

Falsification Criteria and Observational Mapping

Falsification Criteria

A theory must specify conditions under which it can be rejected. The framework presented here is falsifiable under the following criteria.

Absence of Matter Condensation in High Wave-Activity Zones

Claim: High-intensity wave regions are capable of producing matter via condensation when local energy thresholds are exceeded.

Falsification condition: If observational surveys demonstrate that regions with:

- extreme electromagnetic or gravitational wave activity,
- minimal pre-existing baryonic matter,
- long-term wave coherence,

show **no statistically significant excess of matter** beyond what is predicted by transport, accretion, or known decay processes, then the condensation hypothesis is invalid.

This includes:

- absence of unexplained gas clouds,
- absence of anomalous particle populations,
- absence of matter without progenitor signatures.

Strict Non-Interaction of Distinct Radiation Types

Claim: Radiation types may share a common wave substrate or weak coupling prior to interaction with matter.

Falsification condition: If controlled laboratory or astrophysical measurements establish that radiation of distinct spectral classes:

- cannot exchange energy,
- cannot interfere even partially,
- cannot produce non-linear effects under any phase configuration,

then the universal wave substrate interpretation is ruled out.

In such a case, radiation must be treated as fully independent instantiations, and the simplified wave-energy framework collapses.

No Energy Deficit at Phase Cancellation

Claim: Wave anti-phase cancellation may result in energy redistribution or loss not accounted for by pressure or radiation emission.

Falsification condition: If precise experiments show that:

- all input energy is fully recoverable as heat, radiation, or mechanical work,
- no residual or missing energy is detected at cancellation points,

then transported wave energy cannot exceed classical descriptions, invalidating the proposed energy upper-bound measurement method.

Gravitation Fully Reducible to Curvature Alone

Claim: Gravitation arises from gradients of field allowance rather than pure spacetime curvature.

Falsification condition: If all gravitational phenomena—including:

- galaxy rotation curves,
- cluster dynamics,
- strong-field lensing,

are fully and consistently explained by curvature-only models without invoking hidden energy reservoirs or field gradients, then the work-density interpretation of gravitation is unnecessary and rejected.

Persistence of Stable Universes Without External Feeding

Claim: Long-term stability of matter and structure requires continuous or residual external feeding.

Falsification condition: If evidence is found that:

- universes remain structurally stable,
- maintain star formation indefinitely,
- and avoid terminal synthesis collapse,

without any detectable external energy contribution, then the framework feeding requirement is false.

Mapping to Observables

Astrophysical Observables

Framework Prediction	Observable Signature
Wave-driven condensation	Gas clouds without progenitors
Node exhaustion	Old stellar populations, no star formation
Terminal synthesis	Overabundance of heavy elements
Field decay	Redshift-like energy loss without expansion
Work density gradients	Non-Newtonian gravitational behavior

Galactic Core Diagnostics

Predicted properties of galactic centers:

- dominance of old, metal-rich stars,
- absence of young stellar populations,
- limited or extinguished accretion activity,
- possible absence of a classical black hole.

These signatures indicate exhaustion of external feeding and transition into a terminal work regime.

Intergalactic Medium

The framework predicts that the intergalactic medium:

- contains matter not fully attributable to galactic outflows,
- correlates with historical wave activity,
- exhibits chemical compositions inconsistent with transport alone.

Laboratory Observables

Potential measurable effects:

- missing energy at wave interference nodes,
- non-thermal particle emergence,
- energy imbalance beyond radiation pressure.

Failure to detect these effects under sufficient experimental sensitivity directly falsifies the wave-energy component of the theory.

Interpretational Boundary

The framework does not assume intent, agency, or purpose. It asserts only that:

The observed universe behaves as a system operating outside its nominal regime.

This statement remains valid or invalid solely on empirical grounds, independent of metaphysical interpretation.