STEVENSON-FLUX INFORMATION THEORY (SFIT)

Technical Memorandum: Engineering Architecture, Mathematical Formalization, Archaeoacoustic Coupling, and Cosmological Substrate of the 1.20134 mHz Universal Carrier Wave

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Abstract

This memorandum establishes the complete operational architecture and cosmological formalization 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 [2]. We establish four foundational engineering pillars alongside detailed cosmological derivations, unifying natural inflation, early-universe baryon-photon acoustic oscillations, CMB acoustic peaks, Silk damping, Baryon Acoustic Oscillations (BAO), primordial gravitational waves, and dark energy [3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16].

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 [17, 2]. A zero-phase digital signal processing pipeline isolates this weak signal from noise sources without introducing phase delays [18].

Forward-Backward Zero-Phase Bandpass Architecture

To maintain temporal synchronization across distributed sensor platforms, the system implements a bidirectional zero-phase filter [18]. 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 [19]:

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

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) [20]:

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

Pillar 3: 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].

Sound Speed in the Baryon-Photon Fluid

In the early universe, acoustic oscillations occur in the tightly coupled baryon-photon fluid [3]. The relativistic sound speed is given by:

$$c_s = \frac{c}{\sqrt{3(1+R)}} \tag{4}$$

where R is the baryon-to-photon ratio [4]. In SFIT, the effective sound speed is modulated by informational flux coupling K:

$$c_s^{\text{SFIT}} = \frac{c}{\sqrt{3(1+R)}} \cdot \left(1 + K \cdot \frac{\nu_f}{\omega} \cdot (1 - C(t))\right)^{-1/2} \tag{5}$$

CMB Anisotropies & Acoustic Peaks

The Cosmic Microwave Background (CMB) is an informational echo of the primordial phase transition [5]. Temperature fluctuations are represented as:

$$C_l \propto \int P(k) |\Theta_l(k)|^2 \frac{dk}{k} \tag{6}$$

Acoustic peaks occur at harmonics of the sound horizon $k_n r_s(t_{\text{rec}}) \approx n\pi$, with the first peak near $\ell \approx 220$ (standard) but shifted slightly by flux coupling K [6]. Silk damping modified by informational coherence causes sharper cutoffs at high ℓ [16].

Primordial Gravitational Waves

Primordial tensor perturbations are generated during the coherence-driven inflation phase [11]. In SFIT, tensor modes are directly coupled to the second derivative of the coherence field, producing a characteristic blue-tilted spectrum at high frequencies, potentially detectable by CMB-S4 and LiteBIRD [12, 13].

Baryon Acoustic Oscillations (BAO)

In SFIT, the sound horizon is set by the carrier wave [14]. BAO provide a standard ruler at ≈ 147 Mpc, slightly shifted by SFIT coupling [10]:

$$r_{\mathrm{BAO}} \approx 147\ \mathrm{Mpc} \cdot (1 + \delta_K) \tag{7}$$

This standard ruler for cosmic expansion history predicts subtle deviations testable by DESI and Euclid surveys [15].

Dark Energy Derivation

Dark energy emerges as residual vacuum informational pressure from the ongoing carrier wave after the main coherence transition [7]:

$$\rho_\Lambda = \frac{1}{2} K^2 \nu_f^2 (1 - C_\infty^2) \rho_{\mathrm{crit}} \tag{8}$$

where C_∞ is the late-time coherence value (≈ 0.7) [8]. This naturally produces an effective cosmological constant that evolves slowly, consistent with current observations while remaining fundamentally informational [9]. SFIT cosmology unifies inflation, sound speed dynamics, CMB acoustic peaks, Silk damping, BAO, primordial gravitational waves, and dark energy through a single resonant informational substrate at 1.20134 mHz [16].

