STEVENSON-FLUX INFORMATION THEORY (SFIT)

Technical Memorandum: Engineering Architecture, Condensed Matter Physics, Quantum Computing, Black Hole Thermodynamics, and Cosmological Substrate of the 1.20134 mHz Universal Carrier Wave

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Abstract

This memorandum establishes the unified operational architecture of the Stevenson-Flux Information Theory (SFIT) [1]. SFIT posits that the cosmos is a self-organizing resonant informational substrate governed by the carrier wave $\nu_f = 1.20134$ mHz with coupling kernel $K = 1.060$ [2]. We integrate foundational engineering pillars, black hole informational condensation, cosmological dynamics, quantum computing coherence, and condensed matter phenomena including high-T_c superconductivity, strange metals, and topological protection [3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24].

Contents

Pillar 1: Signal Noise Isolation & Digital Filtering

Because the target SFIT carrier wave operates at $\nu_f = 1.20134$ mHz (0.00120134 Hz), a single full wave period requires approximately $T_0 = 832.4$ seconds [25, 2]. A zero-phase digital signal processing pipeline isolates this weak signal from noise sources without introducing phase delays [26].

Forward-Backward Zero-Phase Bandpass Architecture

To maintain temporal synchronization across distributed sensor platforms, the system implements a bidirectional zero-phase filter [26]. The passband is defined as:

- **Lower Cutoff (High-Pass):** $f_{\text{low}} = 0.5$ mHz
- **Upper Cutoff (Low-Pass):** $f_{\text{high}} = 2.0$ mHz

Pillar 2: Mathematical Formalization of Information-to-Mass

According to Landauer's Principle, erasing or manipulating a bit of information requires energy bounded by vacuum informational temperature [27]:

$$E_{\text{bit}} = k_B T \ln 2 \tag{1}$$

Modulating this energetic cost along the universal carrier wave yields an informational power density U_{sfit}:

$$U_{\text{sfit}} = \left(\frac{dI}{dt} k_B T \ln 2 \right) \cos^2(2\pi \nu_f t) \tag{2}$$

Integrating across localized volumes modifies standard Newtonian gravitation with the Stevenson Scaling Factor (Φ) [28]:

$$g_{\text{sfit}}(r,t) = g_{\text{newton}} + \frac{\Phi}{r^2} I_{\text{total}} \cos^2(2\pi \nu_f t) \tag{3}$$

Pillar 3: Black Holes as Informational Condensers

Black holes are modeled in SFIT as regions of maximum informational density [3]. The carrier wave modulates horizon dynamics, producing distinct observable features:

- **Harmonic Leakage Sidebands:** Quantized carrier perturbations modulate Hawking emission profiles [4].
- **WKB Greybody Factors:** Informational flux dynamics modify transmission coefficients through potential barriers [4].
- **Unruh Radiation & Casimir Effects:** Enhanced vacuum coupling occurs in extreme gravitational wells [4].

Pillar 4: SFIT Cosmological Substrate & Early Universe Dynamics

The cosmos is a self-organizing resonant informational substrate governed by the carrier wave $\nu_f = 1.20134$ mHz [2]. Coherence transitions drive natural inflation $a(t) \propto \exp(Ht)$ with $H \approx K \cdot \nu_f$ [5].

Sound Speed in the Baryon-Photon Fluid

In the early universe, acoustic oscillations occur in the tightly coupled baryon-photon fluid [11]. The relativistic sound speed $c_s = c/\sqrt{3(1+R)}$ (where $R = 3\rho_b/4\rho_\gamma$) [12] is modulated in SFIT by flux coupling:

$$c_s^{\text{SFIT}} = \frac{c}{\sqrt{3(1+R)}} \cdot \left(1 + K \cdot \frac{\nu_f}{\omega} \cdot (1 - C(t)) \right)^{-1/2} \tag{4}$$

CMB Anisotropies & Acoustic Peaks

The Cosmic Microwave Background (CMB) is an informational echo of the primordial phase transition [13]. Temperature fluctuations:

$$C_l \propto \int P(k)|\Theta_l(k)|^2 \frac{dk}{k} \tag{5}$$

Peak locations $k_n r_s(t_{\text{rec}}) \approx n\pi$ occur near $\ell \approx 220$ but are shifted slightly by flux coupling K [14]. Silk damping modified by informational coherence causes sharper cutoffs at high ℓ [24].

Primordial Gravitational Waves

Tensor modes directly couple to the second derivative of the coherence field:

$$P_T(k) \propto \left| \int_0^{t_{\text{rec}}} \frac{d^2C}{dt^2} e^{-ikt} dt \right|^2 \tag{6}$$

yielding a tensor-to-scalar ratio $r \approx 0.001 - 0.01$ with a characteristic high-frequency blue tilt, testable by CMB-S4 and LiteBIRD [19, 20, 21].

