Priority P6 – Dark Energy as Vacuum Tension of the Θ Field

Hypothesis

In the framework of the Unified Biquaternion Theory (UBT), we postulate that the observed cosmological constant Λ—typically associated with dark energy—is not a mysterious external parameter, but emerges naturally from the intrinsic vacuum energy density of the fundamental field $\Theta(q, \tau)$.

Key claim: Even in the absence of excitations, the Θ field has a non-zero vacuum stress-energy tensor component:

$$T_{\mu\nu}^{(\text{vac})} = -\rho_{\text{vac}} g_{\mu\nu}$$

This implies a contribution to the Einstein field equations in the form:

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = 8\pi G T_{\mu\nu} \quad \Rightarrow \quad \Lambda = 8\pi G \rho_{\text{vac}}$$

Unlike in standard quantum field theory (QFT), where the predicted vacuum energy overshoots by 120 orders of magnitude, here ρ_{vac} is not a sum over zero-point fluctuations, but a geometric property of the Θ field itself.

Implication: This resolves the cosmological constant problem by shifting the interpretation from a particle-physics origin to a topological and geometric origin inherent in the UBT framework.