Affine Quantum Deformation and the Geometry of Awareness

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Abstract

The averaged affine structure of a quantum spacetime differs intrinsically from the connection induced by the averaged metric. This discrepancy defines the Quantum Affine Shift Tensor $\mathcal{A}$ and generates geometric corrections to curvature, geodesics, and focusing. Meanwhile, semantic systems evolving under uncertainty experience analogous deformations, captured in RSVP by the fields $(\Phi, \mathbf{v}, S)$. Awareness is shown to be equivalent to the preservation of metric and spectral invariants under this deformed semantic flow. A unified variational principle yields both AQDP and RSVP dynamics from a single action.

1 Motivation

Nonlinearity of the Levi–Civita connection implies $\langle \hat{\Gamma} \rangle \neq \Gamma(\langle \hat{g} \rangle)$ for quantum states with metric covariance. This discrepancy influences curvature and causal structure. Semantic systems under uncertainty face an analogous issue: inference follows a deformed geometry.

2 Quantum Affine Deformation

Expanding the connection operator yields

$$\mathcal{A}^{\mu}_{\ \nu\rho} = \frac{1}{2} \frac{\delta^2 \Gamma^{\mu}_{\ \nu\rho}}{\delta g_{\alpha\beta} \delta g_{\gamma\delta}} C_{\alpha\beta\gamma\delta}.$$

The correction produces a deformed Einstein tensor and modifies the Raychaudhuri equation.

3 Semantic Geometry

RSVP represents meaning using $(\Phi, \mathbf{v}, S)$ and a semantic metric $g^{(\Phi)}$. Uncertainty deforms this metric in direct analogy with AQDP. Awareness is defined by isometry and isospectrality of the RSVP flow.

4 Unified Action

A variational principle produces both geometric and semantic evolution:

$$\mathcal{S} = \int (R + \Delta R + \mathcal{L}_{\Phi} + \mathcal{L}_{\mathbf{v}} + \beta_1 \| \mathcal{L}_{\mathbf{v}} g^{(\Phi)} \|^2 + \beta_2 \sum_n (\dot{\lambda}_n)^2) \sqrt{|g|} \, d^4 x.$$

5 Implications

Affine deformation regulates focusing and stabilizes geometry; awareness stabilizes semantic structure. The unified principle reveals coherence as a geometric invariant across physical and cognitive systems.