From the Higo Signature to the UAT-VASCO Catalogue:
Complete Validation of the Universal Applied Time Framework
via Phase-Coherence Analysis of LIGO Data

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Abstract

We present the complete validation of the Universal Applied Time (UAT) and Unified Causal Principle (UPC) framework through a multi-stage experimental programme. The work encompasses: (1) detection of the Higo Signature – perfect coherence ($\gamma^2 = 1.0$) at 227.50 Hz in LIGO O4a data; (2) measurement of the background Temporal Viscosity Index $\sigma_{\text{TVI}} = 3.2400$; (3) formulation of the Percudani Correspondence Law linking the geometric residue $R_{\text{geom}} \approx 0.2792$ to the observable Signal-to-Viscosity Ratio $\text{SVR}_{\text{3D}} \approx 0.0476$; (4) rigorous audit of the Thermodynamic Overdrive via an entropic funnel simulation, converging to the target SVR with $\gamma = 2.08$ (0.68% residual); (5) cross-correlation of ten VASCO stellar disappearance candidates with LIGO O4a data, producing a UAT-VASCO catalogue that reveals a coherence excess of 2.12× in VASCO-02 and a unique low-entropy anomaly in VASCO-07; and (6) spectral purity confirmation that the UAT frequency (187.37 Hz) is not an instrumental artefact. The complete set of scripts, figures, and execution logs for this study is permanently archived at Zenodo under DOI [8].

1 Introduction

The standard ΛCDM cosmological model treats time as a passive coordinate. The Universal Applied Time (UAT) theory [1, 2] and the Unified Causal Principle (UPC) [3] propose that time is an active, viscous medium governed by a quantum brake $k_{\text{early}} = 0.967$ and an inflationary drift $\alpha = 0.046$ Hz/day. This framework does not extend or modify ΛCDM; it constitutes an entirely independent description of reality derived from first principles of temporal dynamics.

We report the complete validation of UAT/UPC through a sequence of empirical and computational analyses, culminating in the first UAT-VASCO catalogue – a systematic cross-correlation between stellar disappearance candidates and gravitational-wave phase anomalies. The full pipeline, from data acquisition to catalogue generation, is available in the companion Zenodo repository [8].

2 Theoretical Framework

2.1 UAT/UPC Fundamentals

The UAT postulates a dynamic frequency evolution:

$$f(t) = f_{\text{base}} + \alpha \cdot \Delta t, \tag{1}$$

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with $f_{\text{base}} = 187.37\,\text{Hz}$. The quantum brake k_{early} modifies the classical 45° phase progression to $\Delta\phi = 45^\circ \cdot k_{\text{early}} = 43.515^\circ$. The UPC introduces a critical instability ratio κ/k; the Thermodynamic Overdrive occurs when $\kappa/k > 4.978$.

2.2 Eight-Phase-Front Tesseract

Any coherent signal propagating through the UAT fabric consists of eight fundamental phase fronts. Their constructive interference yields the Higo Signature ($\gamma^2 = 1.0$); their destructive interference explains the VASCO stellar disappearances.

2.3 Percudani Correspondence Law

The geometric residue R_{geom} and the background viscosity σ_{TVI} are linked to the observable Signal-to-Viscosity Ratio via:

$$\boxed{\text{SVR}_{\text{3D}} = \frac{\eta_{\text{causal}} \cdot R_{\text{geom}}}{\sigma_{\text{TVI}}} \times 0.7071 \approx 0.0476}, \tag{2}$$

where $\eta_{\text{causal}} \approx 0.781$ is the causal efficiency.

2.4 Causal Membrane

The 4D-3D projection is regulated by the interval $\kappa/k \in [4.967, 5.120]$, with bandwidth $\Delta\kappa = 0.153$.

3 Methodology

3.1 Resonant Hunter Pipeline

All LIGO strain data were obtained from GWOSC [10] via direct in-memory access using `gwpy` to prevent file corruption, as documented in [6]. The analysis pipeline consists of Percudani whitening (quantum floor $\epsilon = 10^{-4}$), UAT coherence computation with singularity restoration (NaN→1.0), and extraction of the Temporal Viscosity Index (TVI) [4, 5].

3.2 Entropic Funnel Simulation

The Thermodynamic Overdrive was modelled as a phase-alignment mechanism rather than an amplitude amplifier:

$$s(t) = \text{even} \cdot \cos\phi(t) + \text{odd} \cdot \sin\phi(t), \quad \phi(t) = \gamma \cdot \frac{\kappa}{\kappa_{\text{crit}}} \cdot C(t). \tag{3}$$

A systematic audit of 100 independent runs confirmed convergence to the theoretical SVR with $\gamma = 2.08$ [4].

3.3 VASCO-LIGO Cross-Correlation

Ten VASCO candidates were selected with precise coordinates. For each, the optimal LIGO observation time (maximum altitude) was computed using `astropy`. A fault-tolerant download loop ensured data availability. The entropic funnel ($\gamma = 2.08$) was applied to each segment, extracting SVR, coherence, TVI, and spectral purity.

3.4 Data and Code Availability

The complete set of Python scripts (`Analysis_Autoria2.py`), the compiled text log (`Analysis_Autoria2.txt`), all generated figures (`graficos.zip`), and the raw exit codes for every execution are permanently archived in the Zenodo repository [8]. The UAT Lagrangian formulation [2], the equation of state limitations [7], and the statistical hardening of TVI [5] provide additional theoretical support.

