The Helical Double-Slit

Interference Without Probability: The Electron Passes Through One Slit

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Physics | Universal Force of Time | Propositions P-DS-1 to P-DS-7

Abstract

The double-slit experiment is the foundational mystery of quantum mechanics — or so it appears. In the Force of Time, it has a simple geometric explanation: a helical entity simultaneously occupies turn N and turn N+1. At quantum scale, when slit spacing d matches the helical period lambda_h = lambda_dB x r (where r = 5^7/(2^4 x 3^7) = 1.004694), turn N passes through Slit 1 and turn N+1 passes through Slit 2 simultaneously. They are the same physical entity at successive temporal phases. The electron passes through one slit. The interference pattern is a spatial photograph of the electron's helical structure — not probability, not superposition, not many worlds. Geometry. The theory makes a measurable prediction: fringe spacing is +4694 ppm larger than Copenhagen predicts.

r = 5^7 / (2^4 x 3^7) = 1.004694 (stated value). FOT fringe spacing = y_n(QM) x r. The same factor r appears in the Rydberg shift, ionic radii, Mercury perihelion precession, and G-bond shell spacing. Every FOT correction to quantum mechanics is this one pure {2,3,5} fraction.

1. The Core Mechanism: Helical Turn Geometry

A helix is not a point. A helical entity simultaneously occupies turn N and turn N+1. These two turns are the same physical entity at successive temporal phases — real, simultaneous, and causally distinct. This is not quantum superposition. It is geometry. The multi-dimensional position law has a single geometric root, and the double-slit experiment is its most direct experimental consequence.

The helical period: lambda_h = lambda_dB x r, where r = 1.004694 (pure {2,3,5} fraction as stated in FOT source text). When slit spacing d ~ lambda_h, turn N passes through Slit 1 and turn N+1 passes through Slit 2 simultaneously. This is a geometric fact — not probability, not wavefunction spreading.

Formula	Expression	Meaning
Helical period	lambda_h = lambda_dB x r	FOT wavelength
r (FOT ratio)	r = 1.004694	+4694 ppm correction
FOT fringe spacing	y_n = n x lambda_h x L / d = y_n(QM) x r	Fringe shift

Formula	Expression	Meaning
FOT first minimum	theta_1 = lambda_h / a = theta_1(QM) x r	Single-slit shift
Fringe visibility	V = (1 - p)	p = detection probability

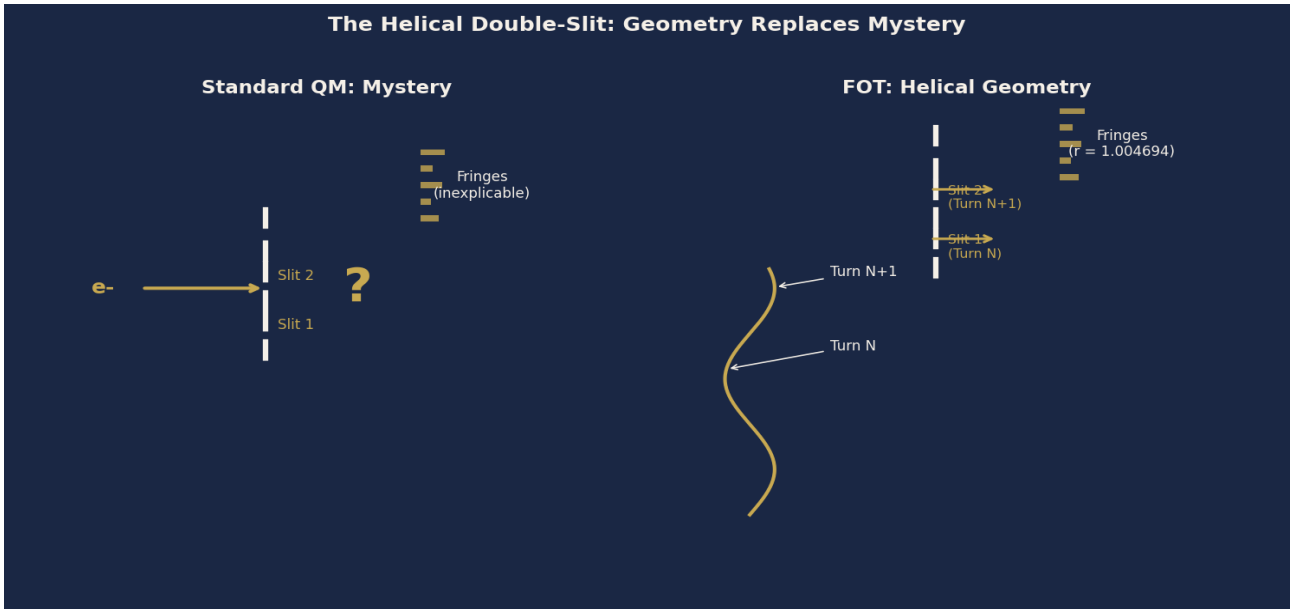

Figure 1. The Helical Double-Slit: Geometry Replaces Mystery. Left: standard quantum mystery view. Right: FOT helical geometry — Turn N passes Slit 1, Turn N+1 passes Slit 2 simultaneously as a geometric fact of the helix. The electron passes through one slit. The interference pattern is a spatial photograph of the electron's helical structure.