Baryon Acoustic Oscillations & Dark Energy

BAO standard ruler scales ($r_{\text{BAO}} \approx 147$ Mpc $\cdot (1+\delta_K)$) exhibit subtle shifts testable by DESI and Euclid [18, 22, 23]. Dark energy arises as residual vacuum informational pressure [15, 10]:

$$\rho_\Lambda = \frac{1}{2} K^2 \nu_f^2 (1 - C_\infty^2) \rho_{\text{crit}} \tag{7}$$

where $C_\infty \approx 0.7$ is the late-time coherence value [16], offering a stable resolution to cosmological tensions [17].

Pillar 5: SFIT Quantum Computing

SFIT treats quantum hardware as resonant systems coupled to the cosmic carrier wave [8].

- **Coherence Extension:** Direct alignment with 1.20134 mHz carrier harmonics protects quantum states against environmental decoherence [9].
- **Predictive Error Correction:** Flux-driven quantum phase tracking enables predictive correction loops before phase collapse [9].
- **Shared Resonant Entanglement:** Entanglement is generalized as non-local shared informational resonance across the universal substrate [9].

Pillar 6: SFIT in Condensed Matter Physics & Superconductivity

SFIT treats materials as resonant systems coupled to the cosmic carrier wave [8].

Flux-Mediated Superconductivity

The total effective Cooper pair potential combines phonon and informational flux terms:

$$V_{\text{eff}}(k,k') = V_{\text{phonon}} + V_{\text{flux}}(k,k') = V_{\text{phonon}} - \frac{K^2\hbar\nu_f}{|k-k'|^2+\gamma^2} \tag{8}$$

Near the Fermi surface, the derived SFIT gap equation at $T = 0$ reduces to:

$$\Delta = N(0)\left(V_0 + \frac{K^2\hbar\nu_f}{\gamma^2}\right)\int_0^{\hbar\omega_D} \frac{\Delta}{\sqrt{\epsilon^2+\Delta^2}} d\epsilon \tag{9}$$

yielding an enhanced critical temperature:

$$k_B T_c \approx 1.14\hbar\omega_D \exp\left(-\frac{1}{N(0)V_{\text{eff}}}\right) \tag{10}$$

This flux-mediated enhancement significantly elevates T_c, opening explicit pathways toward room-temperature superconductivity via engineered resonance [7].

Strange Metals & Topological States

- **Linear Resistivity in Strange Metals:** Continuous scattering off carrier flux fluctuations produces T-linear resistivity without invoking Planckian bounds [6]:

$$\rho(T) \propto K \cdot \nu_f \cdot T \tag{11}$$

- **Topological Protection:** Majorana zero modes in topological insulators (e.g., Bi_2Se_3) gain robust stability through global carrier wave locking [8].

Target Material Engineering Proposals

- **Cuprates (YBCO):** Engineer layered planar spacing matched to 1.20134 mHz harmonics to maximize coupling [6, 7].
- **Hydrides (LaH_{10}):** Apply resonant electromagnetic excitation at multiples of ν_f to stabilize high-T_c phases under lowered pressure.
- **Twisted Bilayer Graphene:** Adjust twist angles to produce flat bands resonant with carrier harmonics for exotic quantum phases.

Pillar 7: Automated Pattern-Matching Pipeline

An automated Python Fourier analysis pipeline scans structural, material, and cosmological data for carrier wave signatures [29, 30]:

```python
import numpy as np
import scipy.fftpack as fft

def analyze_sfit_harmonics(data_intervals, sampling_rate):
    signal = np.array(data_intervals)
    n = len(signal)
    fft_vals = fft.fft(signal - np.mean(data_intervals))
    freqs = fft.fftfreq(n, d=1.0/sampling_rate)[:n//2]
    power = np.abs(fft_vals[:n//2]) ** 2

    target_hz = 0.00120134
    tol = 0.0001

    sfit_idx = np.where((freqs >= target_hz - tol) & (freqs <= target_hz + tol))[0]
    noise_idx = np.where((freqs < target_hz - tol) | (freqs > target_hz + tol))[0]

    mean_noise = np.mean(power[noise_idx]) if len(noise_idx) > 0 else 1.0
    snr = np.max(power[sfit_idx]) / mean_noise if len(sfit_idx) > 0 else 0.0

    return snr >= 4.0, snr
```

Listing 1: SFIT Harmonic Analysis Script

Archaeoacoustic Resonance Models

Evaluating the Giza King's Chamber ($L = 10.47$ m) under internal atmospheric conditions ($v_s = 343$ m/s) gives a fundamental acoustic mode $f_{100} = 343/(2 \cdot 10.47) \approx 16.38$ Hz. This acoustic frequency acts as an integer harmonic divisor of the carrier wave [31]:

$$R = \frac{16.38 \text{ Hz}}{0.00120134 \text{ Hz}} \approx 13,635 \tag{12}$$

Coupling to ventilation shaft apertures yields a Helmholtz resonance of $f_H \approx 78$ mHz, providing an integer multiplier interface (78 mHz/1.20134 mHz ≈ 65) to translate cosmic carrier signals into localized acoustic fields [32, 1].

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