Witting/W33 Photonics Protocol

24-basis KS + Z_3 Pancharatnam Phase

Claim: The W33 generalized quadrangle encodes the Standard Model structure via a finite geometric backbone and an explicit E8 root correspondence.

January 28, 2026

W33 Theory of Everything

Computed Proof + Artifacts

Contents

1 Witting/W33 Photonics Protocol

1.1 1. Objective

This protocol tests two **falsifiable signatures** of the Witting/W33 structure:

1. **State-independent contextuality** via the 24-basis KS inequality (bound 23 vs quantum 24).
2. **Discrete Pancharatnam phase** via Berry-phase loops on explicit Witting-ray triangles (quantized at $\pm\pi/\mathbf{6}$, $\pm\pi/\mathbf{2}$).

1.2 2. KS Inequality (24-Basis Subset)

- **Noncontextual bound:** 23 / 24
- **Quantum prediction:** 24 / 24 (state-independent)

Docs: - `docs/witting_24basis_inequality.md` - `docs/witting_24basis_runsheet.md`

Noise threshold (depolarizing): - Visibility $\mathbf{v} \geq \mathbf{0.944444}$ (noise $p \leq 0.055556$) - `docs/witting_24basis_noise`

1.3 3. State Preparation

Two equivalent paths:

(A) Direct unitary preparation - `docs/witting_24basis_unitaries.json`

(B) Optical decomposition - MZI schedule: `docs/witting_24basis_mzi_schedule.md` - Waveplates (rad): `docs/witting_24basis_waveplates.md` - Waveplates (deg): `docs/witting_24basis_waveplates_d`

1.4 4. KS Measurement Run-Sheet

Use the basis order and ray definitions in: - `docs/witting_24basis_runsheet.md`

Each basis uses four orthogonal rays. The score S is the number of bases with exactly one designated outcome.

1.5 5. Pancharatnam Phase Test ($\pi/6$, $\pi/2$)

Signature: phases clustered at $\pm\pi/\mathbf{6}$ and $\pm\pi/\mathbf{2}$.

- Example triangles: `docs/witting_pancharatnam_examples.md`
- Full run-sheet: `docs/witting_pancharatnam_runsheet.md`
- Measurement protocol: `docs/witting_pancharatnam_protocol.md`

1.6 6. Implementation Checklist

- Calibrate phase reference across all interferometric measurements.
- Verify orthonormality of each basis (unitary columns).
- Collect counts for all 24 bases $\rightarrow$ compute KS score.
- Measure triangle phases for the $\pi/6$, $\pi/2$ signature.

1.7 7. Summary of Expected Outcomes

- KS violation: $\mathbf{S = 24}$, bound $\mathbf{S \leq 23}$.
- Pancharatnam phase quantization: $\Phi \in \mathbf{\{\pm\pi/6, \pm\pi/2\}}$.

If either fails, the Witting/W33 photonic realization is falsified.

External Sources

1. R. A. Wilson, *On Possible Embeddings of the Standard Models of Particle Physics and Gravity in E_8* (2024).

2. A. Marrani and P. Truini, *The Magic Star of Exceptional Periodicity* (2017).

3. L. A. Anchordoqui et al., *Warm Dark Matter from Higher-Dimensional Gauge Theories*, Universe 7 (2021) 462.

4. Schlaefli graph references: MathWorld and Wikipedia (SRG parameters (27,16,10,8)).