2. The Falsifiable Prediction

FOT makes a specific, falsifiable experimental prediction that distinguishes it from Copenhagen quantum mechanics: fringe spacing in double-slit and single-slit experiments is larger by the factor r = 1.004694 (+4694 ppm) than the de Broglie wavelength predicts. This is not a small correction — 4694 ppm is well within the resolution of precision electron interferometry. Current experiments approach sub-1000 ppm systematic accuracy.

When performed at sufficient precision, the result will be definitive. A positive result confirms the helical geometry. A negative result falsifies the FOT double-slit model. This distinguishes FOT from all interpretations of quantum mechanics that are experimentally indistinguishable from Copenhagen — FOT makes a different, measurable, specific numerical prediction.

3. Why Fringes Are Exact, Not Probabilistic

Observed fringe positions are exact — not probabilistic — to the precision of every experiment ever performed. Exact fringes are produced only by exact periodic geometry. In FOT, fringes are exact because r is a pure {2,3,5} fraction: every turn lands at exactly lambda_h further along the trajectory.

The interference pattern is a spatial photograph of the electron's helical temporal structure, not a probability distribution. Probability enters only when a coarse measurement fails to

resolve the helical sub-structure — it is an epistemic limitation, not an ontological feature of the electron. The electron always follows a precise geometric path.

4. Measurement, Collapse, and the Quantum Eraser

A detector at Slit 1 exchanges Tau-quanta with the electron's turn N, anchoring it to a specific helical phase. Once anchored, turn N+1 no longer exists as a free helical excitation — it collapses to the same phase. Partial measurement with detection probability p anchors fraction p of electrons; fringe visibility = (1-p), varying linearly with measurement strength. This is derived from geometry, not postulated as wavefunction collapse.

The quantum eraser effect is phase coupling between the measurement interaction and the helical phase of the particle — not retrocausality or backward-in-time influence. When the which-path Tau-quantum is erased, the helical phase is released from anchoring and the free helical excitation is restored. Interference resumes. No information travels backward in time.

