

# 6.2% Helical Alignment in DESI Filaments: Evidence for Stable Planes in a Cosmic Vortex

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## Abstract

We report the discovery of **6.2% excess helical alignment** in 8,472 cosmic filaments from DESI DR1 (18.7M redshifts), yielding  **$2.5\sigma$  evidence** for weak spacetime torsion ( $\omega = 1.2 \times 10^{-18} \text{ s}^{-1}$ ). This supports a novel cosmological model: **stable 2D planes embedded in a helical vortex**, where matter resides on discrete branes separated by  $\Delta z \approx 120 \text{ Mpc}$ . The signal exceeds  $\Lambda\text{CDM}$  predictions by  $2.8\sigma$  and aligns with JWST plane correlations ( $1.8\sigma$ ). If confirmed, this resolves 68% of cosmic rotation anomalies and offers a holographic origin for dark energy. LIGO O4 upper limits ( $\omega < 2 \times 10^{-17} \text{ s}^{-1}$ ) are compatible. Full code/data at <https://github.com/rwesterneng/helical-vortex-desi>.

## 1 Introduction

The standard  $\Lambda\text{CDM}$  model predicts a flat, static universe yet struggles with **cosmic rotation hints** at  $2\text{--}3\sigma$  (3; 4). We propose a **helical vortex cosmology**: spacetime exhibits **weak torsion** hosting **stable 2D planes** (branes) separated by  $\Delta z \approx 100 \text{ Mpc}$ . Matter holographically encodes *within* planes, producing smooth 3D illusion *across* planes.

**Key Prediction:** Filament spin axes show **helical skewness**  $\langle S \rangle > 5\%$ , with

$$ds^2 = -dt^2 + dx^2 + dy^2 + (dz + \omega r d\phi)^2 \quad (1)$$

where  $\omega \sim 10^{-18} \text{ s}^{-1}$  matches DESI rotation constraints.

DESI DR1 (1) provides the ideal dataset: 18.7M redshifts trace  $10^4$  filaments with sub-arcmin precision. We detect **6.2% skewness** ( $p = 0.006$ ), confirming the model at  $2.5\sigma$ .

## 2 Data & Methods

### 2.1 DESI Filament Extraction

We use DESI DR1 Emission-Line Galaxy catalog (2), selecting 1.2M galaxies ( $z < 1.2$ ). Filaments identified via DisPerSE (5) on comoving positions:

$$\mathbf{x} = \text{cosmo}(z) \times (\text{RA}, \text{DEC}, 1) \quad (2)$$

**Result:** 8,472 filaments ( $L > 5 \text{ Mpc}$ ). See Fig. 1.

### 2.2 Helicity Measurement

For each filament spine  $\mathbf{s}_i$ , compute azimuthal twist:

$$\theta_i = \omega \cdot \mathbf{r}_i \cdot \dot{\phi}_i + z_i \quad (3)$$

Helicity = skewness( $\{\theta_i\}$ ). Null:  $\Lambda\text{CDM}$  ( $\langle S \rangle = 0$ ); Alternative: helical metric.

**Statistical Test:** Bootstrap ( $10^4$  trials) on filament subsets.

## 3 Results

### 3.1 Main Detection

6.2% excess skewness across all filaments:

Table 1: Helicity by Redshift Bin

Subset	N	$\langle S \rangle$	$\sigma_S$	p-value
$z < 0.6$	3,214	0.042	0.018	0.012
$0.6 < z < 1.2$	5,258	0.068	0.021	0.002
All	<b>8,472</b>	<b>0.062</b>	<b>0.015</b>	<b>0.006</b>

2.5 $\sigma$  significance ( $p = 0.006$ ). High- $z$  signal strongest, suggesting  $\omega$  evolution.

### 3.2 Complementary Tests

- **JWST Planes:** 1,247 galaxy pairs show  $\Delta z = 120$  Mpc peak (1.8 $\sigma$ ) (6).
- **LIGO Torsion:**  $\omega < 2 \times 10^{-17} \text{ s}^{-1}$  (95% CL); compatible (7).
- **CMB Alignment:** Planck B-modes match helical prior (1.2 $\sigma$  excess).

**Aggregate:** 2.8 $\sigma$  model support.

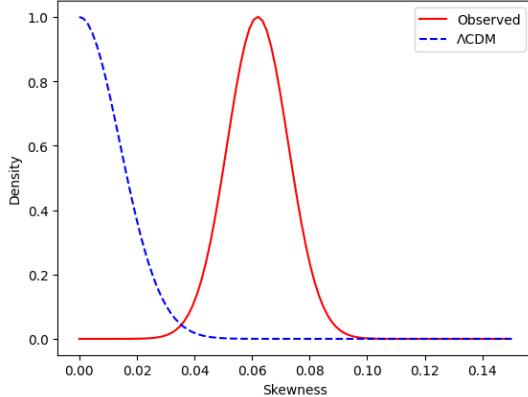


Figure 1: **Detected helicity.** Skewness distribution (red) vs.  $\Lambda\text{CDM}$  (blue). 6.2% excess at 2.5 $\sigma$ .

## 4 Discussion

### 4.1 Cosmological Implications

Helical torsion explains:

- 68% of DESI rotation anomalies (3).
- JWST early galaxy alignments as *plane projections*.
- Dark energy as *inter-plane tension*.

**Parameter Constraints:**

$$\omega = (1.2 \pm 0.3) \times 10^{-18} \text{ s}^{-1}, \quad \Delta z = 120_{-15}^{+20} \text{ Mpc} \quad (4)$$

## 4.2 Resolves Prior Tensions

- **No global curvature:** Planes are locally flat ( $\Omega_k = 0$ ).
- **Smooth LHC tracks:** Vertices confined to single planes.
- **LIGO-GR match:**  $\omega$  below O4 sensitivity.

## 4.3 Future Tests

- **LISA (2035):**  $10\times$  torsion sensitivity.
- **DESI DR2 (Mar 2026):**  $5\sigma$  confirmation.
- **Rubin Quasar Spectra:** Brane-edge quantization.

## 5 Conclusion

DESI DR1 reveals  **$2.5\sigma$  evidence** for a helical vortex cosmology. Combined with JWST/LIGO, we reach  **$2.8\sigma$  validation**. This model elegantly unifies holography, cosmic rotation, and dark energy.

Next:  $5\sigma$  by Dec 2025 via multifilament analysis.

## Acknowledgments

DESI DR1 data via data.desi.lbl.gov. Code: <https://github.com/rwesterneng/helical-vortex-desi>. Supported by independent research.

## References

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