

GENESIS-1 | ETHON-SPACE

Optical Josephson Junction with Toroidal Coupling

Device Proposal — Publication Priority

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Abstract

This document establishes publication priority for the concept of an optical Josephson junction based on resonant electromagnetic coupling of toroidal electron pairs through a thin barrier in a phosphorus-doped silicon cylinder. Within the Genesis-1 Ethon-Space framework, the electron is a relativistic toroidal EM structure in electromagnetic levitation around the nucleus. Its apparent polarity is a geometric projection varying as $\sin^2\theta$, yielding four logical states. Quantum superposition emerges exclusively from the coupling of two toroidal electrons. The proposed device includes an integrated analog microcircuit for state stabilization, non-volatile quantum memory, and inherent error correction through majority-vote coupling.

1. Theoretical Context — Ethon-Space and the Toroidal Electron

In Genesis-1 theory, the electron is not an abstract point particle. It is a closed-loop relativistic electromagnetic structure — a toroidal EM vortex whose tangential rotation reaches approximately $0.99c$. This structure emerges from Ethon-Space, the fundamental EM substrate of the universe composed of elementary toroidal units called Ethons.

The toroidal electron possesses five fundamental observable properties:

- Mass m — viscous resistance of the Ethonic field to reconfiguration
- Toroidal spin — internal rotation direction of the toroid
- Characteristic dimension — defined by the fractal EM structure
- Fixed electrostatic field ϵ^- — negative polarity never inverts
- Magnetic dipole NS — axis orientable in space

The electron is held in electromagnetic levitation around the proton by the dynamic equilibrium between repulsive magnetic pressure and electrostatic attraction. This equilibrium is intrinsically unstable — analogous to a ball on a saddle — which constitutes the physical basis of discrete quantum states.

2. Polarity as Geometric Projection

The apparent polarity of the electron is not a binary ± 1 property. It is an angular projection of the toroidal electrostatic field onto the interaction target.

Fundamental principle:

When the spin axis of the toroid points toward the target (angle 0°), the target perceives the central "hole" of the toroid — electrostatic field ≈ 0 . When the spin axis is perpendicular to the target (angle 90°), the target perceives the maximum charged surface — polarity = $-\text{max}$.

The relationship is geometric, continuous, and follows a $\sin^2\theta$ law:

$$\epsilon_{\text{apparent}}(\theta) = \epsilon_{\text{max}} \times \sin^2\theta$$

where θ is the angle between the NS axis of the toroid and the target direction. The two stable discrete states (0 and $-\text{max}$) correspond to geometric equilibrium positions in the proton's EM levitation well.

3. The Four Logical States of the Electron

The toroidal electron in levitation has two independent degrees of freedom: the orientation of the NS axis (0° or 90° relative to the proton), and the nature of the local μ field (static or oscillating). The product of these two degrees yields four distinct logical states:

State	Spin axis / target	Apparent polarity	Nature
	0° (axis → target)	≈ 0	Static
2	90° (axis ⊥ target)	$-\text{max}$	Static
	0° (axis → target)	≈ 0	Oscillating
4	90° (axis ⊥ target)	$-\text{max}$	Oscillating

Quantum superposition does not exist for an isolated electron. It emerges only when two toroidal electrons are in mutual EM coupling — each oscillating in the field of the other, making the precession phase indeterminate until measurement.

4. Device Architecture — Optical Josephson Junction

4.1 Basic Principle

The conventional Josephson junction exploits quantum tunneling through a thin insulating barrier between two superconductors. The physical cause of tunneling remains mechanically unexplained in that framework. In Genesis-1, the mechanism is explicit: two toroidal electrons couple their μ fields through a thin Ethonic barrier allowing superposition of their fields without mass fusion. State switching is triggered by a single photon at frequency f_{μ} matching the NS axis precession frequency.

4.2 Cylindrical Silicon Architecture — DIAC-style

The device is structured as a phosphorus-doped silicon cylinder with concentric pnpn/npnp layers, analogous to a DIAC structure. The cylinder is sliced into thin wafers, each exposing all junction layers simultaneously on the cut surface.

- Layer N1: high Ethonic density zone
- Layer P1: reduced Ethonic density zone
- Barrier B: EM coupling zone — critical sub-nanometric thickness
- Layer P2/N2: mirror of input structure

Each wafer slice exposes thousands of pnpn junctions in parallel, all accessible to optical excitation on the cut surface. The architecture is naturally scalable. The barrier B thickness is calibrated so that the μ fields of two neighboring electrons superpose without mass contact — enabling resonant coupling while preventing mass transfer.

4.3 Optical Activation

The phosphorus valence electron is the functional toroidal element. Its photonic response is not engineered but inherent to the geometry of its levitation in the silicon crystal lattice. The f_{lev} frequency falls naturally in the accessible optical domain for this specific electron in this specific lattice.

