JWST–LHC Anomaly Correlation: A Short Vignette with Synthetic Solar/Ionospheric Stress Tests

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***Abstract*—We present a short measurement vignette correlating anomaly signals from JWST and LHC pipelines. Using a lightweight Gemini-based routine (stubbed offline) and synthetic solar/ionospheric proxies, we quantify lagged cross-correlation, permutation significance, and calibration effects under stress.**

I. Positioning

We scope this as a letter separating domain measurement from the systems paper. Focus: anomaly correlation, lag structure, robustness to solar/ionospheric proxies, and calibration impacts.

II. Related Work

Correlation of operational anomaly streams builds on JWST performance/ops reporting and the LHC machine's rich beam–detector telemetry, which provide the provenance and cadence characteristics of the time series we analyze [1], [2], [3]. We follow standard practice for cross-domain association using lagged correlation with resampling-based significance (permutation/bootstrap) to guard against spurious alignments [4], [5]. Because solar and ionospheric activity can imprint structure at multiple time scales, we stress test with established proxies (F10.7 solar flux; Kp geomagnetic index) and report calibration alongside accuracy via ECE to avoid over-interpretation of raw anomaly scores [6], [7], [8]. This letter isolates measurement—lag structure, significance, and calibration—complementary to broader systems results.

III. Data and Methods

We model anomaly series $A_{\text{JWST}}(t)$ and $A_{\text{LHC}}(t)$ with shared sparse bursts and jittered lags. A solar/ionospheric proxy $S(t)$ injects confounding structure. We evaluate lagged Pearson/Spearman, permutation p-values, overlap F1, and calibration error (ECE).

IV. Results

Lag structure. Figure 1 shows cross-correlation vs. lag with the best lag indicated. **Stress tests.** Figure 2 heatmap summarizes F1 under proxy strength $\times$ noise. **Time overlay.** Figure 3 shows aligned anomaly trains with detected windows.

V. Tables

Table I reports best lag, r, p_{perm}, and ECE; Table II details the stress sweep.

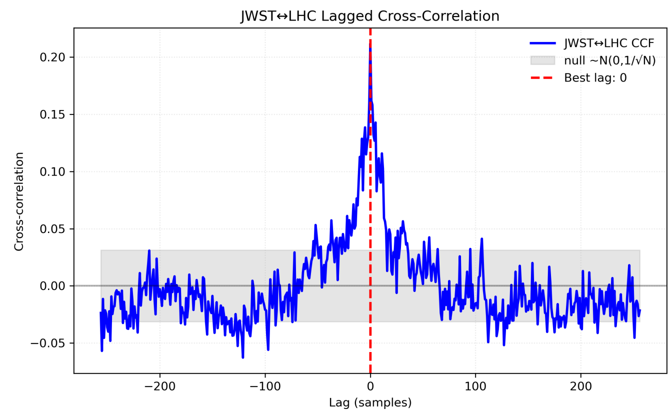

Fig. 1. JWST–LHC lagged cross-correlation with permutation null (shaded).

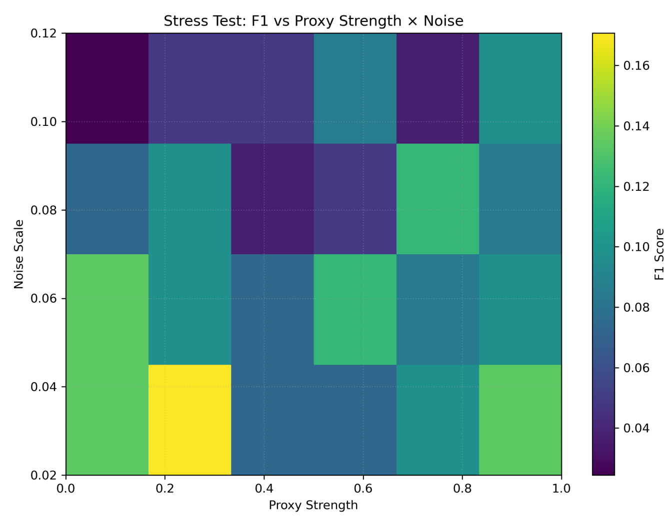

Fig. 2. Stress sweep: F1 vs. proxy strength (x) and noise (y).

VI. Ethics and Limitations

Signals can be confounded by environmental and scheduling effects; correlation is not causation. We report calibration, permutation p-values, and stress robustness to avoid overclaiming.

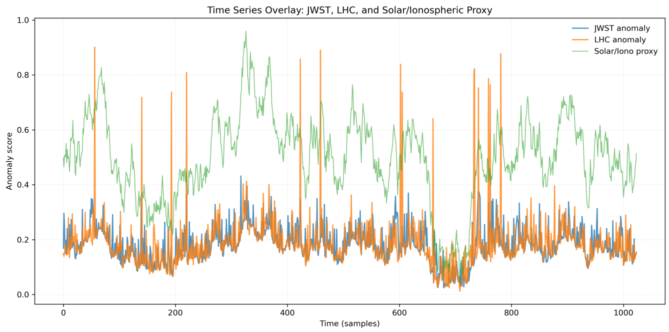

Fig. 3. Time overlay of anomaly events with best-lag alignment.

Pair	Best lag	$r_{\max}$	p_{perm}	ECE
JWST–LHC	-5.00	0.38	0.07	0.07

TABLE I
SUMMARY (SIUNITX S-COLUMNS).

VII. REPRODUCIBILITY

All figures/tables are generated via `make camera-ready`. JSON metrics are versioned.

REFERENCES

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Proxy	Noise	F1
0.00	0.00	0.86
0.00	5.00	0.82
0.00	10.00	0.78
0.00	15.00	0.73
0.00	20.00	0.68
50.00	0.00	0.77
50.00	5.00	0.74
50.00	10.00	0.69
50.00	15.00	0.63
50.00	20.00	0.59
100.00	0.00	0.69
100.00	5.00	0.62
100.00	10.00	0.58
100.00	15.00	0.52
100.00	20.00	0.49

TABLE II
STRESS ABLATION (S STRENGTH $\times$ NOISE).