# CMG–LCE: Magnetogravitational Cosmology — Vol. III (2025.11 Release)

Macro & Micro Experimental Falsifiability Framework

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GitHub: https://github.com/EugenioCMG/CMG\_LCE

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## 1. Overview and Motivation

This third release of the CMG–LCE framework consolidates the theoretical formulation of the Ψ-field as an electromagnetic memory of the vacuum and expands its scope toward experimental falsifiability.

Two complementary domains are proposed:

* Macrocosmic validation, using astronomical data (galaxies, interstellar objects).
* Microcosmic replication, via coherent plasma experiments in controlled laboratory environments.

Together, they form a complete and scalable test of the Coherence–Energy Law (LCE):

ẋρΨ = − μ · ẋΨ · ẍΨ

## 2. Theoretical Background

The LCE describes how coherent electromagnetic oscillations alter the vacuum’s internal energy distribution.

A fully coherent plasma (E and B in phase) transfers part of its oscillatory energy into vacuum curvature, producing a measurable magnetogravitational feedback:

aΨ ∝ B² ⇒ δg\_eff ∝ − η · B\_coh²

This implies that coherent magnetic fields can locally modulate gravitational tension — a prediction testable both astrophysically and experimentally.

## 3. Macro Falsifiability: Galactic and Interstellar Tests

### (a) Galactic Rotation Anomalies

The CMG–LCE predicts that the flattening of galactic rotation curves arises naturally from the coherent contribution of large-scale magnetic fields rather than from dark matter.

Proposed test: Re-analysis of LOFAR, ALMA, and SPARC datasets to evaluate the correlation aΨ ∝ B².

#### Updated Expected Outcome — Galactic Validation Criteria (CMG–LCE Test)

**Objective:**

To evaluate whether the excess centripetal acceleration observed in disk galaxies correlates quantitatively with the mean magnetic-energy density derived from LOFAR/ALMA polarization maps.

**Datasets:**

LOFAR DR2 polarization cubes (RM-synthesis) + SPARC rotation curves (v\_obs, v\_bar). Optional cross-check: ALMA dust-polarization (Bands 3–7)

**Computational method:**

* Ring-averaged profiles of ⟨B²⟩ and aΨ = (v\_obs² – v\_bar²)/R
* Statistical tests: Pearson r, Spearman ρ, bootstrap CI (N = 10⁴)
* Regression model: aΨ = η · B² + ε, with η expected positive if coupling exists

**Validation Criteria:**

|  |  |  |  |
| --- | --- | --- | --- |
| Criterion | Metric | Threshold | Scientific meaning |
| 1. Correlation strength | Spearman ρ | > 0.70 (p < 0.01) | Statistically significant monotonic link between magnetic-energy density and dynamical anomaly |
| 2. Robustness | Bootstrap confidence | > 95 % retention of sign(ρ) | Not driven by outliers or small-sample noise |
| 3. Spatial consistency | Gradient alignment test | Δφ < 20° between ∇aΨ and ∇B² | Physical coherence across galactic radius |
| 4. Control test | Randomized B-fields | ρ ≈ 0 ± 0.1 | Confirms correlation is not a projection artefact |
| 5. Cross-dataset reproducibility | LOFAR → ALMA subset | Δρ < 0.1 | Independent confirmation across instruments |

**Interpretation:**

1. Meeting all five criteria would constitute prima facie evidence of magnetogravitational coupling (Ψ-field influence) at galactic scales.
2. Partial fulfilment (ρ > 0.5 but weaker spatial alignment) would indicate a secondary or environment-dependent effect.
3. Null result (ρ ≤ 0.3 in all samples) would falsify the hypothesis at the present sensitivity.

**Next step after validation:**

Independent replication by LOFAR/SPARC teams followed by submission to Monthly Notices of the Royal Astronomical Society or Astronomy & Astrophysics for peer review.

### (b) 3I/ATLAS Interstellar Event

The interstellar object 3I/ATLAS, currently under ESA/NASA observation, presents multiple anomalies compatible with CMG–LCE predictions:

* Emission of Ni(CO)₄, suggesting coherent metallic plasma chemistry.
* A sunward plasma jet, aligned with the solar magnetic gradient.
* Negative polarization and structured reflectivity, consistent with phase-ordered plasma.

Cross-analysis between Gemini/Keck, NOIRLab, and Parker Solar Probe data could detect Ψ-resonant modulation of the solar wind or magnetic field coherence.

*(See Supplementary: Scientific Brief V2 — CMG–LCE Application to 3I/ATLAS, DOI 10.5281/zenodo.17376891.)*

## 4. Micro Falsifiability: Laboratory Replication (PLASMANT Test)

A technically achievable plasma experiment can simulate Ψ–plasma coupling at small scale.

Facility: PLASMANT Laboratory (University of Antwerp)

Frequency: 13.56 MHz RF plasma

Coherence factor: Q > 10⁵

Environment: magnetically shielded chamber

Measurement: energy deviation ΔE/E ≈ 10⁻⁴ correlated with magnetic phase stability

Objective: To detect a non-thermal, coherent energy deviation consistent with vacuum–plasma coupling as defined by the LCE.

Even a 0.01% effect would constitute the first measurable evidence of electromagnetic memory exchange in a controlled environment — comparable in significance to the Casimir or Aharonov–Bohm effects.

## 5. Expected Outcomes (Summary)

|  |  |  |  |
| --- | --- | --- | --- |
| Domain | Observable | Dataset / Source | Validation Criteria |
| Galactic | aΨ ∝ B² correlation | LOFAR, ALMA, SPARC | Five-tier criteria above |
| Interstellar | Ni(CO)₄ spectral anomaly, jet asymmetry | ESA / Keck / Gemini | phase-coherence signature |
| Solar wind | Modulation of plasma coherence | Parker Solar Probe / Solar Orbiter | deviation from background turbulence |
| Laboratory | ΔE/E deviation | PLASMANT (Antwerp) | > 10⁻⁴ deviation, repeatable |

## 6. Scientific Impact

* Establish vacuum coherence as a measurable physical entity.
* Provide a direct empirical bridge between electromagnetism and gravitation.
* Integrate astrophysical and laboratory data into a unified model of cosmic structure formation.

## 7. Institutional Collaboration and Feasibility

Macro tests: feasible using existing datasets (no new missions required).

Micro tests: feasible with current PLASMANT infrastructure (< €25,000 operational cost, < 6 months runtime).

Supervision & co-authorship: potential collaboration UAntwerpen under external PhD framework.

Supplementary material includes:

* LOFAR Archival Research Proposal (2025)
* Scientific Collaboration Briefs (NOIRLab / Keck / Gemini / NASA–ESA)
* PLASMANT External PhD Package (UAntwerpen)

## 8. References

Oliva Sánchez, E. (2025). CMG–LCE: Magnetogravitational Cosmology — Vol. I & II. Zenodo. DOI: 10.5281/zenodo.17376891

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