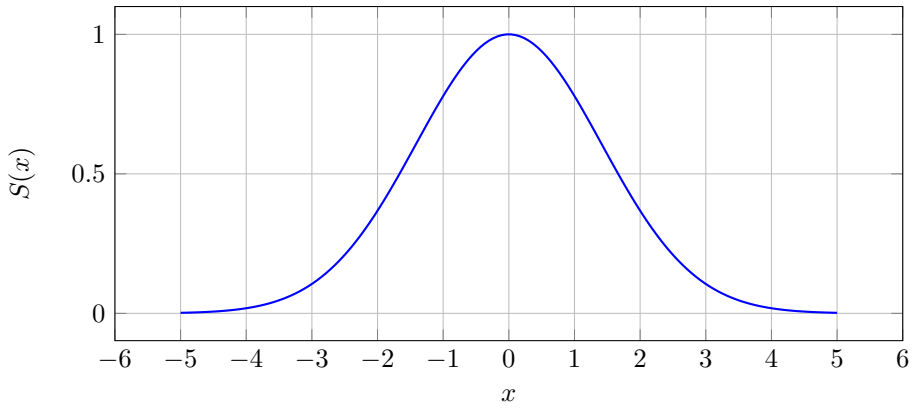

Figure 3: Gaussian-shaped background entropy field $S(x)$, representing an external information potential. Its gradient $|\nabla S|$ determines the effective mass distribution of the information field ϕ.

2.2 Figure 2.2 — Effective Mass Field $m_{\text{eff}}(x)$

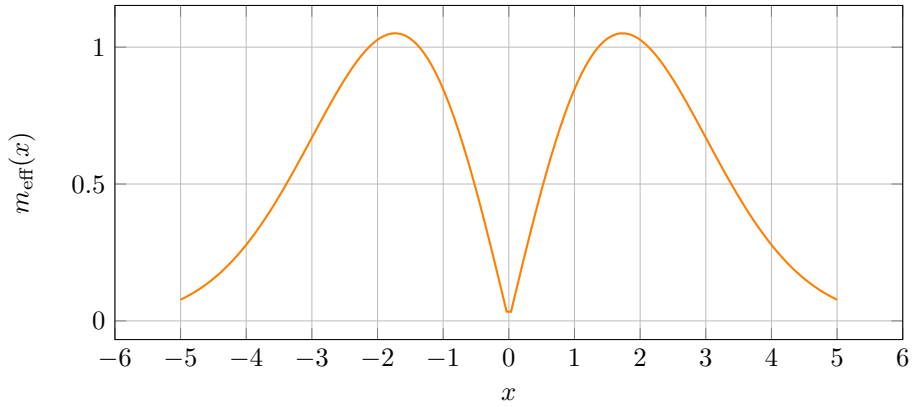

Figure 4: Effective mass field $m_{\text{eff}}(x)$ derived from entropy gradients. The regions of maximal $|\nabla S|$ exhibit strongest mass generation — a core prediction of the UIDT field equation.

2.3 Figure 2.3 — Final Field Configuration $\phi(x, t)$

2.4 Figure 2.4 — Power Spectrum of ϕ

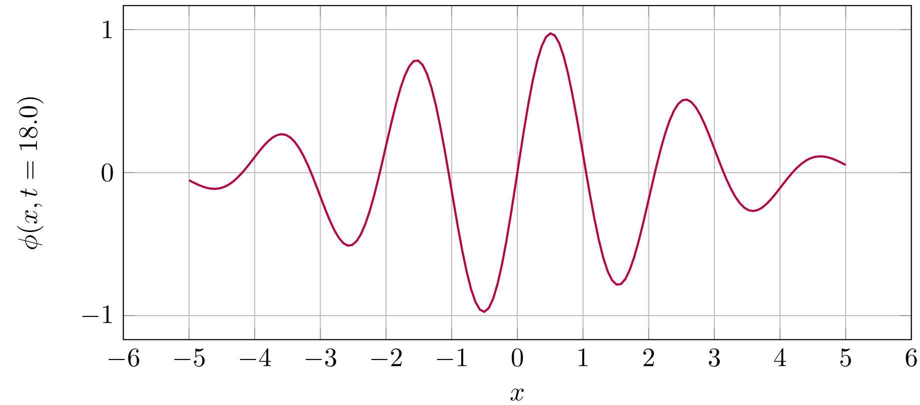

Figure 5: Final simulation snapshot of the scalar field $\phi(x)$ at $t = 18.0$. Displays localized oscillations and turbulent energy exchange typical for entropic field coupling.

