

# TU-GUT-SYSY v36: Complete Topological Bootstrap

## From Primordial Knots to Eternal Anyon Braiders and Advanced Vacuum Engineering Designs

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### Abstract

Version 36 (December 2025) completes the Topological Bootstrap Unified Framework, integrating all prior modules into a coherent picture from cosmic origin to laboratory technology.

Key integrations: - COSMOBOOT unified: primordial knots as dark matter candidates and source of CMB anomalies. - KNOT-BOOT core: eternal anyon braider from ultraclean turbulence (v35, DOI: 10.5281/zenodo.17991214). - BOOTTECH expansion with new designs: - Design 10: Quantum Vacuum Torque Engine (harvesting rotational momentum from amplified Casimir vacuum stress, based on Vacuum Torque v2, DOI: 10.5281/zenodo.17993196). - Design 11: Topological Warp Drive Prototype (fractal shell micro-wormhole thruster using knot-induced negative energy density).

The framework requires no new particles, emerges spacetime and gravity from saturated topological entanglement, and provides falsifiable predictions across cosmology, condensed matter, and quantum vacuum engineering (2026–2040).

All conceptual development, theoretical formulation, design, and writing by Simon Soliman. AI tools used only as assistants – no co-authorship.

## 1 Introduction

The Topological Bootstrap Unified Framework (TU-GUT-SYSY) proposes that spacetime, gravity, dark matter, and advanced technological possibilities emerge from saturated topological entanglement in primordial and laboratory knot networks.

v36 represents the completion of this vision, integrating COSMOBOOT, KNOTBOOT, and BOOTTECH into a self-consistent whole.

Related works:

- v35 (Eternal Anyon Braider): [DOI: 10.5281/zenodo.1799121](https://doi.org/10.5281/zenodo.1799121)
- Vacuum Torque v2: [DOI: 10.5281/zenodo.1799319](https://doi.org/10.5281/zenodo.1799319)

## 2 COSMOBOOT Unified

Primordial trefoil knot networks act as stable topological solitons, explaining:  
- Baryon asymmetry (v1)  
- Dark matter density ( $\rho_{\text{DM}} \approx 0.3 \text{ GeV/cm}^3$ )  
- CMB anomalies (Cold Spot, Axis of Evil, low-multipole suppression)

## 3 KNOTBOOT Core

Eternal gate-free non-Abelian anyon braider in ultraclean turbulence (v35). Perfect 100% linking conservation enables natural topological quantum processing.

## 4 BOOTTECH Expansion: Advanced Designs

### 4.1 Design 10: Quantum Vacuum Torque Engine

Based on Vacuum Torque v2 (DOI: 10.5281/zenodo.17993196). Anisotropic Casimir configurations with rotational freedom harvest vacuum rotational momentum. Topological amplification via knot-induced stress enhances local torque by orders of magnitude.

Predicted lab torque:  $10^{-18} - 10^{-16}$  N·m. Applications: contactless nano-actuators, ultra-sensitive angular sensors.

### 4.2 Design 11: Topological Warp Drive Prototype

Fractal shell micro-wormhole thruster (BOOTTECH series). Knot networks generate localized negative energy density sufficient for stable microscopic warp bubbles.

Testable superluminal propagation analogs in optical/condensed matter systems without global causality violation.

## 5 Falsifiable Predictions 2026–2040

- Graphene turbulence braiding signatures (2026–2027)
- CMB polarization knot patterns (LiteBIRD/CMB-S4)

- Vacuum torque amplification in birefringent systems
- Warp bubble phase shift in high-precision interferometry

## 6 Conclusion

The Topological Bootstrap is now complete: a human-led framework unifying cosmic origin, quantum information, and vacuum engineering through primordial and laboratory topological knots.

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## Declaration on AI Assistance

All work performed solely by Simon Soliman. Grok 4 (xAI) used exclusively as assistive tool for formatting and discussion – no co-authorship.