Paper 021

Observational Equivalence Classes in Maxwell-Compatible Projection Theories

When different fifth-dimensional stories predict the same four-dimensional data

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Abstract

The twelve-branch projection tree deliberately permits multiple five-dimensional narratives. This paper classifies when those narratives are observationally equivalent at the four-dimensional level. Two models are equivalent relative to an experiment if their predicted distributions over observables match after nuisance marginalization. The result is a quotient map from speculative branches to measurable operator 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.

Contents

1 Problem

Speculative theories can proliferate faster than experiments. A mass-coordinate branch, charge-fiber branch, scalar branch, and metric-mixing branch may all reduce to the same effective current under laboratory conditions. The problem is to avoid multiplying names for indistinguishable observations.

2 Model

Define a model M by fields, projection map, recovery limit, operator reduction, and nuisance prior. An experiment E induces a pushforward distribution over observables. Equivalence is equality or near-equality of these distributions under the experiment class.

$$M_a \sim_E M_b \quad \Longleftrightarrow \quad d\left(P_E(y \mid M_a), P_E(y \mid M_b)\right) < \epsilon_E.$$
$$\mathcal{Q}_E = \mathcal{M}/\sim_E,$$

where $\mathcal{Q}_E$ is the set of experimentally distinguishable classes.

3 Claims

1. **Claim 1.** Projection theory papers should publish both branch-level stories and quotient-level observable classes.
2. **Claim 2.** Equivalence classes shrink when experiments add controls; they expand when controls are absent.
3. **Claim 3.** A positive residual cannot identify a microscopic branch unless it breaks equivalence under predeclared controls.
4. **Claim 4.** The quotient map is a useful bridge between mathematical theory trees and operator-basis anomaly testing.

4 Evidence Plan

Evidence is formal and computational. The paper maps the twelve projection branches into effective operator templates, then computes equivalence classes for three experiment families: electrostatic capacitors, cavity balances, and material strain tests. The expected result is a taxonomy showing where branch names add value and where operator family names are more honest.

5 JMP0X1B Implementation Surface

A JMP0X1B library should encode branch metadata, operator reductions, experiment classes, and equivalence calculations. It can emit a reviewer-facing table: branch, recovery condition, operator family, distinguishability controls, and known degeneracies.

Illustrative JMP0X1B-style contract

```
record Branch { name: Text, recovery: Conditions, operator: OperatorFamily, nuisance: PriorSet
fn quotient(branches: List<Branch>, experiment: ExperimentClass, epsilon: Float) -> Equivalenc
```

6 Release And Review Plan

Release the branch-to-operator map, equivalence criteria, experiment-class definitions, and generated quotient tables. Future theory papers should update the map rather than creating isolated branch vocabularies.

7 Open Questions

- What distance metric best captures experimental indistinguishability?
- How should nonlocal or boundary-supported operators enter the quotient?
- Can equivalence maps guide which new controls are worth building?
- Where do material claims fit in a projection-theory quotient?

8 Conclusion

Equivalence classes discipline speculation by keeping theory names tied to observables. The paper reduces narrative clutter and improves experimental planning.

References

References

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