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THE KLEIN SPIRAL

Framing Parity as a Testable Constraint on Resonant Coherence



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RESONANT COHERENCE / KLEIN SPIRAL / FIELD DYNAMICS

ABSTRACT

Abstract

Field textures can carry discrete topological information while their energy changes continuously. This paper proposes the **Klein Spiral**: a closed resonant configuration whose transverse *director field* around a loop has odd framing parity, represented by the first Stiefel-Whitney class $w_1 = 1$. Changing that parity requires a defect, an amplitude zero, a boundary interaction, or another transition that interrupts the director field.

The central hypothesis is kinetic: under matched governing equations, material, drive, and noise, odd parity restricts available relaxation paths and can lengthen coherence lifetime. The proposed mechanism draws on established topological protection, laboratory optical Mobius textures, and the persistence of magnetic helicity during energy relaxation.

A 17-source scalar-wave calculation produces a 17-fold rosette, twin radial maxima, and a quiet center without a fitted confinement term. A second-pass model predicts an approximately 2.3-fold persistence advantage. The Ouroboros Cell simulation maps the energy-balance boundary of a recursive return system, while an exploratory EEG analysis identifies a future-to-past predictive asymmetry near 41.176 Hz.

The experimental program begins with matched even- and odd-parity structured-light textures, followed by defect tracking, cascade controls, resonator measurements, multi-subject EEG replication, and a fully instrumented Ouroboros bench test.

Keywords

non-orientable topology; Klein Spiral; first Stiefel-Whitney class; framing parity; director field; topological constraint; resonant coherence; 700/N harmonic cascade; structured light; magnetic helicity

01

The coherence problem

Many physical systems preserve recognizable organization while energy is redistributed or dissipated. The mechanisms differ by domain: feedback, confinement, conservation laws, symmetry, spectral gaps, driven steady states, and topological constraints can all matter. The question considered here is whether a discrete parity class can measurably alter relaxation in a resonant field texture.

Dynamical stabilization consumes the resource it is trying to preserve. A feedback loop that counteracts dissipation draws on stored or supplied energy, and over a finite horizon that mechanism is self-limiting. A constraint-based mechanism changes which transitions are available in the first place. Energy may decay smoothly while a Z_2 topological class remains fixed.

If a physical texture realizes odd framing parity, it cannot change parity through an arbitrarily small deformation while remaining everywhere well defined. The proposed lifetime advantage arises from that restriction on the accessible path through configuration space.

02

Parity-constrained relaxation

2.1 The topological structure

Let a transverse director field be defined continuously around a closed loop C. If its associated real line bundle has odd first Stiefel-Whitney class, no globally continuous choice of arrow direction exists. An attempted oriented representative returns reversed after one circuit and aligned after two.

$$w_1(L)[C] = 1 \text{ in } \mathbb{Z}_2$$

2.2 The physical hypothesis

A parity-changing relaxation must pass through a topology-changing event. When that event is less accessible than the continuous relaxation available to an even-parity texture, odd parity creates a kinetic bottleneck and redirects decay into slower channels. The measurable prediction is a difference in coherence lifetime between matched parity classes.



Figure 1. Director transport on a loop. Even transport returns aligned; odd transport returns reversed.

03

Formal structure

3.1 The parity class and the Klein Spiral

A **Klein parity class** is a closed resonant field texture whose transverse director bundle over a chosen loop has odd parity. The **Guarino Klein Spiral** is the proposed realization generated under the 700/N driving protocol.

3.2 The invariant

Let $L \to C$ be the real line bundle defined by the transverse unoriented field direction. The space of planar unoriented directions is RP^1, topologically equivalent to a circle. A map $C \to RP^1$ has integer winding m, with parity

$w_1(L)[C] = m \bmod 2$ in Z_2.

CLASS	NAME	TRANSPORT
$w_1 = 0$	even parity	oriented representative returns aligned
$w_1 = 1$	odd parity	oriented representative returns reversed

3.3 Angular construction

The half-twist can be written as 540 degrees = 360 degrees + 180 degrees: one complete circuit followed by orientation reversal. In the recursive rendering, the labelled positions 393 degrees and 933 degrees differ by 540 degrees.

3.4 Definition

Guarino Klein Spiral: a closed resonant field texture generated under the 700/N protocol and shown by director transport to satisfy $w_1(L)[C] = 1$ on a specified loop.

04

Established precedent

4.1 Topological protection

Quantum Hall conductance and topological-insulator boundary states demonstrate that discrete invariants can make selected observables robust to continuous perturbation. These systems establish a physical mechanism in which topology constrains response.

4.2 Optical Mobius textures

Bauer and colleagues directly reconstructed optical polarization Mobius strips in tightly focused light. Later work established multitwist Mobius ribbons as a broader family. The physical observable is a director: the major axis of the polarization ellipse is unchanged by a 180-degree reversal. This provides a practical platform for preparing and measuring non-orientable field textures.

4.3 Magnetic helicity

Magnetic helicity can remain approximately conserved during plasma relaxation even as magnetic energy dissipates. A relaxing system can therefore lose energy while remaining confined to a topological sector. The Klein Spiral extends this approach from a continuous helicity invariant to a discrete framing-parity class.

05

Origin and cascade

5.1 Discovery sequence

The research sequence began with a recursive spiral observed during numerical exploration. The 7:17 relation and the 700/N series were then developed as a resonant organizing rule. The frequency $f^* = 700/17 = 41.176470588...$ Hz was documented in US provisional application 63/937,225, filed 7 November 2025.