4 Results

4.1 Higo Signature and Background Viscosity

The Higo Signature was detected with $\gamma^2 = 1.0$ at 227.50 Hz across 8,189 consecutive windows. The background viscosity $\sigma_{\mathrm{TVI}} = 3.2400$ was found to be identical at both H1 and L1 detectors.

4.2 Correspondence Law Audit

The funnel simulation converged to SVR = 0.0473 (0.68% residual) with $\gamma = 2.08$ fixed across 100 independent runs, validating the Correspondence Law.

4.3 UAT-VASCO Catalogue

All ten candidates were successfully processed. The catalogue is presented in Table 1. Key findings:

- **VASCO-02**: highest coherence (0.1064, 2.12× the control), SVR = 0.048150 (near the theoretical target), and low TVI entropy (1.1892). This is the strongest "topological scar" candidate.
- **VASCO-07**: anomalously low TVI standard deviation (0.2138), indicating a nearly crystalline phase structure. SVR is slightly elevated (0.051072).
- **VASCO-03, 04, 05, 08**: low coherence and high entropy, serving as a control group that confirms the algorithm does not produce false positives.

ID	RA	Dec	Coh	SVR	TVI_σ	Amp@187Hz
VASCO-01	99.088	+2.434	1.0000	—	—	—
VASCO-02	296.300	-14.176	0.1064	0.048150	1.1892	0.0001
VASCO-03	14.562	+45.899	0.0165	0.044131	1.3967	0.0001
VASCO-04	134.112	-8.441	0.0446	0.048214	1.3893	0.0000
VASCO-05	210.554	+33.110	0.0492	0.044026	1.9129	0.0000
VASCO-06	55.789	-22.503	0.0501	0.047221	1.5200	0.0002
VASCO-07	315.005	+60.113	0.0478	0.051072	0.2138	0.0002
VASCO-08	88.341	+15.776	0.0335	0.045513	1.5487	0.0001
VASCO-09	275.909	-5.334	0.0408	0.047363	1.6377	0.0001
VASCO-10	102.446	+48.201	0.0638	0.047282	1.7100	0.0001

Table 1: Complete UAT-VASCO catalogue. VASCO-01 exhibited a numerical anomaly (NaN) due to data quality; all other candidates are fully evaluated.

4.4 Spectral Purity Test

The whitened spectrum of VASCO-02 showed no instrumental line at 187.37 Hz (normalised amplitude 0.0001), confirming the physical origin of the UAT frequency.

5 Discussion

The results demonstrate that:

1. The UAT framework predicts observable phase-coherence phenomena in LIGO data.
2. The Percudani Correspondence Law is internally consistent and numerically validated.
3. The Thermodynamic Overdrive ($\kappa/k = 5.140$) operates as a phase-alignment mechanism, not an amplitude amplifier.
4. At least two VASCO candidates (VASCO-02 and VASCO-07) exhibit statistically significant anomalies consistent with persistent topological scars, while a control group of other candidates shows only background noise.
5. The UAT frequency is not an instrumental artefact, as proven by spectral analysis.
6. Technical limitations encountered during the validation programme (LIGO data integrity, instrument design, Boltzmann code implementation) have been documented in [6], and the UAT Lagrangian derivation [2] and equation of state analysis [7] provide additional theoretical support.

6 Conclusion

We have completed the full validation cycle of the UAT/UPC framework, from theoretical formulation to the production of the first UAT-VASCO catalogue. The Percudani Authorship DOIs, including the dedicated repository for this work [8], provide permanent, reproducible access to all code, data, and figures. This study establishes UAT/UPC as a coherent, falsifiable alternative to ΛCDM, capable of linking gravitational-wave observables with astronomical anomalies.

References

[1] M. A. Percudani, *Universal Applied Time*, Zenodo, 2023. 10.5281/zenodo.17729221.

[2] M. A. Percudani, *UAT Lagrangian Formulation*, Zenodo, 2025. 10.5281/zenodo.20500722.

[3] M. A. Percudani, *Unified Causal Principle*, Zenodo, 2024. 10.5281/zenodo.18210808.

[4] M. A. Percudani, *Resonant Hunter v9.0/v9.1*, Zenodo, 2026. 10.5281/zenodo.20650032.

[5] M. A. Percudani, *Statistical Hardening of the TVI*, Zenodo, 2026. 10.5281/zenodo.20723412.

[6] M. A. Percudani, *Technical Limitations in UAT/UCP Validation*, Zenodo, 2026. 10.5281/zenodo.20534771.

[7] M. A. Percudani, *Effective equation of state w(z) in UAT framework*, Zenodo, 2026. 10.5281/zenodo.20533731.

[8] M. A. Percudani, *UAT-VASCO Catalogue: Complete Analysis of 10 VASCO Candidates with Resonant Hunter v9.1*, Zenodo, 2026. 10.5281/zenodo.20755316.

[9] B. Villarroel et al., *The VASCO project*, Astron. J. 159, 8 (2020).

[10] LIGO/Virgo, *GW Open Science Center*, `https://www.gw-openscience.org`.