Intelligence as Geometry: RTSG Framework

!!! info "Update Note (2026-03-07)" References to $\beta|W|^2W$ in this document refer to the **equation of motion**, not the action density. The action is $S[W] = \int(|\partial W|^2 + \alpha|W|^2 + (\beta/2)|W|^4)d\mu$. See Master Reference v3.

Intelligence as Geometry: RTSG Framework

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Source file: `IAG_v754_clean.tex` (1,771 lines, sole author)

Abstract (from paper)

We present the Relational Three-Space Geometry (RTSG) framework — a unified mathematical theory modeling any cognitive system as a vector in variable-dimensional intelligence space, grounded in a co-primordial three-space ontology (quantum space QS, physical space PS, the CS operator CS). The framework provides formal definitions for measuring and comparing intelligence, a theory of ideas as decomposable geometric objects with measurable value (IdeaRank), a filter cascade transforming raw capacity into effective performance, consciousness architecture via fiber bundle geometry, and a generalized Nash equilibrium theory of cooperative cognitive systems (GNEP). Applications span 12 academic disciplines with 68 open problems addressed. The framework includes a live computational engine with verified results across 5 Millennium Problems.

Sections (from IAG_v754.tex)

- Co-Primordial Thesis (Three-Space)
- The Intelligence Vector
- Interaction Matrices K, R, J
- Spectral Theory
- Idea Portfolios
- Bundle Synergy
- Filter Pipeline
- Emotion: Three Channels
- Deployment Equation
- IdeaRank and Idea Theory
- Conservation Laws (Cognitive Noether)
- Thermodynamic Bound
- Hypervisor / Consciousness Architecture
- CIT — Conceptual Irreversibility Theorem
- Three Classes of Emergence
- Temporal Dynamics
- Open Problems (68 total across 9 disciplines)

New Section for v7.6: Will Field Dynamics

2026-03-07 addition: The framework paper needs a new section (§XV or equivalent) covering:

§XV. Will Field Dynamics and the Ginzburg-Landau Action

The Will Field W is the complex scalar field mediating QS → PS conversion. Its U(1) phase symmetry (Axiom 0: only relational reality) forces the unique leading-order action:

$$S[W] = \int \left[|\partial W|^2 + \alpha |W|^2 + \frac{\beta}{2} |W|^4 \right] d\mu$$

This is Ginzburg-Landau for instantiation. Four regimes:

1. **Cosmic:** $\Lambda_{\text{eff}} \sim \langle \rho_W \rangle_{PS}$ (dark energy as VEV)
2. **Fluid:** Blow-up when $\int \beta |W|^2 W \, dV > \int \alpha \nabla S \, dV$
3. **Cognitive:** SDE drift $\mu = -\delta S / \delta W^*$
4. **Information:** Quotient bound $|PS| \leq \exp(S[W]/\alpha)$

§XVI. Bisimulation Quotienting and Unitarity

Wave-function collapse = bisimulation quotienting of QS under ZFA. The quotient map $\pi : QS \rightarrow PS$ intertwines unitary evolutions. Born rule follows from L^2 norm preservation.

§XVII. Yang-Mills Mass Gap as GL Correlation Length

$$\Delta_{\text{YM}} = 1/\xi_W$$

where ξ_W is the Will Field correlation length on gauge orbit space.

!!! info "Implementation Note" These sections need to be compiled into the LaTeX source `IAG_v760_clean.tex` before arXiv submission. The markdown drafts are in GL paper and Will Field universality.

Updated Submission Checklist

- ☒ Sole author byline
- ☒ LaTeX source clean (v7.5.4)
- ☐ **NEW: Add §XV-XVII (Will Field, Bisimulation, YM gap)**
- ☐ Recompile LaTeX → v7.6.0
- ☐ arXiv account created
- ☐ Category: cs.AI (primary), math.CT, math-ph, q-bio.NC (cross-list)
- ☐ License: arXiv non-exclusive