Twist–Topological Framework

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These three manuscripts form a coherent trilogy that develops a twist-topological framework bridging fundamental physics and foundational philosophy. Starting from the hypothesis of a globally non-orientable spacetime with a half-twist structure, the papers present a mathematically rigorous, empirically testable, and ontologically grounded account of physical reality.

1. Twist–Topological Gravity: Formal Foundations and Minimal Cosmology

This paper introduces a quantum–geometric model in which all interactions arise from the parity structure of a globally non–orientable four-manifold. A half-quantised twist flux $\varphi f = 1/2$ encodes topological non-orientability, yielding a stiff-fluid $w = 1$ term in the field equations and explaining fermion family replication via a mod-2 index. The dynamics derive from a twist-extended Holst–Palatini action. Cosmological implications are discussed but elaborated further in the second paper.

2. Twist–Topological Phenomenology

This paper derives precise, parameter-free predictions for cosmology, galaxy dynamics, gravitational-wave signals, and neutrino physics. A single geometric scale—the twist curvature radius $R\ominus$—governs an early stiff-fluid component that simultaneously accounts for:

- the H_0 and σ_8 tensions,
- MOND-like acceleration scales without free parameters,
- CMB TB/EB parity violation,
- ringdown frequency shifts in black holes,
- and Aharonov–Bohm phases in neutrino oscillations.

A consolidated forecast shows that this framework can be falsified by upcoming missions: LiteBIRD, SKA, DUNE, and the Einstein Telescope.

3. Philosophy of the Twist–Topological Structure

The third manuscript explores the epistemic and ontological foundation of the framework. It describes how reality structurally emerges from the recursive interplay between state, process, and simultaneity—modeled as a triadic, twist-based topology. A functorial bridge is constructed between logical fixed-point lattices (Knaster–Tarski) and geometric non-orientability. The paper places the framework within structural realist philosophy, connecting categorical logic with empirical testability.

Together, these three works establish a unified theoretical framework that interweaves physics, mathematics, and philosophy—structurally coherent, mathematically sound, and empirically accessible.