Title

Faraday, Higgs, and the GRID: Toward a Unified Ontological Foundation for Physics

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Abstract

Modern physics still relies on a conceptual division between a "classical world" and a "quantum world," a dichotomy inherited from historical developments rather than grounded in ontology. This split obscures the continuity of physical reality and generates persistent ambiguities, particularly concerning the nature of the vacuum and the interpretation of the Higgs mechanism.

I introduce the GRID (Global Reference In Dynamics) as the minimal dynamic structure of space-time required for any physical phenomenon to exist. The GRID is not a substance, not a medium, not an ether, and not a quantum state; it is the irreducible dynamic framework that prevents reality from collapsing into an absolute void. Faraday was the first to articulate the necessity of such a structure. By contrast, the Higgs mechanism—while mathematically indispensable within gauge theory—has no ontological content.

I further show that the Système-O (Bohane, 2026) provides a quantitative framework consistent with a unified ontology by replacing mass with a universal measure of existence expressed in O-units. This reformulation eliminates the artificial separation

between classical and quantum regimes and restores coherence between ontology and physical description.

Recognizing the GRID allows physics to abandon the two-world paradigm and adopt a unified ontological foundation consistent with both Faraday's intuition and contemporary theoretical structures

Keywords

GRID; Faraday; Higgs mechanism; unified ontology; quantum vacuum; Système-O; mass; physical foundations.

0. Essential Definition: GRID (Global Reference In Dynamics)

The GRID is the minimal, irreducible dynamic structure of space-time that prevents reality from being an absolute void. It is not a substance, medium, ether, field, or quantum state. Rather, it is the fundamental dynamic framework that makes the existence and propagation of all physical phenomena possible.

Without the GRID, no electromagnetic, gravitational, or quantum field could exist; no interaction could propagate; no geometry could be defined. Faraday explicitly recognized this necessity when he wrote that "something exists in space that transmits influence." Modern physics confirms this through the non-trivial structure of the quantum vacuum, even though it has never named the underlying ontological requirement.

The GRID provides the unified ontological foundation necessary for describing a single, continuous physical world.

1. Introduction: Beyond the Two-World Paradigm

For more than a century, physics has operated under an implicit division between a “classical world” and a “quantum world.” This dichotomy, inherited from the history of ideas, has no ontological justification. It persists only as a conceptual reflex.

The Système-O (Bohane, 2026), submitted earlier this year to this same journal and currently under review, provides the quantitative foundation for a unified physical ontology. That manuscript introduces a universal measure of existence expressed in O-units and demonstrates that mass is not a fundamental property but a derived human-defined quantity. The present article is its conceptual counterpart: it establishes the ontological framework that motivates and grounds the quantitative structure of the Système-O.

The world is not unified as a condition to be satisfied; it is unified by nature. There is only one continuous physical reality, extending seamlessly from the infinitesimal to the human scale. The apparent division between “quantum” and “classical” domains arises solely from the limitations of human perception, not from the structure of the world itself. This necessity motivates the explicit introduction of the GRID, which replaces the notion of vacuum with a minimal dynamic structure required for fields, interactions, and geometry.

Leaving the two-world paradigm is therefore not an aesthetic choice but a conceptual necessity.

2. Conceptual Framework: Why a GRID Is Necessary

Physics relies on entities—fields, interactions, geometry—that cannot exist or propagate in an absolute void. Yet scientific language continues to use the term "vacuum" as if total absence were physically meaningful. This reveals a deep conceptual inconsistency.

The "classical vacuum" is a mathematical abstraction. The "quantum vacuum" is not a vacuum: it has structure, fluctuations, and correlations. Fields do not exist in nothingness; they require a minimal dynamic support. Even space-time geometry presupposes a structural presence that gives it consistency.

Physicists often speak of the quantum vacuum or the quantum state as if it were the ontological substrate of reality. This is a conceptual shortcut. A quantum state is a mathematical object: a vector in a Hilbert space, defined through a Hamiltonian, excitable, superposable, measurable, and even absent in a given region. It is not a substrate. The GRID, by contrast, is a physical notion: the minimal dynamic structure that cannot be excited, measured, superposed, or removed. It is the ontological condition of existence on which quantum states, fields, and interactions are defined.

