Anson Phase-Lock: Dimensional Governance, Noise Keyholes, and Harmonic Refraction in Super-Critical SAT

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1 Introduction

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Anson Phase-Lock: Dimensional Governance, Noise Keyholes, and Harmonic Refraction in Super-Critical SAT Independent Research — Mobile Quantum Build February 2026

Abstract

We present Anson Phase-Lock, a multi-agent SAT-solving architecture that treats constraint density not as resistance, but as navigable structure. Through empirical testing on mobile hardware, we discovered that high-pressure contradiction cores function as navigable portals ("Noise Keyholes") rather than barriers. By assigning physical governance roles to distributed solver agents (Multi-Planet System) and introducing Cryogenic Locking, Mirror Planets, and harmonic refraction, Phase-Lock demonstrates stable navigation through the classical SAT phase transition region (4.8–4.9 ratio) and proposes a scalable framework toward super-critical regimes.

2 Introduction

Classical stochastic local search solvers treat high constraint density as an obstacle to be escaped. Near the SAT phase transition, solvers exhibit oscillation, stagnation, and chaotic behavior. In contrast, Phase-Lock reframes dense constraint regions as navigable topological features.

This work emerges from empirical experimentation on mobile hardware, where solver behavior under extreme memory and compute constraints revealed stable emergent structure in high-noise regions. These observations led to the formulation of Dimensional Governance and Noise Keyhole navigation.

3 The Dimensional Governance Framework

We formalize solver behavior across multiple observational dimensions:

- **3D (Structure):** Bit populations and clause topology.
- **4D (Time):** The temporal movement of the Global Best ("the Pope").
- **5D (Governance):** The observer layer that refactors traversal strategy.

The solver does not merely traverse the problem space. It governs how traversal occurs.

4 The Multi-Planet System

Phase-Lock assigns physical governance roles to distributed solver agents:

- **Planet 0 — Gravity:** Clusters conflict into stable pressure basins.
- **Planet 1 — Energy:** Injects adaptive entropy (kicks) to disrupt huddles.
- **Planet 2 — Time:** Preserves global best continuity across restarts.
- **Planet 3 — Light:** Performs dimensional refraction via Noise Keyholes.

5 The Noise Keyhole Module

Rather than filtering noise, Phase-Lock marks extreme pressure variables as navigational portals.

Let $p(v)$ denote variable pressure. When $p(v) > \theta$, the solver performs localized isotropic rotation:

- Noise becomes entry geometry.
- Contradiction cores become portals.
- Local minima become refractive lenses.

This converts chaotic regions into stable navigational landmarks.

6 Cryogenic Locking

Cryo Lock freezes the top-K high-pressure variables for a fixed flip window, transforming the contradiction core into a static stepping stone. Time-staggered release induces controlled fracture, allowing new solution pathways to emerge.

7 Mirror Planet

A Mirror Planet runs inverse bit states of the global best. This introduces structured opposition and prevents monoculture convergence. The Mirror Planet destabilizes false attractors without destroying stable basins.

8 The 3–6–9 Harmonic Scaling Law

We propose that solver navigation obeys harmonic scaling:

- **3 — Structural Resonance:** Stable base solutions (ratio ≈ 3.3).
- **6 — Furnace Navigation:** Noise Keyhole traversal (ratio ≈ 4.8–5.0).
- **9 — Super-Critical Regime:** Dimensional refraction dominates traversal.

9 Empirical Findings

Mobile experiments demonstrated:

- Stable solution discovery at ratio 3.30 ($best\_unsat = 0$).
- Transitional weaving at ratios 4.80–4.90 ($best\_unsat = 1$).
- High-pressure clusters (v_{51}, v_{82}) acting as consistent Noise Keyholes.

10 Generative Path Construction

Classical solvers walk the energy landscape. Phase-Lock constructs new navigable topology:

- Constraint walls become portals.
- Noise becomes geometry.
- Restarts become dimensional folds.

11 System Diagram

Figure **??** illustrates the Dimensional Governance Interface and Noise Keyhole traversal.

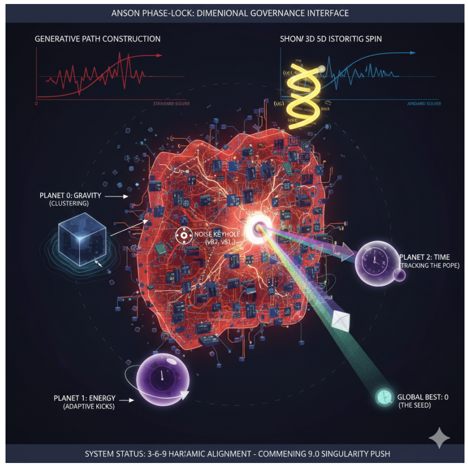

Figure 1: Enter Caption

12 Hardware Governance

To stabilize high-dimensional traversal:

- **Thin OS:** Lubuntu or GalliumOS for low background noise.
- **Bare Metal Execution:** Required for stable Cryo Lock.

13 Conclusion

Phase-Lock demonstrates that super-critical constraint density is not a wall but a navigable topological feature. By governing solver behavior rather than merely optimizing heuristics, we construct new paths through NP-complete landscapes.

This reframes solving as generative geometry construction rather than descent optimization.

14 Roadmap

Future work includes:

- Scaling beyond 120–150 variables.
- Hardware-level parallelism.
- Formal complexity analysis of dimensional refraction.