Ontology of Coherent States

Fundamental Parameters: Mass and Energy

Author: Alexander Shurlygin

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Abstract

This document formalizes the role of **mass** and **energy** as fundamental parameters within the ontology of coherent states.

In the proposed framework, mass and energy are not treated as physical substances, fields, or entities, but as **structural parameters of system coherence**, determining the stability of states and the accessibility of transitions between them.

The document clarifies why both parameters are necessary, how they are ontologically distinct yet inseparable, and why their physical manifestations appear through measurable entities rather than directly.

The goal is to establish a minimal, observer-independent foundation for further discussion of distinguishability, quantum behavior, geometry, and field structures.

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1. Ontological Status of Fundamental Parameters

Within the ontology of coherent states, reality is described not as a collection of independent objects or forces, but as a set of **permissible coherent states** and **allowed transitions** between them.

Fundamental parameters do not describe *what exists*, but rather:

> which states are allowed to exist coherently and how they may change.

Mass and energy are introduced as parameters of this type.

They are:

- not substances,
- not carriers,
- not entities localized in space,

  but **conditions of coherence** for the system as a whole.

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2. Necessity of Two Fundamental Parameters

A system that merely exists without change is static and trivial.

A system that changes without stability cannot preserve identity.

Therefore, coherence of reality requires two logically distinct conditions:

1. **Stability of states**
2. **Possibility of transitions**

These conditions cannot be reduced to a single parameter without contradiction.

Thus, two fundamental parameters are required:

Ontological Function	Parameter
Stability of coherent states	Mass
Accessibility of transitions	Energy

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3. Mass as a Parameter of Stability

In ontological terms, **mass** is defined as:

> a measure of a system’s resistance to losing coherence under possible transitions.

Mass characterizes how strongly a state is retained once established.

Consequences:

- higher mass corresponds to greater stability;
- transitions become more constrained;

- the system resists rapid or frequent change.

Physical manifestations of mass (inertia, gravitational effects, localization) are **secondary projections** of this underlying role.

They do not define mass itself, but reflect how stability appears at a given level of distinguishability.

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4. Energy as a Parameter of Transition Accessibility

Energy is defined ontologically as:

> a measure of the availability of coherent transitions between distinguishable states.

Energy does not “flow” or “exist inside objects” as a substance.

Instead, it characterizes how many transitions are permitted and how easily they may occur.

Higher energy implies:

- increased number of accessible transitions;
- reduced dominance of a single stable state;
- greater dynamical freedom.

Observed physical effects—radiation, excitation, motion—are expressions of how increased transition accessibility appears within specific systems.

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5. Inseparability of Mass and Energy

Mass without energy yields perfectly stable but inert states.

Energy without mass yields change without persistence.

Neither configuration corresponds to coherent reality.

Therefore:

> Mass and energy are complementary aspects of the same coherence condition.

Their relationship is structural, not mechanical.

The physical equivalence expressed in relations such as

E=mc2E = mc^2E=mc2

is not an empirical coincidence, but a necessary consequence of the fact that:

> stability and change are governed by the same coherence structure.

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6. Why Fundamental Parameters Are Measured Through Entities

Mass and energy cannot be measured directly.

They are inferred through:

- interactions,
- transitions,
- responses of systems to change.

Measurements always occur **via entities and processes**, because observation itself is a special case of interaction between coherent systems.

Thus:

- mass is inferred through resistance to acceleration or gravitational structure;
- energy is inferred through emitted radiation or state transitions.

These measurements reflect **manifestations**, not the parameters themselves.

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7. Observer as a Coherent Subsystem

The ontology does not require an external observer.

Observers, including humans, are:

> coherent subsystems governed by the same parameters.

A human system exhibits:

- mass as bodily stability;
- energy as internal dynamical capacity (biological, neural, cognitive).

This correspondence is not metaphorical.

It reflects the recursive nature of coherence within reality.

Conclusion

Mass and energy are fundamental not because they are the smallest building blocks of matter, but because they define the **conditions under which coherent reality is possible**.

They do not describe what reality is made of.

They describe how reality **remains itself while changing**.

This document serves as a foundational fixation for subsequent analysis of:

- distinguishability limits,
- quantum behavior,
- spacetime geometry,
- and field structures.

Author’s Note

This document represents an initial conceptual fixation (v0.1).

It is published to establish authorship, coherence, and a reference point for further development.