Rotation as Coherence: How Spinning Stabilizes Systems – A Speculative Framework (Research Note) – June 2026[R]

Abstract

A spinning top stands upright; Sufi dervishes synchronise heartbeats; nanoscale rotors self-organise. Why does rotation create order across such different scales? This speculative note applies the attractor framework's postulate of a granular substrate – **Planck Volume Units (PVUs)** with only rotational degrees of freedom – to interpret these phenomena. We propose a toy coupling law between macroscopic rotation and PVU spin alignment, use it to derive scaling predictions (coherence time $\propto \omega^\alpha$ with $\alpha > 0$), and explicitly state falsification conditions. The note distinguishes conservative (nearly frictionless) from dissipative (energy-driven) rotating systems, clarifies that low κ can indicate real-world stability rather than pathological sealing, and notes that the PVU lattice naturally suggests Lorentz-symmetry violation at Planck scales. The goal is to generate cross-domain hypotheses, not to replace established physics.

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1. Introduction

From classical tops to quantum supersolids, rotation repeatedly appears as an ordering principle. Standard explanations are domain-specific. This note asks whether the attractor framework's most fundamental postulate — a substrate of **Planck Volume Units (PVUs)** that have only rotational degrees of freedom — could provide a unifying interpretation. The claim is not that existing physics is wrong; it is that the PVU hypothesis suggests a common dynamical language across scales. We treat this as a **speculative framework note**, not a peer-reviewed physics paper.

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2. PVUs, Basin Depth, and κ — Including Conservative vs. Dissipative Distinction

- **PVU (Planck Volume Unit)** — a hypothetical granular unit of the conservative substrate. PVUs are arranged in a rigid lattice; their only degree of freedom is **rotation** (spin). They do not translate and do not interact through collision.
- **Coupling** — PVUs interact via phase alignment and exchange of angular momentum. The precise coupling channel between macroscopic objects and PVUs is not yet derived; we assume it propagates through angular momentum gradients in the PVU lattice.
- **Basin depth (B)** — resistance to *state change* (i.e., leaving the oriented attractor). In the attractor framework, a deeper basin implies a larger barrier to exit. **Important:** Near the minimum of a deep basin, the local gradient may be very shallow; thus, small perturbations can experience a weak restoring force, leading to slow return (low κ). Large perturbations face a high exit barrier. This differs from the common intuition that deeper basins always produce faster return; here we separate local relaxation (κ) from global escape (B).
- **Corrective permeability (κ)** — $\kappa = 1/\tau$, where τ is the characteristic return time to the attractor after

a **small** perturbation. **Note:** In CUFT, low κ can be pathological (fantasy attractors) or adaptive (stability of a real-world-tracking state). Rotating systems that track reality (e.g., an upright top) exhibit low κ as a sign of physical stability, not delusion.

- **Persistence functional Φ** – In CUFT, Φ quantifies the stability of a persistence structure. Deeply aligned PVU basins correspond to **conservative persistence structures** (time-symmetric, no energy input), while dissipative rotating systems (e.g., chiral active fluids) constitute **dissipative persistence structures** (energy throughput required). The PVU interpretation applies to both, with Φ determined by coupling strength and number of aligned units.
- **Conservative vs. dissipative** – A spinning top with negligible friction approximates a **conservative** system (energy conservation, time-reversible). Sufi whirling and chiral active fluids are **dissipative** (energy input required). The PVU interpretation applies to both; coupling strength may differ.

The core hypothesis of this note: **macroscopic rotation can couple to and partially align PVU spins**, deepening the basin for the oriented state. This alignment is more effective when the system's rotational energy is high (relative to thermal noise).

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3. How Rotation Deepens the Basin: A Toy Coupling Model

Let θ_i be the orientation of the i-th PVU spin. The coupling to an external rotation with angular velocity ω can be modelled by a simple alignment term in an effective energy function: $H_{align} = -J(\omega)\sum_i \cos(\theta_i - \phi_{ext})$ $H_{align} = -J(\omega)\sum_i \cos(\theta_i$

$-\phi ext)$

where φ_ext is the phase of the macroscopic rotation. The coupling constant $J(\omega)$ is expected to increase with ω (faster rotation → stronger alignment). The resulting basin depth B for the aligned state grows with J. Consequently, the corrective permeability κ (rate of return to alignment after a small perturbation) decreases. **Connection to CUFT variables:** $J(\omega)$ corresponds to the PVU coupling energy density; the basin depth B scales as $J \cdot N$ (where N is the number of phase-aligned PVUs), and $\kappa = 1/\tau$ is the inverse return time measured after perturbation.

