The Silent Background: A Foundational Critique of Modern Physics

Evert van Brummelen

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Abstract

This paper presents a concise critique of the three dominant frameworks in modern physics: General Relativity (GR), Quantum Mechanics (QM), and the Standard Model (SM). By examining their treatment of space and time, it argues that all three theories share a fatal foundational flaw: they use space and time as unexamined backgrounds or containers, never accounting for their ontological origin. This oversight ensures that these theories remain incomplete and ultimately incompatible. The paper follows a structured, question-based format to progressively reveal this deep structural problem, setting the stage for a new paradigm in fundamental physics.

1. When we speak of everything, we begin with space and time, and from there, we consider additional properties such as mass and charge.

Physics, at its core, attempts to describe everything. But what is "everything" made of? Any theory must begin by identifying the fundamental entities. Traditionally, these include:

1. Space
2. Time
3. Mass
4. Charge
5. Spin
6. Energy
7. Momentum
8. Force/Field
9. Particle Identity
10. Entropy

11. Temperature
12. Information
13. Symmetry/Conservation Laws

Among these, space and time are the foundation. Everything else is layered on top. Thus, how a theory treats space and time defines its philosophical and physical depth.

2. Charge is attributed to particles, isn't it?

Yes. In all current frameworks, charge is not an independent entity. It is always a *property* of a particle (or quantum). For example, electrons carry negative electric charge, protons carry positive charge, and photons carry none. Even in field theories, charge is a property of field excitations (interpreted as particles).

Thus, charge only exists *on something*—a localized, distinguishable object or excitation. It is never distributed in space as an independent entity.

3. And a particle—or a quantum—is always placed *in* space, with space serving as the background, isn't it?

Yes. All major theories treat particles as *existing within* space:

- Classical mechanics: particles have positions in space.
- Quantum mechanics: wavefunctions are defined over space.
- Quantum field theory: fields are defined on spacetime.
- Even general relativity, despite dynamic geometry, places matter *in* spacetime.

So even when space is allowed to bend or evolve (as in GR), it remains a container—an assumed background in which particles and fields are embedded. The ontology of space itself is never questioned.

4. General Relativity, Quantum Mechanics, the Standard Model—these are the leading frameworks. Yet they treat space as a background, without ever saying what space is.

Correct. The three dominant frameworks are:

- General Relativity (GR)
- Quantum Mechanics (QM)
- The Standard Model (via Quantum Field Theory, QFT)

How they treat space:

Theory	Space is...	Dynamic?
GR	A field (geometry), part of the system	Yes
QM	Fixed background	No
QFT/SM	Flat background spacetime	No

Only GR treats space as dynamic, but it still assumes space(-time) as a container. QM and QFT use a fixed, absolute space without questioning its existence.

This is a core inconsistency. GR and QM are incompatible partly because they do not agree on the nature of space and time. Neither explains what space *is*.

5. So Quantum Mechanics assumes space without explaining what space is—that's a problem from the start. General Relativity does better, but even GR still puts the 'particle' *in* space.

Exactly. GR improves upon Newton by making space-time dynamic, but it still treats matter and fields as existing *within* it. GR does not derive particles from space—it simply lets them influence curvature. There's no mechanism that turns space into particles.

So all three theories make the same assumption: that space (and often time) is given, unexplained, and external to the objects it hosts. They treat the stage as real, but never ask where the stage came from—or whether it might *be* the actors themselves.

6. How do these leading theories get away with it—using space and time without ever explaining what they are?

Standard physics gets away with it for four reasons:

1. **It Works.** Predictions match experiments with extreme precision.
2. **Division of Labor.** Most physicists focus on calculations, not philosophical foundations.
3. **Historical Inertia.** Space and time were assumed since Newton; GR and QM didn't rebuild them.
4. **No Replacement Yet.** Alternatives like quantum gravity haven't produced a complete, testable model.

But this does not mean the flaw isn't real. It only means that utility has overshadowed ontology. The cost is clarity: we have powerful equations but no understanding of what space or time actually *are*.

Conclusion: A Necessary Reset

So why do our best theories still assume space and time instead of explaining them? That's exactly why unification keeps slipping through our fingers. It's time to reset—to stop assuming the stage, and instead ask how the stage itself is made.

The papers in this series will outline such a framework, in which space is the only substance, and time is the measure of its change.

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This critique is the necessary prelude to such a reset.