Paper 013

A Bayesian Null Ledger for Electrostatic Projection Experiments

Combining compatible negative results without collapsing them into folklore

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Abstract

Projection-electromagnetism experiments are likely to produce null results. This paper proposes a Bayesian null ledger that treats each experiment as a constrained likelihood over operator amplitudes rather than as a binary success or failure. The ledger stores apparatus metadata, transformation controls, nuisance models, priors, posterior bounds, and declared non-goals. It is designed for cumulative exclusion of scalar, boundary-flux, fifth-current, and artifact families.

Status. Draft manuscript for review and revision. This paper is not an empirical claim of new physics or field-ready technology. It is a structured proposal, theory note, protocol, or application architecture intended to be auditable, falsifiable, and publishable with source.

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1 Problem

Negative results are scientifically valuable only when their assumptions are visible. Electrostatic anomaly tests often differ in geometry, gas pressure, dielectric construction, voltage waveform, shielding, cable routing, and balance dynamics. A single headline force limit is not enough to combine them. The problem is to build a ledger where null results can be accumulated while preserving their local apparatus context.

2 Model

Each experiment e contributes a likelihood L_e(a,eta) over mechanism amplitudes a and nuisance parameters eta. The ledger never erases nuisance structure; it marginalizes only after storing the model, priors, calibration data, and controls. The global posterior is a product over compatible experiments, with compatibility checked by shared mechanism definitions and declared observables.

$$p(a \mid D_{1:N}) \propto p(a) \prod_{e=1}^{N} \int L_e(D_e \mid a, \eta_e)\, p(\eta_e \mid I_e)\, d\eta_e.$$

$$B_{mn} = \frac{p(D \mid M_m)}{p(D \mid M_n)}, \qquad a_{95} = \inf\{a : P(|A| < a \mid D) \geq 0.95\}.$$

3 Claims

1. **Claim 1.** A null ledger should record likelihoods and controls, not only final force limits.
2. **Claim 2.** Operator families with different transformation laws require separate posterior channels even when their best-fit amplitudes are zero.
3. **Claim 3.** A shared ledger enables rapid detection of false convergence when several nulls share the same missing control.
4. **Claim 4.** The publication target should be a versioned exclusion surface over mechanism amplitudes and ranges.

4 Evidence Plan

Evidence begins with synthetic experiments drawn from known artifact models. The ledger is validated by showing that it recovers injected scalar or boundary amplitudes when the control matrix is adequate and refuses mechanism-specific attribution when it is not. A second validation step ingests published or internal null data using redacted metadata, then compares per-experiment and cumulative bounds.

5 JMP0X1B Implementation Surface

The JMP0X1B implementation should use typed provenance, deterministic serialization, and replay fingerprints. Each ledger entry is immutable after publication; corrections are appended as errata and superseding revisions.

Illustrative JMP0X1B-style contract

```
record NullEntry {
    apparatus_digest: Digest,
    controls: List<ControlState>,
    likelihood: LikelihoodModel,
    nuisance_priors: List<Prior>,
    result: PosteriorSummary,
    reviewer: Signer
}
fn append_null(entry: NullEntry) -> LedgerReceipt effects{Provenance, Signature, Audit}
```

6 Release And Review Plan

Publish a reference schema, example synthetic entries, posterior notebooks, and a PDF report showing how one null result changes the global exclusion surface. The ledger itself should publish signed digests before raw sensitive data are released.

7 Open Questions

- What minimal metadata makes two capacitor null experiments compatible?
- How should publication bias be represented when positive-looking runs are more likely to be reported?
- Can blinded analysis manifests be committed before experiments to prevent posterior tuning?
- What is the right public/private split for laboratory metadata?

8 Conclusion

A Bayesian null ledger treats negative results as accumulating scientific infrastructure. It is a conservative technology: it will more often strengthen exclusions than support anomaly claims, which is exactly why it is useful.

References

References

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