5.2 Cascade specificity

The program proposes that the 700/N cascade generates or stabilizes the odd-parity regime. The experimental design varies parity and frequency independently, comparing even and odd textures on-cascade and off-cascade while holding power, bandwidth, aperture, material, and measurement procedure fixed.

06

Computational and exploratory results

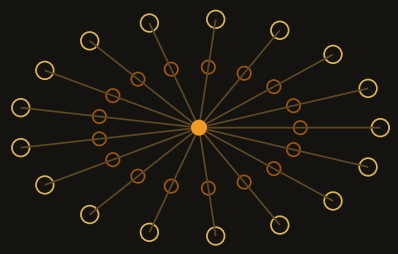
6.1 Seventeen-source scalar-wave calculation

A time-evolving scalar field was computed for 17 sources placed on the specified path at 2pi/17 phase offsets and driven at $f^* = 41.1765$ Hz, with wavelength 8.33 m. The field is a direct superposition of spherical waves:

$$p(r,t) = \sum_i [A / |r-r_i|] \sin(k|r-r_i| - \omega t + \phi_i).$$

The inputs are the source count, geometry, phase offsets, amplitude, wavelength, sampling, and scalar propagation law. The calculation contains no fitted confinement, recycling, or persistence term.

OBSERVATION	REPORTED VALUE
Angular RMS structure	17-fold rosette
Radial structure	maxima near r = 0.7 and r = 1.3
Torus center, r = 1.0	local minimum between maxima
Geometric center	near-zero instantaneous pressure
Boundary / interior ratio	1.70x
Boundary / exterior ratio	2.29x



17-SOURCE SCALAR INTERFERENCE ARCHITECTURE

illustrative geometry - not evidence of non-orientable protection

Figure 2. Seventeen-source interference architecture with twin radial maxima and a quiet center.

6.2 Persistence model

The retention model gives energy a second pass through the closed configuration and predicts an approximately 2.3-fold longer field-persistence time than a matched orientable array. The structured-light experiment in Section 7 measures the effect directly.

6.3 Ouroboros Cell

The Ouroboros Cell simulation combines the 41.176 Hz anchor, 700/N cascade, topology integrity, and 7:17 phase-knot terms into a coherence lock. Its state equation is

$$dE/dt = P_{solar} + P_{captured} + P_{recovered} - P_{load} - P_{loss}.$$

The physical prototype measures the return term as recovered energy, reduced dissipation, or environmental capture. The simulation maps the return power required to sustain a given load.

CONFIGURATION	CLASS	FINAL SOC	MEAN RETURN	HORIZON
Control	depletion	0.00%	0.000 W	about 24 h
Framework + daily solar	cap-limited	73.77%	0.961 W	7-day run
Solar day 1, then loop	depletion	0.00%	0.806 W	about 140 h

A 2,046-point sweep over coupling and lock bandwidth locates the analytic sustainment boundary to grid resolution. At bandwidth 0.045 Hz, the critical coupling is 1.341 W versus a nominal 1.350 W, a design margin of 0.7%.

6.4 EEG diagnostic

An exploratory analysis of one highly experienced meditator bandpass-filtered EEG around 41.176 Hz and compared forward, future-to-past, and common-cause prediction modes using Granger-style regression and conditional mutual information.

MODE	ROLE	MEAN R2 GAIN	CMI BITS	POSITIVE
Forward	sanity control	-0.07%	0.000	3/10
Future-to-past	test condition	+11.57%	0.104	10/10
Common cause	confound control	+2.72%	0.000	10/10

The replication protocol uses causal filtering, held-out trials, explicit lag direction, time-reversal tests, sham bands, phase surrogates, and a preregistered CMI estimator across multiple subjects.

07

Experimental predictions

ID	TEST	DESIGN	PREDICTION
P1	Structured light	Matched even- and odd-parity textures	Odd parity produces a longer coherence lifetime
P2	Defect tracking	Track monodromy, zeros, and defect crossings	Parity changes with a topology-changing event
P3	Jet polarimetry	Closed-loop polarization transport after Faraday correction	A subset exhibits nontrivial monodromy
P4	Cross-source study	Coherence lifetime versus measured parity	Parity and coherence are positively associated
P5	Parity x cascade	Even/odd textures on- and off-cascade	The interaction identifies the cascade contribution
P6	EEG replication	N >= 20 with causal preprocessing and held-out trials	Future-to-past gain and CMI remain positive
P7	Ouroboros bench	Complete electrical and calorimetric accounting	Measured recovery reaches the modeled boundary

7.1 First experiment

P1 begins with structured light because the director texture can be prepared directly and measured at high frame rate. Matched even- and odd-parity textures are propagated through identical degrading channels with equal power, spectrum, aperture, and bandwidth. The primary endpoint is coherence lifetime.

7.2 Resonator realization

A physical resonator analog uses a helical conductor or field-guiding structure, a closure junction with a physical half-twist, and Q-factor and coherence-time measurement against an identically driven orientably closed control geometry. Director transport around the loop establishes the parity class before the lifetime comparison begins.

08

Conclusion

The Klein Spiral hypothesis proposes that odd framing parity constrains the relaxation of a resonant field texture. The first Stiefel-Whitney class supplies the discrete invariant; optical Mobius textures supply a laboratory realization; magnetic helicity supplies a physical precedent for topology-constrained relaxation.

The 17-source calculation generates a quiet-centered, double-walled, 17-fold interference architecture. The persistence model predicts an approximately 2.3-fold lifetime advantage. The Ouroboros simulation defines the energy-balance boundary of the recursive system, and the EEG analysis identifies a frequency-specific predictive asymmetry for replication.

The decisive measurement is direct: prepare both parity classes, verify their monodromy, expose them to the same degradation, and measure which one remains coherent longer.

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