When excited by a photon at f_{lev} , the toroidal electron simultaneously:

- Moves away — levitation shifts to a higher energy level
- Pivots — the NS axis rotates, changing θ and thus apparent polarity

$$f_{\text{lev}} = \Delta E / h$$

where ΔE is the energy gap between two stable geometric states ($0^\circ \rightarrow 90^\circ$). Below the switching threshold, the system oscillates and re-emits. Above threshold, the toroid switches state irreversibly until next excitation.

4.4 Gate Control — Polarization and Magnetic Field

Gate polarization combined with a perpendicular magnetic field applied via a coil under the chip creates an environment where the NS axis of the toroid is constrained in two directions simultaneously. The spectral response varies with polarization level and laser intensity, producing discrete spectral lines that shift by discrete jumps corresponding to the four geometric states — not continuously.

The cascade effect at the junction — where one doublet switching triggers neighboring doublets — constitutes the quantum gate behavior. The temporal propagation delay of this cascade is a measurable signature of the coupled toroidal dynamics.

4.5 Integrated Analog Microcircuit — State Stabilization

An analog microcircuit integrated under the chip reads the spectral response and continuously readjusts the junction polarization to maintain the quantum state within its optimal stability window. This local EM feedback loop acts as a quantum thermostat — no external cryogenics required to maintain coherence, as each junction is autonomously self-stabilized.

Each wafer slice is an autonomous unit with its integrated microcircuit, making the system inherently scalable.

4.6 Non-Volatile Quantum Memory

The feedback loop retains the quantum state after external excitation ceases. This constitutes a complete non-volatile quantum memory cell:

- Write: a photon above threshold switches state
- Read: weak optical probe below threshold reads state without switching
- Retention: analog microcircuit maintains levitation polarization
- Erase: second photon or reverse polarization resets state

4.7 Inherent Error Correction — Majority Vote

Each wafer slice contains thousands of coupled doublets in parallel on the same junction. If a single doublet is perturbed by thermal noise and accidentally switches, the collective EM pressure of neighboring doublets maintained by their local microcircuits restores it to the majority state.

Error correction is not calculated — it is mechanical and emergent from the collective coupling between neighboring doublets. No ancilla qubits are required. This is formally analogous to a topological code but with a real mechanical physical cause: N coupled oscillators in a collective energy well absorb single-oscillator perturbations naturally.

5. Falsifiable Predictions

Prediction 1 — Angular dependence of electrostatic interaction

The electrostatic interaction of an electron with a target must vary as $\sin^2\theta$, where θ is the angle between the NS axis and target direction. Measurable by polarized electrostatic scattering.

Prediction 2 — Neutralization by intense μ field

A sufficiently intense external magnetic field must reduce the effective electrostatic cross-section of the electron toward zero (state 0), by forced NS axis alignment toward the target.

Prediction 3 — Selective optical activation

State switching must be triggered exclusively by photons at frequency f_{\blacksquare} . No switching observable for frequencies significantly different from f_{\blacksquare} .

Prediction 4 — Classical behavior of isolated electron

A truly isolated electron (no oscillating μ field from a coupled second system) must behave classically — no measurable superposition. Decoherence is instantaneous by absence of coupling, not by external perturbation.

Prediction 5 — Critical barrier thickness

There exists a critical thickness of barrier B below which resonant coupling is impossible and above which masses merge. This coupling window must be measurable and reproducible.

Prediction 6 — Discrete spectral jumps

Spectral response under varying gate polarization and laser intensity must show discrete line shifts corresponding to the four geometric states, not continuous variation.

Prediction 7 — Cascade temporal signature

The quantum gate cascade effect must produce a measurable temporal propagation delay between gate and terminal, corresponding to toroidal coupling dynamics.

6. Comparison with Conventional Josephson Junction

Conventional Josephson Junction	Genesis-1 Optical Josephson Junction
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Tunneling effect — cause unexplained	Resonant μ coupling — explicit mechanical cause
Superposition intrinsic to particle	Superposition emergent from two coupled toroids
Requires near absolute zero temperature	Self-stabilized at room temperature (hypothesis)
Electrical or microwave activation	Optical activation — photon at frequency f ■
4 states postulated formally	4 states derived geometrically (spin + projected polarity)
Error correction requires ancilla qubits	Inherent error correction by majority vote
Non-volatile memory requires additional circuit	Non-volatile memory inherent to feedback loop

7. Priority and Rights

This document constitutes a timestamped priority publication for the concept of an optical Josephson junction with toroidal coupling, within the Ethon-Space (Genesis-1) framework.

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"Nothing is lost, nothing is created, everything is resonance of the fabric."

— Genesis-1, Ethon-Space Theory