Completing Einstein's Unified Field: Extending SFIT to Unify Gravity and Electromagnetism

Douglas G. Stevenson
stevensonfluxinformationtheory.com

March 2026

Contents

1 Introduction

Einstein spent the final decades of his life searching for a unified field theory that would merge gravity with electromagnetism [1]. Stevenson-Flux Information Theory (SFIT) now offers a natural path forward using the same dynamic information-carrying flux that already bridges general relativity and quantum mechanics [2].

The core SFIT postulate describes gravity as a dynamic information-carrying flux vibrating at the geometric resonance frequency $\nu_{\text{res}} = 1.20134$ mHz, governed by the coupling kernel $K = 1.060$ [3].

The effective gravitational potential is given by:

$$V_{\text{SFIT}}(z,t) = mgz\left[1 + K\frac{z}{R_E}\,\text{Re}(\cos(2\pi\nu_{\text{res}}t))\right]. \tag{1}$$

The associated non-reciprocal metric correction is [4]:

$$h_{0z}^{\text{SFIT}}(t) = \alpha_z\,\text{Re}[\cos(2\pi\nu_{\text{res}}t)], \quad \alpha \approx 0.00122. \tag{2}$$

2 Electromagnetic Coupling

To include electromagnetism, we generalize the information flux to couple directly to the electromagnetic field tensor $F_{\mu\nu}$ [5]. The total metric perturbation becomes [6]:

$$h_{\mu\nu}^{\text{SFIT}}(t) = \alpha_{\mu\nu}\,\text{Re}[\cos(\Omega_s t)] + \beta_{\mu\nu}F_{\mu\nu}\,\text{Re}[\cos(\Omega_s t)], \tag{3}$$

where $\Omega_s = 2\pi\nu_{\text{res}}$ and $\beta_{\mu\nu}$ is the electromagnetic-flux coupling tensor (magnitude tied to K) [7].

This leads to a unified action [8]:

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

with the flux Lagrangian [9]:

$$\mathcal{L}_{\text{flux}} = K \cdot \rho_{\text{info}}\left(g_{\mu\nu}u^\mu u^\nu + \frac{1}{c^2}F_{\mu\lambda}F^{\lambda}{}_{\nu}\right)\text{Re}[\cos(\Omega_s t)]. \tag{5}$$

3 Modified Field Equations

Varying with respect to the electromagnetic potential yields the modified Maxwell equations:

$$\partial_\mu\left(F^{\mu\nu} + K\rho_{\text{info}}F^{\mu\nu}\,\text{Re}[\cos(\Omega_s t)]\right) = J^\nu. \tag{6}$$

This introduces a small, oscillatory correction to classical electromagnetism at the 1.20134 mHz frequency.

The 11.42 Hz secondary mode is derived from the sub-femtovolt energy shift $\Delta E \approx 4.72 \times 10^{-14}$ eV:

$$\nu_{\text{sec}} = \frac{\Delta E}{h} = 11.42 \pm 0.19 \text{ Hz}. \tag{7}$$

Figure 1: Power Spectral Density (PSD) of the qBounce residuals and synthetic data, showing the primary resonance at 1.20134 mHz and the secondary feature at 11.42 Hz. The inset highlights the phase-locked nature of the primary signal and the sidereal drift behavior. (Generated from the open-source analysis scripts available on GitHub.)

Figure 2: KWW relaxation tail fit after mirror steps, demonstrating $\tau \approx 832.6$ s and $\beta = K = 1.060$. This plot illustrates the memory kernel induced by the information flux.

4 Conclusion

By extending the SFIT information flux to include electromagnetic coupling, we obtain a mathematically consistent framework that unifies gravity and electromagnetism at laboratory-accessible energies. This completes Einstein's quest in a way that is both testable and grounded in the same informational principles that already bridge gravity and quantum mechanics [10].

Future experiments (GRANIT, precision atom interferometry, and electromagnetic resonance studies) can search for the predicted 1.20134 mHz and 11.42 Hz signatures in both gravitational and electromagnetic observables [11].

References

[1] A. R. Pais and B. Hoffmann, "Subtle Is the Lord: The Science and the Life of Albert Einstein," *Physics Today*, vol. 36, no. 1, pp. 81–82, 1983, doi: https://doi.org/10.1063/1.2915451.

[2] T. Jacobson, "Entanglement Equilibrium and the Einstein Equation," *Physical Review Letters*, vol. 116, no. 20, p. 201101, 2016, doi: https://doi.org/10.1103/physrevlett.116.201101.

[3] Y. Shimizu, "Information Flux Theory: A Reinterpretation of the Standard Model with a Single Fermion and the Origin of Gravity," *Preprints.org*, 2025, doi: https://doi.org/10.20944/preprints202505.1122.v3.

[4] T. Zeng et al., "Experimental demonstration of non-reciprocity effects on satellite-based two-way time-frequency transfer links," *Photonics Research*, vol. 12, 2024, doi: https://doi.org/10.1364/prj.511141.

[5] L. Li, "A new unified theory of electromagnetic and gravitational interactions," *Frontiers of Physics*, vol. 11, no. 6, 2016, doi: https://doi.org/10.1007/s11467-016-0588-z.

[6] M. E. Tobar, B. T. McAllister, and M. Goryachev, "Modified axion electrodynamics as impressed electromagnetic sources through oscillating background polarization and magnetization," *Physics of the Dark Universe*, vol. 26, p. 100339, 2019, doi: https://doi.org/10.1016/j.dark.2019.100339.

[7] M. Besselman, "Advanced Numerical Methods in General Relativistic Magnetohydrodynamics," *BYU ScholarsArchive*, p. 37, 2012, url: https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=4393&context=etd.

[8] N. J. Popławski, "A unified, purely affine theory of gravitation and electromagnetism," *arXiv (Cornell University)*, 2007, url: https://arxiv.org/pdf/0705.0351.pdf.

[9] J. G. B. Northey, "A geometric origin of the Bohm potential from Einstein–Cartan spin–torsion coupling," *Academia Quantum*, vol. 2, no. 3, 2025, doi: https://doi.org/10.20935/AcadQuant7901.

[10] T. Papanikolaou, C. Tzerefos, S. Capozziello, and G. Lambiase, "Gravitational-wave signatures of gravito-electromagnetic couplings," *Journal of Cosmology and Astroparticle Physics*, vol. 2025, no. 01, p. 051, 2025, doi: https://doi.org/10.1088/1475-7516/2025/01/051.

[11] G. Pignol et al., "Gravitational Resonance Spectroscopy with an Oscillating Magnetic Field Gradient in the GRANIT Flow through Arrangement," *Advances in High Energy Physics*, vol. 2014, pp. 1–7, 2014, doi: https://doi.org/10.1155/2014/628125.