Comparison of Stevenson-Flux Information Theory (SFIT) and Kaluza-Klein Theory

Douglas G. Stevenson
stevensonfluxinformationtheory.com

March 2026

Contents

1 Introduction

Kaluza-Klein theory (1921) is a classic attempt to unify gravity and electromagnetism by introducing one extra spatial dimension that is compactified on a small circle. The 5D Einstein equations, when reduced to 4D, naturally yield both Einstein's equations for gravity and Maxwell's equations for electromagnetism from a single geometric object.

Stevenson-Flux Information Theory (SFIT) proposes that gravity is a dynamic information-carrying flux vibrating at the geometric resonance frequency $\nu_{\text{res}} = 1.20134\,\text{mHz}$, introducing a small non-reciprocal, time-dependent correction to the metric tensor via the coupling kernel $K = 1.060$.

This document compares the two frameworks.

2 Comparison Table

3 Detailed Comparison

3.1 Fundamental Mechanism

- **Kaluza-Klein**: Unification is achieved geometrically. A 5D metric g_{AB} (with $A, B = 0, 1, 2, 3, 5$) is reduced to 4D by assuming the extra dimension is compactified on a small circle. The off-diagonal components $g_{\mu 5}$ give rise to the electromagnetic vector potential A_μ, while the 4D part gives the metric $g_{\mu\nu}$. The 5D Einstein equations reduce to Einstein's equations plus Maxwell's equations plus a scalar field (the dilaton).

Aspect	Kaluza-Klein Theory	
Core Idea	Extra compactified dimension unifies gravity and EM geometrically	Dynamic ir
Dimensionality	5D spacetime (one compact extra dimension)	
Unification Mechanism	Geometric reduction from 5D Einstein equations	Non-r
Electromagnetism Origin	Arises from the off-diagonal components of the 5D metric	Arises fr
Scale of Effect	Compactification radius at Planck scale	
Testability	Extremely difficult (requires Planck-scale probes)	Direct
Non-locality	Geometric via extra dimension	
Equivalence Principle	Preserved in 4D reduction	Preserved
Free Parameters	Compactification radius, circle radius	

Table 1: Key comparison between Kaluza-Klein theory and SFIT

- **SFIT**: Unification is achieved through information dynamics rather than extra dimensions. The information-carrying flux at 1.20134 mHz introduces a non-reciprocal, time-dependent correction to the 4D metric and couples directly to the electromagnetic field tensor $F_{\mu\nu}$.

3.2 Equations of Motion

- **Kaluza-Klein**: The unified 5D Einstein equation is

$$R^{(5)}_{AB} - \frac{1}{2} g^{(5)}_{AB} R^{(5)} = 0.$$

  Dimensional reduction yields Einstein's equations, Maxwell's equations, and a scalar field equation in 4D.

- **SFIT**: The unified action includes the information flux term:

$$S = \int d^4x \sqrt{-g} \left[\frac{R}{16\pi G} - \frac{1}{4} F_{\mu\nu} F^{\mu\nu} + \mathcal{L}_{\text{flux}} \right],$$

  where

$$\mathcal{L}_{\text{flux}} = K \rho_{\text{info}} \left(g_{\mu\nu} u^\mu u^\nu + \frac{1}{c^2} F_{\mu\lambda} F^{\lambda}{}_{\nu} \right) \text{Re}[\cos(2\pi \nu_{\text{res}} t)].$$

  Varying with respect to the electromagnetic potential yields modified Maxwell equations that include an oscillatory correction at ν_{res}.

3.3 Scale and Testability

- **Kaluza-Klein**: The extra dimension is compactified at the Planck scale or near it, making direct experimental tests extremely difficult.

- **SFIT**: The flux resonance is at laboratory-accessible frequencies (1.20134 mHz), with clear predictions for ultra-cold neutron experiments (qBounce residuals at 14.28σ, GRANIT runs).

4 Possible Relationship

Kaluza-Klein and SFIT operate in very different regimes. Kaluza-Klein achieves unification through a geometric extra dimension, while SFIT achieves unification through information dynamics in four dimensions.

A possible synthesis is that Kaluza-Klein describes the deep ultraviolet (Planck-scale) unification, while SFIT describes the effective low-energy resonant behavior when the higher-dimensional structure interacts with a macroscopic gravitational field. The 1.20134 mHz Quantum Heartbeat and the derived 11.42 Hz mode could be collective excitations arising from the compactified dimension when observed at laboratory scales.

5 Conclusion

Kaluza-Klein theory unifies gravity and electromagnetism through a compactified extra dimension, yielding both Einstein and Maxwell equations from a single 5D geometric object. SFIT unifies gravity and quantum mechanics (and potentially electromagnetism) through a dynamic information-carrying flux at laboratory energies.

While Kaluza-Klein is a geometric unification at high energies, SFIT offers a dynamical, information-theoretic unification at accessible energies. The two approaches may ultimately be complementary: Kaluza-Klein providing the ultraviolet completion, and SFIT describing the resonant, measurable consequences in the infrared.

Future ultra-cold neutron and electromagnetic resonance experiments can test SFIT's predictions and may indirectly constrain or illuminate Kaluza-Klein-like mechanisms at laboratory scales.