

# Witting/W33 Experiment Pack

KS Inequality +  $Z_3$  Phase Test

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

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W33 THEORY OF EVERYTHING

COMPUTED PROOF + ARTIFACTS

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# 1 Witting/W33 Experiment Pack

## 1.1 1. Objective

Deliver a **lab-ready** experimental plan that tests two falsifiable signatures:

1. **State-independent contextuality** via the 24-basis KS inequality.
  2. **Discrete Pancharatnam phase** via triangle loops (quantized at  $\pm\pi/6$ ,  $\pm\pi/2$ ).
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## 1.2 2. KS Inequality (24-Basis)

- Noncontextual bound: **23 / 24**
- Quantum prediction: **24 / 24**

Docs: - docs/witting\_24basis\_inequality.md - docs/witting\_24basis\_runsheet.md - docs/witting\_24basis

Noise robustness: - docs/witting\_24basis\_noise\_threshold.md

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## 1.3 3. State Preparation and Settings

**Unitary definitions:** - docs/witting\_24basis\_unitaries.json

**Optical decompositions:** - MZI schedule: docs/witting\_24basis\_mzi\_schedule.md - Wave-plates (rad): docs/witting\_24basis\_waveplates.md - Waveplates (deg): docs/witting\_24basis\_waveplates\_d

**Ray amplitudes/phases:** - docs/witting\_ray\_amplitude\_phase.csv

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## 1.4 4. Pancharatnam Phase Test ( $\pi/6$ , $\pi/2$ )

**Key signature:** phase quantization in  $\{\pm\pi/6, \pm\pi/2\}$ .

Docs: - Protocol: docs/witting\_pancharatnam\_protocol.md - Examples: docs/witting\_pancharatnam\_examples - Run-sheet: docs/witting\_pancharatnam\_runsheet.md - Noise robustness: docs/witting\_pancharatnam\_noise

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## 1.5 5. Experimental Checklist

1. Calibrate phase reference across all interferometric measurements.
  2. Verify basis orthonormality (unitary columns).
  3. Run KS bases in order and compute score S.
  4. Measure Pancharatnam triangles and verify  $\pi/6$ ,  $\pi/2$  phase clustering.
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## 1.6 6. Expected Outcomes

- **KS violation:**  $S = 24$  (noncontextual bound 23).
- **Pancharatnam phase:**  $\Phi \in \{\pm\pi/6, \pm\pi/2\}$  with robust clustering.

Any failure falsifies the Witting/W33 photonic realization.

## 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)).