UAT Frequency Projections for LIGO O5: Predictions for the Dynamic Resonance at 177.37 Hz Based on the Universal Applied Time Framework

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Abstract

We present the frequency projections for the upcoming LIGO O5 observing run (expected 2027–2029) based on the Universal Applied Time (UAT) and Unified Causal Principle (UPC) framework. The dynamic resonance at 177.37 Hz —discovered during the analysis of O4a/O4b data with the Peripheral_Observer v12.0— is predicted to shift according to the inflationary drift $\alpha = 0.046$ Hz/day, while maintaining a constant offset of $\Delta f = -10.00$ Hz from the UAT base frequency. By the midpoint of O5 (mid-2028), the tuning frequency is expected to reach 261.64 Hz. We further predict that Hanford (H1) will continue to exhibit a 52% entropy reduction relative to shuffled noise, Virgo (V1) will show a 29% reduction with Overdrive saturation at $\kappa/k \approx 7.47$, and the three VASCO candidates (VASCO-02, VASCO-04, VASCO-07) will remain active resonance sites. These predictions are falsifiable with public LIGO data and constitute a critical test of the UAT/UPC framework.

1 Introduction

The Universal Applied Time (UAT) [1] postulates that the temporal flow is governed by a dynamic base frequency $f_{\text{base}}(t)$ that evolves linearly with time:

$$f_{\text{base}}(t) = 187.37 + \alpha \cdot \Delta t, \tag{1}$$

where $\alpha = 0.046$ Hz/day is the inflationary drift and Δt is the number of days elapsed since the UAT reference date of 2023-05-27.

The recent discovery of a universal tuning frequency at 177.37 Hz in the LIGO Hanford (H1) and Virgo (V1) detectors [2] revealed that the 4D causal signal resonates exactly 10.00 Hz below the base frequency. This offset is a geometric constant of the causal membrane. The tuning frequency therefore evolves as:

$$f_{\text{tuning}}(t) = f_{\text{base}}(t) - 10.00. \tag{2}$$

The LIGO O5 observing run is expected to begin in mid-2027 and extend through 2029 [5]. This note provides explicit, falsifiable predictions for the frequencies and detector behaviours that should be observed during O5 if the UAT/UPC framework is correct.

2 Methodology

The predictions are derived directly from Eqs. (1) and (2), using the reference date of 2023-05-27. Three representative dates are chosen:

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- **O5 start:** 2027-06-01 (1,466 days from reference).
- **O5 midpoint:** 2028-06-01 (1,832 days from reference).
- **O5 end:** 2029-06-01 (2,197 days from reference).

The expected detector behaviours are extrapolated from the empirical classification established during O4a/O4b analysis:

- **H1 (Hanford):** Pure 4D detector. Entropy reduction 52% below shuffled noise. Widest Overdrive range (6.8–10.8).
- **V1 (Virgo):** Intermediate detector. Entropy reduction 29% below shuffled noise. Overdrive saturates at ~ 7.47 ($1.5 \times \kappa_{\text{crit}}$).
- **L1 (Livingston):** 3D collapser. Does not exhibit dynamic resonance; SVR remains anchored at ~ 0.0476.

3 Predictions

3.1 Frequency Projections

Event	**Date**	$f_{\textbf{base}}$ **(Hz)**	$f_{\textbf{tuning}}$ **(Hz)**
O5 start	2027-06-01	254.81	244.81
O5 midpoint	2028-06-01	271.64	261.64
O5 end	2029-06-01	288.43	278.43

Table 1: Predicted UAT frequencies for the LIGO O5 observing run.

The tuning frequency is expected to increase by approximately 16.8 Hz per year during O5, reflecting the continuous inflationary drift of the UAT base frequency.

3.2 Detector Behaviour

1. **H1 (Hanford):** The tuning frequency will match the predicted value in Table 1. The joint phase entropy at this frequency will remain 3.8–4.1 bits, representing a 52% reduction relative to the shuffled noise baseline (~ 8.26 bits). The Overdrive will continue to show the widest dynamic range among all detectors, with values between 6.8 and potentially exceeding 10.8 during extreme events.
2. **V1 (Virgo):** The tuning frequency will be identical to H1. The entropy reduction will be 29% (5.8–5.9 bits). The Overdrive will saturate at $\kappa/k \approx 7.47$ ($1.5 \times \kappa_{\text{crit}}$), and the causal filtration energy will remain constant at approximately 0.69 units of F_{UAT}.
3. **L1 (Livingston):** No dynamic resonance will be observed at the tuning frequency. Instead, L1 will continue to exhibit a stable SVR of ~ 0.0476 and perfect coherence ($\gamma^2 = 1.0$) in the 227.5–232.5 Hz Higo band.

3.3 VASCO Candidate Persistence

The three VASCO candidates that exhibited the strongest resonance during O4a/O4b are predicted to remain active:

- **VASCO-02** (RA = 296.3°, Dec = −14.2°): Continued entropy anomaly in H1. Overdrive ~ 6.8.
- **VASCO-04** (RA = 134.1°, Dec = −8.4°): Continued entropy anomaly in H1. Overdrive ~ 7.2.
- **VASCO-07** (RA = 315.0°, Dec = +60.1°): Continued extreme Overdrive events (> 10.7) with entropy anomaly.

If these candidates are topological scars —regions where the causal membrane is permanently deformed— their resonance signatures should persist independently of the observing epoch.

3.4 Falsifiability

The predictions in this note are explicitly falsifiable. If O5 data analysed with the identical Peripheral_Observer protocol (Overdrive trigger > 4.967, frequency fixed at the predicted f_{tuning}) do not show:

- The predicted tuning frequency in H1 and V1,
- The entropy reductions of 52% (H1) and 29% (V1) relative to shuffled noise,
- The V1 Overdrive saturation at ~ 7.47,

then the UAT/UPC dynamic resonance hypothesis must be rejected or substantially revised.

4 Conclusion

We have provided explicit, falsifiable predictions for the LIGO O5 observing run based on the UAT/UPC framework. The tuning frequency will shift from 244.81 Hz (O5 start) to 278.43 Hz (O5 end), maintaining a constant 10.00 Hz offset from the drifting UAT base frequency. The detector-specific behaviours (H1 as 4D detector, V1 as intermediate, L1 as 3D collapser) and the persistent VASCO candidate anomalies constitute a comprehensive set of tests for the theory. All analysis code and data from O4a/O4b are publicly available under the Percudani Authorship DOIs, enabling independent verification by the LIGO collaboration or any interested researcher.

References

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