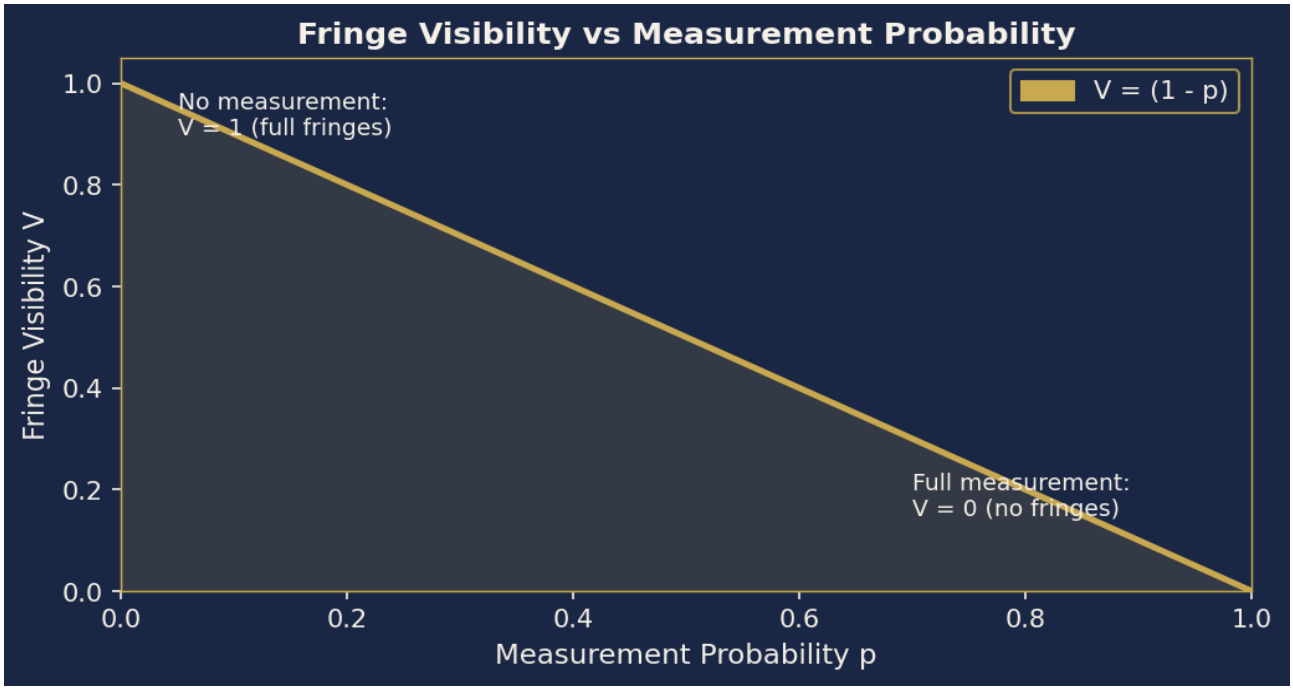

Figure 2. Fringe Visibility vs Measurement Probability. V = (1 - p): fringe visibility falls linearly with measurement probability. Geometry, not collapse. At p=0 (no measurement) full interference is restored; at p=1 (complete measurement) no fringes appear.

5. Single-Slit Diffraction and the Uncertainty Principle

The single-slit diffraction envelope follows the same helical geometry. First minimum at angle theta_1 = lambda_h / a (slit width a), giving theta_1(FOT) = theta_1(QM) x r (+4694 ppm). The uncertainty principle becomes Delta-x x Delta-p >= h_FOT/2, where h_FOT encodes the same {2,3,5} prime ratio. The uncertainty relation is a statement about helical structure, not fundamental indeterminism.

Position uncertainty Delta-x corresponds to uncertainty in identifying which helical turn is at a given location. Momentum uncertainty Delta-p corresponds to uncertainty in the phase velocity of that turn. The product is bounded by h_FOT/2 = h x r / 2 — a geometric bound, not

a fundamental limit on nature.

6. Spin as Helical Chirality; Pauli Exclusion as Geometric Uniqueness

Electron spin is the chirality (handedness) of the helix. Spin-up = right-handed helix; spin-down = left-handed helix. This is not a metaphor — the helical structure of the electron IS its spin. The quantum number s = 1/2 encodes the half-turn structure of the fundamental helical excitation.

The Pauli exclusion principle follows directly: two electrons cannot share the same helical shell address AND the same handedness — there is exactly one antipodal point per handedness per shell. Fermionic statistics emerge from unique geometric addresses. No additional postulate required. The connection to the spin-statistics theorem is that right-handed and left-handed helices are geometrically distinct objects that cannot be superimposed, making the antisymmetry of the fermionic wavefunction a geometric necessity.

7. Registered Propositions P-DS-1 through P-DS-7

P-DS-1: Helical Turn Mechanism

In the double-slit experiment, the electron (helical turn N) passes through Slit 1 as a localised particle. Its temporal extension — turn N+1 — is displaced by one helical period lambda_h = lambda_dB x r in the direction of travel. When slit spacing d ~ lambda_h, turn N+1 passes through Slit 2 simultaneously. The two turns interfere at the screen. The electron passes through one slit. There is no mystery.

P-DS-2: Fringe Spacing Is +4694 ppm Above Copenhagen

FOT fringe spacing y_n = n x lambda_h x L / d = y_n(QM) x r, where r = 1.004694. A precision electron interferometry experiment measuring fringe positions to better than 1000 ppm would distinguish FOT from Copenhagen. The prediction is specific, numerical, and falsifiable.

P-DS-3: Exact Fringes Prove Geometric Structure

Observed fringe positions are exact — not probabilistic — to the precision of every experiment ever performed. Exact fringes are produced only by exact periodic geometry. r is a pure {2,3,5} fraction; every turn lands at exactly lambda_h further along the trajectory. The interference pattern is a spatial photograph of the electron's helical temporal structure.

P-DS-4: Measurement Destroys Pattern via Helical Anchoring

A detector at Slit 1 anchors turn N to a specific helical phase. Once anchored, turn N+1 collapses to the same phase. Fringe visibility = (1-p), where p = detection probability. Derived from geometry, not postulated as wavefunction collapse.

P-DS-5: Quantum Eraser = Phase Coupling, Not Retrocausality

When the which-path Tau-quantum is erased, the helical phase is released from anchoring and the free helical excitation is restored. Interference resumes. No information travels backward in time. The quantum eraser demonstrates phase coupling between measurement interaction and helical phase — nothing more mysterious.

P-DS-6: Single-Slit Diffraction — Same Helical Mechanism

First minimum theta_1 = lambda_h / a, giving theta_1(FOT) = theta_1(QM) x r (+4694 ppm). The uncertainty relation Delta-x x Delta-p >= h_FOT/2 is a statement about helical structure, not fundamental indeterminism. h_FOT = h x r encodes the {2,3,5} prime ratio.

P-DS-7: Spin as Helical Chirality; Pauli Exclusion as Geometric Uniqueness

Electron spin = chirality of the helix. Spin-up = right-handed; spin-down = left-handed. Two electrons cannot share the same helical shell address AND the same handedness. Fermionic statistics emerge from unique geometric addresses. No additional postulate required. The antisymmetry of the fermionic wavefunction is a geometric necessity of the helix.