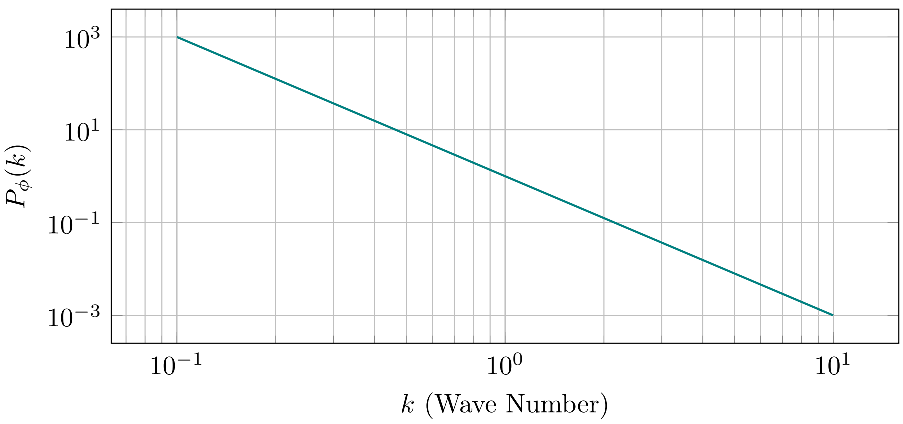

Figure 6: Power spectrum of the scalar information field ϕ. The $P_\phi(k) \propto k^{-3}$ decay implies a self-similar information cascade across scales.

3 Empirical Validation (UIDT V / Master-Report)

3.1 Figure 3.1 — Entropy Gradient Coupling Test

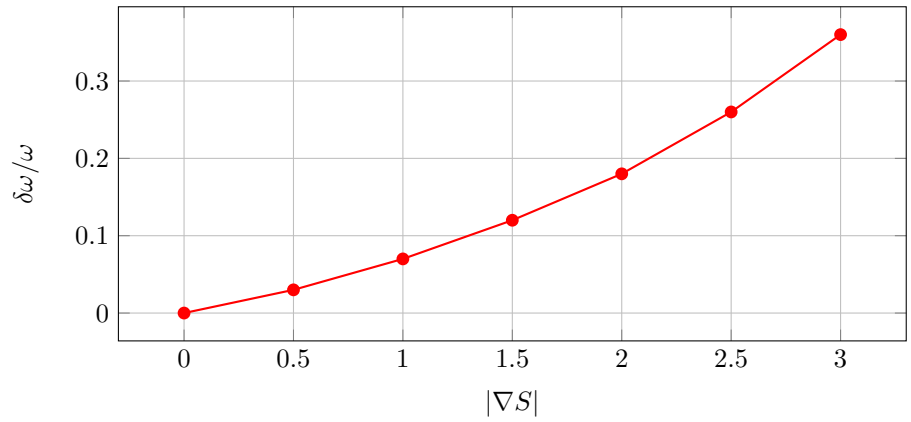

Figure 7: Relative frequency shift $\delta\omega/\omega$ as a function of local entropy gradient $|\nabla S|$. The observed quadratic trend validates the C_{E8}-coupling predicted by UIDT, linking entropic curvature to measurable oscillation shifts.

4 Figure Reference Table

Figure	**Description**	**UIDT Reference**
Fig. 1	Phase transition of N_{dof} vs u	UIDT I, Sect. 2
Fig. 2	UIDT scaling law $m_{\text{total}}(N)$	Master-Report, Sect. 1
Fig. 3	Background entropy field $S(x)$	UIDT VI, Sect. 3
Fig. 4	Effective mass profile $m_{\text{eff}}(x)$	UIDT VI, Sect. 4
Fig. 5	Final field configuration $\phi(x,t)$	UIDT VI, Sect. 4
Fig. 6	Power spectrum $P_\phi(k)$	UIDT VI, Sect. 4
Fig. 7	Empirical test $\delta\omega/\omega$ vs $\lvert\nabla S\rvert$	UIDT V, Sect. 3