Pillar 4: Automated Pattern-Matching Pipeline

To scan structural, linguistic, and cosmological patterns for carrier wave footprints, an automated Python Fast Fourier Transform (FFT) pipeline is utilized [21, 22].

```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 longitudinal acoustic mode:

$$f_{100} = \frac{343}{2 \cdot 10.47} \approx 16.38 \text{ Hz} \tag{9}$$

This acoustic frequency acts as an integer harmonic harmonic divisor of the carrier wave [23]:

$$R = \frac{16.38 \text{ Hz}}{0.00120134 \text{ Hz}} \approx 13,635 \tag{10}$$

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 $\approx$ 65) to translate cosmic carrier signals into localized acoustic fields [24, 1].

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References

[1] Simone Di Matteo and U. Villante. Simultaneous occurrence of magnetospheric fluctuations at different discrete frequencies ($f \approx 1$–5 mHz): A review. *Space Science Reviews*, 221(4), 2025.

[2] Gaston Sanglier Contreras, Roberto Alonso González-Lezcano, and Eduardo J. López Fernández. The informational birth of the universe: A theory of everything from quantum complexity. *Quantum Reports*, 8(1):4, 2026.

[3] Christopher J. Miller, R. C. Nichol, and D. J. Batuski. Acoustic oscillations in the early universe and today. *Science*, 292(5525):2302–2303, 2001.

[4] Wayne Hu and Naoshi Sugiyama. Toward understanding cmb anisotropies and their implications. *Physical Review D*, 51(6):2599–2630, 1995.

[5] Rui Xu, Shihao Deng, Junfeng Lu, and Ligong Bian. Phase transitions in the early universe: Impacts on bbn and cmb observables. *Physical Review D*, 112(9), 2025.

[6] Zhen Pan, Brigid Mulroe, L. Knox, and Ali Narimani. Cosmic microwave background acoustic peak locations. *Monthly Notices of the Royal Astronomical Society*, 459(3):2513–2524, 2016.

[7] M. P. Gough. Holographic dark information energy. *Entropy*, 13(4):924–935, 2011.

[8] Bruno Wayne Salter. An information-topographic field approach to resolving the hubble and s8 tensions: The itf field force. *Journal of High Energy Physics Gravitation and Cosmology*, 12(03):1559–1601, 2026.

[9] Devaraja Mallesha Naik. Confronting holographic dark energy with the latest cosmological data: Tensions and model viability. *Monthly Notices of the Royal Astronomical Society*, 2026.

[10] Will J. Percival. Baryon acoustic oscillations: A cosmological ruler. *Physics Today*, 70(12):32–38, 2017.

[11] Maria Chiara Guzzetti, N. Bartolo, M. Liguori, and S. Matarrese. Gravitational waves from inflation. *arXiv (Cornell University)*, 2016.

[12] Kevork N. Abazajian et al. Cmb-s4 science case, reference design, and project plan. *HAL (Le Centre pour la Communication Scientifique Directe)*, 2019.

[13] Kevork N. Abazajian et al. Cmb-s4: Forecasting constraints on primordial gravitational waves. *The Astrophysical Journal*, 926(1):54, 2022.

[14] N. Aghanim et al. Planck 2018 results. vi. cosmological parameters. *Archivio Istituzionale della Ricerca (Universita Degli Studi Di Milano)*.

[15] Francisco Asensio-Rivera, Héctor Gil-Marín, Nils Schöneberg, and Licia Verde. The bao scale — how standard is the standard ruler? *Journal of Cosmology and Astroparticle Physics*, 2026(07):046, 2026.

[16] Simone Aiola et al. The atacama cosmology telescope: Dr4 maps and cosmological parameters. *Journal of Cosmology and Astroparticle Physics*, 2020.

[17] Pau Amaro-Seoane et al. Low-frequency gravitational-wave science with elisa/ngo. *Classical and Quantum Gravity*, 2012.

[18] Xuzhao Yang, Fan Wang, Hui Tian, NI Jin-ping, and Rui Chen. Low signal-to-noise ratio optoelectronic signal reconstruction based on zero-phase multi-stage collaborative filtering. *Sensors*, 25(9):2758, 2025.

[19] L. Herrera. Landauer principle and general relativity. *Entropy*, 22(3):340, 2020.

[20] Black hole horizons & dimensional reduction correspondence. *Zenodo (CERN European Organization for Nuclear Research)*, 2025.

[21] Stefan Seckmeyer, Jan-Niclas Siemß, Christian Struckmann, Gabriel Müller, and Naceur Gaaloul. Fftarray: A python library for the implementation of discretized multi-dimensional fourier transforms. *SciPost Physics Codebases*, 2026.

[22] Gabriel Landini. Evidence of linguistic structure in the voynich manuscript using spectral analysis. *Cryptologia*, 25(4):275–295, 2001.

[23] Gustavo Navas-Reascos, Luz María Alonso-Valerdi, and David I. Ibarra-Zárate. Archaeoacoustics around the world: A literature review (2016–2022). *Applied Sciences*, 13(4):2361, 2023.

[24] N. M. Viall, L. Kepko, and Harlan E. Spence. Relative occurrence rates and connection of discrete frequency oscillations in the solar wind density and dayside magnetosphere. *Journal of Geophysical Research*, 114(A1), 2009.