

MRRC MULTILAYER FRAMEWORK: FRACTALS, HOLOGRAPHY, AND DIMENSIONAL INFORMATION STRUCTURE

I. Foundational Postulate

Each informational layer in the universe is a self-contained instance of MRRC (Minimal Recorded Relational Change), operating recursively and governed by the same principles of resource-constrained correlation maintenance.

Planck's constant (\hbar) acts as the minimal unit of causal differentiation and informational action. All recorded evolution must expend at least this quantum of change.

II. Core Proposition

Energy is not a primitive but a derived property:

Energy = available capacity to maintain and transition informational correlations under MRRC constraints.

This reframing yields the following foundational equivalences:

Physical Quantity	MRRC Interpretation
Energy	Rate of information-bound correlation transitions (dC/dt)
Mass	Internal correlation refresh rate
Momentum	Indexed correlation transfer rate across substrate
Time	Ordered memory update index
Space	Writable correlation addressing grid
Entropy	Loss of distinguishable correlations
Temperature	Average comparator noise rate
Noise	Diffused or broken information — unresolved or degraded correlation structures

III. Multilayer MRRC Architecture

Every layer of structure (particles, fields, space, observers) is a nested MRRC frame:

1. **Particles** = Stabilized MRRC configurations, differing in degradation rate (β), stiffness (α), and resource flow (W_{in}).

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- 2. **Fields** = Distributed correlation gradients between local MRRC registers.
 - 3. **Spacetime** = Persistent correlation topology of the writable substrate.
 - 4. **Observers** = MRRC systems that recursively self-index and preserve change-aware memory (meta-comparators).
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IV. Emergent Phenomena

A. Fractals

Self-similarity across scales arises because each MRRC layer re-applies correlation logic under scale-constrained resource availability. Recursive comparator patterns encode shape-preserving structures.

B. Holographic Principle

Surface correlations contain compressed summaries of interior informational states. Boundary layers act as MRRC projection surfaces, sufficient to reconstruct internal memory structure.

C. Dimensional Fluidity

Dimensionality is not fundamental but defined as:

The minimum number of MRRC coordinate indices required to resolve correlations at a given layer.

Changes in energy, scale, or resolution modify effective dimensionality.

V. Superposition Redefined

Quantum superposition is not a particle “in multiple places,” but a state in which MRRC has not yet enforced differentiation:

Superposition = unresolved comparator state across relationally indistinct indices.

Collapse occurs when a higher-level comparator (e.g., measurement) forces correlation anchoring.

VI. Mathematics as Relational MRRC System

Mathematics is not a transcendent structure but an emergent relational system, constrained and expressed by MRRC logic. All mathematical operations implicitly encode comparison, memory, and structured difference.

Math is the codified language of MRRC — a formal system to describe how information is differentiated, preserved, and recombined under resource constraints.

VII. Summary Lemmas

1. Correlation Emergence Lemma

All observable properties (mass, charge, spin) are outputs of stable MRRC structures with specific resource/degradation ratios.

2. Fractal Recursion Lemma

Fractal structures appear when MRRC correlation logic recurses across multiple memory scales with constrained indexing.

3. Dimensional Constraint Corollary

A system's dimensionality emerges from the minimum indexing required to resolve and maintain internal correlations.

4. Holographic Reduction Lemma

Boundary-maintained correlations can reconstruct the informational interior of any MRRC-contained system.

5. Collapse Resolution Lemma

Superposition is resolved when a system's comparator is forced to allocate correlation into distinct relational indices via entropy export.

VIII. Conclusion

The MRRC framework, generalized across all scales and substrates, transforms the ontology of physics into a logic of information-preserving operations. In this paradigm, matter, space, energy, and time are not substances or dimensions — they are emergent properties of recursive correlation logic executing across multidimensional MRRC layers.