

Where Does Gravity Come From?

written by Victor Stoyanov | February 20, 2026

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For over a century, physics has described gravity as the curvature of spacetime. A massive object bends the geometry around it, and other objects follow curved paths through that geometry. The mathematics works. The predictions match observations. But the question remains: what is gravity, physically?

Medium Theory SMT proposes a different answer — not geometry, but dynamics. Gravity is the result of energy gradients in a physical medium Φ .

The Standard View: Geometry

In general relativity, spacetime is a four-dimensional fabric that can be stretched and bent by mass and energy. A planet doesn't "pull" on objects nearby — it warps the geometry, and objects move along the straightest possible paths (geodesics) through that warped space.

This is elegant. It's mathematically precise. And it works.

But it raises a question: if spacetime is just geometry — a coordinate system, a way of measuring distances and intervals — how does it physically interact with matter? How does a mathematical structure cause physical motion?

The SMT Alternative: Medium Dynamics

Medium Theory SMT starts from a different premise: space is not empty geometry. It is a continuous physical medium Φ — a real, nonlinear field with energy density, tension, and dynamics.

In this framework, what we call "gravitational interaction" is the flow of energy through the medium. A massive object like the Sun creates a localized deformation in Φ . This deformation has energy. That energy spreads outward — not instantaneously, but at a finite speed, governed by the medium's properties.

Other objects, like planets, are themselves configurations of the medium. They respond to local gradients in Φ — differences in energy density right where they

are. There is no action at a distance. There is no need for spacetime to “know” about distant masses. Everything is local: a planet moves because the medium energy is higher on one side than the other.

The effective force on an object in Medium Theory SMT can be written:

$$F \approx -\nabla U(\Phi)$$

where $U(\Phi)$ is the energy distribution of the medium. This looks like a force, but it's not a pull between distant objects. It's a response to an energy gradient in the medium — right here, right now.

Same Predictions, Different Ontology

The predictions of Medium Theory SMT match those of general relativity in most observable regimes. Planetary orbits, light bending, gravitational time dilation — all of these emerge from medium dynamics in the same way they emerge from curved geometry.

But the physical picture is different. In general relativity, gravity is geometry. In Medium Theory SMT, gravity is physics — the response of a physical substrate to energy gradients.

This distinction matters when exploring regimes where the two approaches diverge: cosmological scales, quantum gravity, and the structure of spacetime itself.

Locality as a Principle

One of the key advantages of the SMT framework is that it preserves locality. In general relativity, the Einstein field equations are local — the curvature at a point depends only on the matter and energy at that point. But the ontology is less clear: if spacetime is just a coordinate system, what does it mean for it to have curvature?

In SMT, the answer is straightforward: the medium Φ has energy density and tension, and these properties vary from place to place. The “curvature” of spacetime in general relativity corresponds to gradients in medium energy in SMT. And those gradients propagate — not as abstract geometric influence, but as real physical disturbances in a real physical medium.

What This Means

If gravity is the dynamics of a physical medium rather than the geometry of spacetime, then several long-standing puzzles may have new solutions:

Dark matter: If the medium has nonlinear response properties, structures like galaxies may produce medium deformations that mimic the presence of additional mass — without requiring new particles.

Quantum gravity: If spacetime is not fundamental geometry but an emergent description of medium dynamics, the challenge of quantizing geometry may dissolve. The medium itself has dynamics; spacetime is just how we describe those dynamics at large scales.

Cosmology: If the expansion of the universe corresponds to changes in the medium's state, cosmological acceleration may not require “dark energy” — just the evolving properties of Φ .

These are not claims. They are directions for exploration.

The Question Remains Open

Medium Theory SMT does not replace general relativity. It reinterprets it. The mathematical structure remains powerful and predictive. But the ontology — the question of what gravity is, physically — shifts from geometry to dynamics, from spacetime to medium.

Whether this shift leads to new predictions, new experimental tests, or simply a clearer conceptual foundation depends on further work. But the question is worth asking:

What if gravity is not the curvature of spacetime — but the flow of energy through a physical medium?

Based on Research #155 v3.1 — Locality and Gravitational Interaction in Medium Φ

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