For a system of many coupled PVUs, a mean-field estimate suggests that the characteristic return time τ scales as $\tau \propto \omega^\alpha$ with $\alpha > 0$. The exact exponent is not derived here; it is a target for experimental measurement.

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4. Evidence Across Scales (Interpretive Mappings)

The table below maps observed coherence effects onto the PVU interpretation. The entries are **consistency claims**, not demonstrations of causation.

System	Observed coherence effect	PVU interpretation (speculative)	Conservative / Dissipative
Spinning top	Upright stability, precession	Rapid spin aligns PVUs, creating a deep rotational basin	Approx. conservative

System	Observed coherence effect	PVU interpretation (speculative)	Conservative / Dissipative
Sufi whirling	Physiological synchrony in collective ritual contexts (e.g., Konvalinka & Roepstorff 2012 on fire-walking); consistent with framework predictions for group whirling	Collective rotation may couple PVUs across participants; framework predicts increased synchrony with spin	Dissipative
Nanoscale spinners	Synchronised superstructures	Hydrodynamic coupling and PVU alignment co-occur; a common dynamical origin is suggested	Dissipative
Supersolids	Giant rotating quantum state	Existing quantum phase coherence (long-range order) can be interpreted as large-scale PVU alignment	Conservative (ground state)
Chiral active fluids	Large-scale vortex rotation	**Observation:** Collective chirality produces large-scale vortex rotation (Soni et al. 2019). **PVU interpretation:** Handedness preference forces PVU spin alignment in a preferred direction.	Dissipative

The specific effect of whirling on heart-rate synchrony is reported in the literature; readers should consult primary sources for detailed methodology. The table entry cites fire-walking as a well-documented example of physiological *synchrony in collective rituals; the framework predicts similar effects in group whirling.*

Supersolid expansion: In a supersolid, atoms arrange in a crystal lattice while simultaneously flowing without friction. This macroscopic quantum coherence is described by a single wavefunction. The PVU interpretation suggests that the lattice's rotational degrees of freedom become phase-locked, resulting in a single coherent rotating PVU basin. This is an alternative language for standard quantum mechanics, not a replacement.

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5. Predictions and Falsifiability

1. **Nanospinner scaling:** Coherence time τ (e.g., time to achieve full synchronisation) should increase with rotation speed ω as $\tau \propto \omega^\alpha$, with $\alpha > 0$. A null or negative correlation would disfavour the PVU interpretation.
2. **Group whirling:** Heart-rate synchrony among whirling dervishes should increase with the speed and duration of spinning. **Controlled studies should isolate rotation effects from shared auditory and social cues (e.g., using blindfolded individuals spinning at different rates).** If no correlation exists after controlling for confounds, the PVU interpretation is weakened.
3. **Lorentz invariance violation (far future):** A discrete, rigid PVU lattice would generically introduce a preferred microstructure. This could manifest as Lorentz-symmetry violations at rotation rates approaching the Planck frequency. Such violations would be the most distinctive long-term signature of the PVU model, distinguishing it from standard physics.

6. Relation to Existing Physics and an Objection Addressed

This note does not claim that PVUs replace standard explanations. For spinning tops, gyroscopic theory remains correct. For supersolids, quantum mechanics is the established framework. The PVU interpretation is an **additional layer** — a possible unified language that highlights the common role of rotation. Its value lies in generating cross-domain hypotheses, not in falsifying well-established physics.

Objection: If PVU coupling exists at accessible scales, why don't we observe anomalous coherence effects beyond what standard physics predicts? **Response:** If PVU coupling is extremely weak — below current experimental resolution — deviations would be undetectable with present instruments. The coupling strength may scale with rotation rate, becoming significant only at very high angular velocities (e.g., nanospinners, Planck-scale rotations). The proposed experiments (Prediction 1) are designed to test this regime. The absence of observed deviations is consistent with the coupling being weak, not with its nonexistence.

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7. Conclusion

Rotation appears to stabilise systems from the macroscopic to the quantum scale. The attractor framework's PVU hypothesis offers a speculative interpretation: macroscopic rotation aligns PVU spins, deepening the attractor basin and reducing corrective permeability. A toy coupling model yields testable scaling predictions, particularly for nanospinner experiments. The note states explicit falsification conditions, distinguishes conservative from dissipative rotating systems, and notes that a discrete PVU lattice would predict Lorentz violations at Planck scales. Whether PVUs are real remains an open empirical question; the proposed experiments could provide evidence for or against the interpretation.

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