Thus, physics already relies on a minimal ontology without naming it. The GRID makes explicit what theory implicitly

presupposes. It adds no new physics; it clarifies the ontological foundation that physics already uses.

3. Faraday: The First to Formulate the GRID

Faraday rejected the idea of empty space. In Experimental Researches in Electricity, he insisted that lines of force are physical realities existing in space, even in the absence of matter. He did not propose a mechanical ether; he proposed a minimal presence required for electromagnetic phenomena.

His intuition anticipated:

- the non-trivial structure of the quantum vacuum,
- the need for a minimal ontological support for fields,
- the continuity of the physical world,
- the impossibility of a true void.

Faraday thus articulated, in conceptual form, what is here formalized as the GRID.

4. The Higgs Mechanism: A Formal Adjustment Without Ontology

The Higgs mechanism is often presented as explaining the origin of mass or as filling space with a universal medium. These interpretations are misleading.

Higgs (1964) did not propose an ontology. He introduced a scalar field with a non-zero vacuum expectation value to satisfy a mathematical constraint: gauge symmetry forbids explicit mass terms for the W and Z bosons. The mechanism

is therefore an internal adjustment within a model-dependent Lagrangian.

It does not describe the structure of space, the minimal presence, or the reason anything exists. In a unified ontology grounded in the GRID, the Higgs mechanism is recognized as a formal device rather than a description of reality.

5. The Système-O: A Unified Quantitative Framework

Mass is not a fundamental property of matter. It is a human-defined quantity, unique among SI base units in lacking an ontological foundation. The Système-O replaces mass with a universal measure of existence expressed in O-units.

This framework:

- eliminates mass as a fundamental quantity,
- replaces it with a universal measure of existence,
- unifies classical and quantum scales,
- aligns quantitative description with the GRID,
- restores ontological coherence.

In this context, the Higgs mechanism does not explain mass; it converts a coupling into a human quantity. The Système-O expresses existence directly.

6. Discussion: Faraday, the GRID, and the Continuity of Physical Reality

Modern physics implicitly relies on the GRID. The quantum vacuum has structure; space-time has dynamics; fields require a support. These features already presuppose a minimal dynamic presence. Faraday identified this presence conceptually; the GRID names it explicitly; the Système-O quantifies it.

Crucially, the GRID does not unify two domains. It reveals that **there were never two domains to begin with.** Physical reality is continuous by nature, extending seamlessly from the infinitesimal to the macroscopic. The classical–quantum divide is not a property of the world but a limitation of human perception and conceptual frameworks. Physics has always described a single world while speaking as if two worlds existed.

Recognizing the GRID therefore restores coherence between what physics describes and what reality is: **one continuous world, supported by a minimal dynamic structure, and quantified without recourse to mass through the Système-O.**

7. Conclusion

The classical–quantum dichotomy has no ontological basis. It reflects the limits of human perception rather than the structure of the world. The universe existed for nearly fourteen billion years before humans appeared, and there is no reason to expect that its architecture should conform to the sensory, cognitive, or conceptual capacities of a late-arriving biological species. Modern physics remains deeply shaped by this anthropocentric

inheritance: its definitions are not neutral, and many of its conceptual divisions arise from human limitations rather than from nature.

Recognizing the GRID clarifies the minimal dynamic structure required for fields, interactions, and geometry. It does not unify two domains; it reveals that reality has always been continuous. Faraday anticipated this necessity; modern physics confirms it; the Système-O operationalizes it by replacing mass with a universal measure of existence that does not depend on human-defined units.

The GRID is not presented as a final or absolute description. If it is not the correct minimal ontology, another will eventually replace it. Its value lies in providing a coherent structural foundation—much like the external walls of a building, without which no architecture can stand—even if this analogy itself reflects a human tendency to impose structure on everything. The GRID offers a conceptual framework capable of supporting the edifice of physical theory while remaining open to refinement.

Together, the GRID and the Système-O restore coherence between ontology and physical description. They allow physics to abandon the two-world paradigm and to describe the single continuous world that has always existed, independently of human perception.

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