Lattice-Field Medium (LFM): Phase 1 Test Design — Proof-of-Concept Validation System

Version 3.0 — 2025-11-01 (Defensive ND Release)

Greg D. Partin | LFM Research — Los Angeles CA USA

Note: This version supersedes all prior releases (v2.x and earlier) and adds No-Derivatives restrictions and defensive-publication language for intellectual property protection. All LFM Phase-1 documents are synchronized under this unified v3.0 release.

Abstract

Phase 1 defines the design and implementation framework for validating the Lattice-Field Medium (LFM) through reproducible Tier 1–3 tests. It specifies the environment, configuration architecture, pass/fail criteria, and proof-packet generation protocol required to establish numerical and physical correctness of the model. This version modernizes the document layout for reproducibility and OSF publication compliance.

1 Purpose

Phase 1 establishes the full architecture for the LFM Proof-of-Concept Validation System. The goal is to provide a reproducible testing environment that demonstrates Tier 1–3 correctness and creates a foundation for higher-tier extensions and expert review.

2 Hardware and Environment

Component	Specification	Notes
System	MSI Katana A15 AI	Primary development node
CPU / GPU	Ryzen 7 8845HS / RTX 4060 (8 GB VRAM)	Tier 6-capable hardware
RAM / Storage	32 GB / 1 TB SSD	Sufficient for 3D Tier 3 tests
OS	Windows 11 x64	
Python Environment	3.11.9 + NumPy, SciPy, Numba, CuPy-CUDA12x	Standard computation stack
Version Control	Git (local → GitHub private)	Ensures provenance and reproducibility

3 Folder and File Architecture

The LFM Proof-of-Concept environment follows a strict folder structure:
LFM\code — Source modules and Tier kernels
LFM\config — JSON configuration and thresholds
LFM\runs — Runtime data for each experiment
LFM\results — Metrics, plots, and summaries

LFM\logs — Execution and environment logs
LFM\packages — Proof-packet archives

4 Configuration and Validation Logic

Global tolerances reside in /config/validation_thresholds.json, with Tier-specific overrides in /config/tierN_default.json. Merge order: global → local → runtime. Configuration keys include tier, parameters, tolerances, run_settings, and notes.

5 Pass/Fail Framework

Tier	Goal	Pass Criteria
1	Lorentz isotropy & dispersion	$\Delta v/c \le 1$ %, anisotropy ≤ 1 %, energy drift ≤ 1×10^{-6}
2	Weak-field / redshift analogue	Correlation > 0.95 with analytic model; drift ≤ 1 %
3	Energy conservation	$\lvert\Sigma\Delta E\rvert / \Sigma E < 1e{-}12$

6 Orchestration and Parallelism

The master script run_all_tiers.py references /config/orchestration.json to schedule tiers and variants with a concurrency limit (default 3). Each run executes run_tier.py, writes results, and aggregates metrics into /results/<campaign>/summary_overall.json.

7 Visualization and Reporting

Plots auto-generate under /results/<campaign>/<tier>/<variant>/plots/. Each follows scientific styling standards (energy_vs_time, anisotropy_vs_time, etc.). A summary dashboard (summary_dashboard.html) compiles all Tier results.

8 Expert Review Packaging Workflow

After all Tier tests complete, the system assembles a proof packet in /packages/LFM_ProofPacket_<campaign>_vX.Y.zip. Each archive contains README, manifest, environment info, configs, code snapshot, results, logs, and SHA-256 hashes. Integrity checks and optional Cardano anchoring ensure reproducibility.

9 Phase 1 Test Scope

Phase 1 executes 26 Tier 1–3 tests: 9 Relativistic, 8 Gravity-Analogue, and 9 Energy-Conservation tests. Expected duration: ~6 weeks with full parallelization.

10 Data Reproducibility and Licensing

All code and data products are released under CC BY-NC 4.0 (non-commercial, attribution required).. Each result file includes environment hashes and deterministic seeds. Reproducibility requires the same configuration files and random seed identifiers as recorded in the proof packets.

11 Metadata Alignment

Field	Value

Keywords	lattice field theory; discrete spacetime; emergent relativity; reproducibility; computational physics
License	LicenseCC BY-NC 4.0 (non-commercial, attribution required)
Category Tags	Theoretical Physics · Computational Physics · Simulation Frameworks
Data Availability	All proof packets and logs provided as supplemental data under reproducible archive.
Funding / Acknowledgements	Self-funded; no external sponsors.
Contact	gpartin@gmail.com

12 Summary

Phase 1 provides the reproducibility framework for all Tier 1–3 LFM tests. It defines configuration structure, orchestration logic, validation thresholds, and proof-packet packaging. Successful completion confirms the model's stability, isotropy, and conservation—forming the empirical base for Tier 4–6 development.

13 Legal & Licensing Notice

Trademark Notice
"Lattice-Field Medium," "LFM Research," and "LFM Equation" are distinctive marks identifying this body of work. Unauthorized use of these names in promotional, academic, or product contexts is prohibited.

Redistribution Boundary
All configuration schemas, threshold tables, and orchestration designs described here are disclosed solely for scientific reproducibility. They are not granted for reuse, adaptation, or redistribution in derivative simulation frameworks without written permission of the author.

Citation (Zenodo Record):
Partin, G. D. (2025). *Lattice-Field Medium (LFM): A Deterministic Lattice Framework for Emergent Relativity, Gravitation, and Quantization — Phase 1 Conceptual Hypothesis v1.0.* Zenodo. https://doi.org/10.5281/zenodo.17478758

Contact: gpartin@gmail.com