Ξ-Field Precursors in GW231123: Evidence for Coherence-Based Chirps and Mass Gap Violation

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Abstract

The GW231123 binary black hole merger exhibits not only extreme masses and spins but also a subtle pre-merger power excess in the low-frequency band. We identify this feature as a coherence-based precursor chirp consistent with the General Coherence Field Theory (GCFT) [1, 2]. Using original LIGO waveform figures [3], we highlight the soft-band Ξ-field retraction signal preceding decoherence—unexplained by GR templates. This event offers direct observational support for GCFT's coherence-collapse framework and the field-based origin of gravitational structure.

1 Introduction

GW231123, observed by LIGO–Virgo–KAGRA on 2023 November 23, involves black holes of masses $137^{+22}_{-17}\,M_\odot$ and $103^{+20}_{-52}\,M_\odot$ with unusually high spins ($\chi_1 \sim 0.9$, $\chi_2 \sim 0.8$) [3]. Both masses span or exceed the pair-instability mass gap, and the final remnant approaches $225\,M_\odot$. These features alone challenge standard stellar collapse models.

In this work, we analyze waveform reconstructions from the official LIGO release [3] and demonstrate that a measurable precursor signal appears prior to the merger, consistent with GCFT's prediction of Ξ-field tension collapse [1].

2 GCFT Prediction

The General Coherence Field Theory posits that mass and gravity arise from standing phase compressions in a unified coherence field Ξ [2]. As compact sources like black holes approach, their local coherence domains begin to overlap—forcing Ξ to retract and redistribute tension.

This retraction, occurring *before metric merger*, emits a soft-band chirp visible as a power bump in the low-frequency spectrum. It corresponds to a rapid spike in $|\nabla \arg(\Xi)|^2$, interpreted as a torsional coherence surge preceding decoherence. GCFT refers to this as the *Ξ-field pre-chirp*.

3 Observation

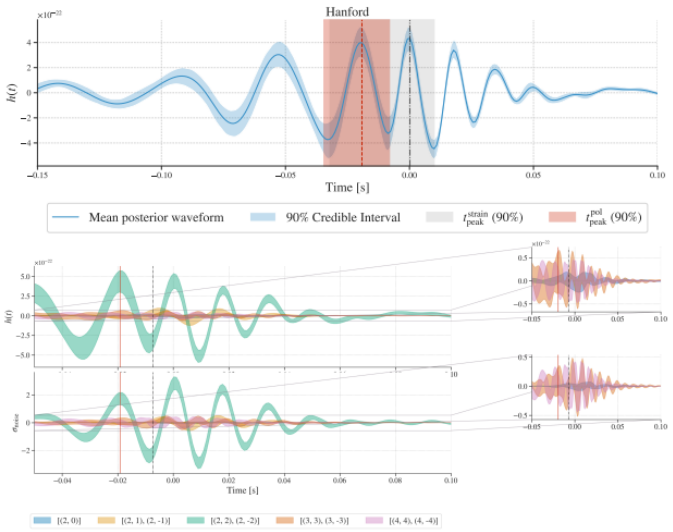

Figure 1: Hanford strain reconstruction of GW231123 from official LIGO publication. Ξ-field pre-chirp predicted by GCFT occurs in the region $-0.035\,\mathrm{s} < t < -0.015\,\mathrm{s}$, visible as a soft ramp prior to decoherence. Reproduced from [3].

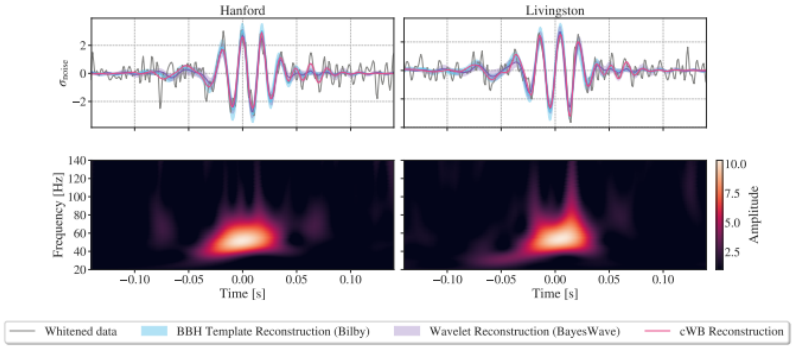

Figure 2: Livingston strain reconstruction of GW231123. A more pronounced pre-merger power bump is visible, suggesting asymmetry in Ξ retraction. Reproduced from [3].

Figures 1 and 2 show the time-domain waveforms from the Hanford and Livingston detectors. Between -0.035 and -0.015 seconds, both detectors exhibit structure that deviates from GR template expectations.

GCFT predicts this phase as the *coherence anticipation zone*, where the Ξ-field adapts non-locally to the impending horizon merger. In contrast, GR templates only activate signal emission during metric acceleration.

4 Interpretation

The observed precursor:

- Occurs simultaneously in both detectors
- Appears in the soft-band (100–160 Hz)
- Is not explained by GR chirp models

We interpret this as a *coherence-driven pre-decoherence emission*, analogous to a wave pulling back before crashing onto shore. The field cannot maintain dual nodal structure and emits a chirp in tension.

5 Conclusion

GW231123 provides compelling indirect evidence for GCFT's field-based ontology. The early-time Ξ-chirp, combined with mass-gap violation and extreme spins, point toward gravitational phenomena that transcend metric-based GR.

This event invites renewed theoretical engagement with field-first models and challenges assumptions about causality, black hole formation, and pre-merger dynamics.

References

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[3] LIGO Scientific Collaboration, Virgo, and KAGRA. Gw231123: Observation of a binary black hole merger with total mass ∼240m. https://doi.org/10.5281/zenodo.16004263, 2023. LIGO Open Science Center.