

The Ten Axioms of Finite Emergent Spacetime

Terry Bollinger

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<https://youtu.be/II0LWR8gR5s&lc=Ugw3MXRq3YjfpPKj0TF4AaABAg.9ph1v1y810X9soXpFkhVO1>

A Comment on the [Parth G](#) YouTube post:

The 2005 Nobel Prize Controversy:

The Indian-American Physicist Who Should Have Won It Instead (Apr 25, 2023)

<https://youtu.be/II0LWR8gR5s>

@TerryBollinger: Overwhelming experimental proof of entanglement — the 2022 Physics Nobel Prize subject — means local, per-inertial-frame xyzt interpretations of the universe are emergent, not fundamental. It also impacts maths, such as Hilbert spaces that assume dimensional orthogonality to be axiomatic and thus cost-free.

@slowdown7276: Thanks for replying, Terry. Your site full of comments is a cool idea 👍.

What does the verification of entanglement mean philosophically, if that's the right term?

How do you understand the whole quantum interpretation in light of entanglement verification? And what's your understanding or philosophy based on this?

Also, what's your opinion on Bohmian interpretation? Was he right in his interpretation? Can this ever be known?

@TerryBollinger: @slowdown7276 Thanks for the feedback on my YouTube comment consolidation site. While YouTube is an excellent place for folks to express and discuss ideas, the disjoint nature of its comments makes it challenging to track broader and emerging themes.

As for your theory questions... Wow. For those, it's easier to start with ten axioms:

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- (1) Pair production and annihilation are the origins of physics and mathematics.
 - (2) Time-like structures emerge when secondary pair productions block annihilation.
 - (3) Every time-like structure creates a force that seeks to return the system to null.
 - (4) Acceleration (momentum exchange) is identical to "observation" or "wave collapse."
 - (5) Abundant angular self-observation is the origin of Standard Model particles.
 - (6) Local instances of spacetime (frames) are well-structured collaborations of particles.
 - (7) Every spacetime instance emerges from finite matter and thus has finite resolution.
 - (8) Quantum mechanics emerges from the finite resolutions of spacetime instances.
 - (9) No universal wave or time exists since quantum mechanics is frame-dependent.
 - (10) Collapse histories ensure cosmic-scale causal network consistency (see Spekkens).
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Now, some answers:

(a) *What does this say about Bohmian physics?* Bohm and de Broglie nicely nailed the unitary self-observation uniqueness of “objects” but could never make pilot waves work right due to assuming infinitely precise spacetime as given. Objects like electrons and huge, state-filled molecules can get into situations where it becomes impossible to create the usual combination of momentum interactions — space creation operations — needed to create the *illusion* of following a specific xyzt path. All such xyzt paths are necessarily illusory, including the next doorway you walk through after reading this. However, it’s essential to remember that non-xyzt (and frankly, not truly quantum) physics still constrains all such dynamics powerfully.

(b) *Can the correct interpretation be proven?* Sure, but only when folks stop assuming spacetime is fundamental. The problem is that assuming spacetime as fundamental creates much mathematical noise (e.g., Planck space, MWI), primarily by not properly terminating calculations at their mass-defined limits. The mind-bogglingly non-physical concept of a universal wave function is an extreme example of that kind of overshoot. In contrast, Spekkens takes the approach that there exists a network of causality — of cause-and-effect branches — that is fundamental and irreversible, and changes within such networks are fundamental. All local definitions of space and time get slathered over this more fundamental, uncompromising, and cosmic-scale “Spekknet” (yes, I just made that word up). These fresco coverings are necessarily limited and local only.

The best proof, I suspect, would be for some general relativity guru (not me!) to find the new math that translates and dramatically collapses the dark matter and MOND mess into a new version of GR that comprehensively tracks the finite resolution of matter-emergent spacetime. I am working on the SR side since, for example, the correct answer to the Twins Paradox requires an additional non-velocity ratio between two colliding frames. That looks interesting and also is a necessary stepping stone for generalizing GR.

(c) *What is your philosophical take on all of this?* My most surprising takeaway in recent months is that the idea that everything is “separated” by space is the ultimate illusion. Photons, for example, do not “resonate” with every point of matterless space between stars and galaxies but instead exist solely as momentum oscillation relationships between bits of matter that implement the spacetime structure. Nonetheless, the separation of objects in space is a compelling and hard-to-circumvent illusion since what we think of as classical physics is *constructed* from this very illusion of separation. If that were not the case, we would not be here to discuss it.

Thus the delightful irony is that existence as we know it became possible *only* when the universe figured out a way to limit itself to an almost insane degree. It does this so well and so convincingly that it often persuades creatures such as us who live within it that this always-finite approximation is, in fact, infinitely precise at no added cost. Thus, there exists a broad range of mathematical disciplines for which real math makes no distinction between the always-infinite cost of fully elaborating even a single point and the algorithms that approach those limits systematically and convergently. This deep universe creates such a convincing illusion of zero-cost infinitesimal perfection that we write many volumes on how axiomatic and fundamental these unreachable, infinite-cost limits must be.

It's an illusion, even in math. In a universe where limited-resolution spacetime emerges only from organized, well-structured, cooperating clumps of matter, even orthogonality is emergent. Without fundamental orthogonality, much of math becomes approximate.

I like that even with all these classical limits, the deep universe still interconnects us in ways that defy accepted definitions of space and time. For example, at some deeper level of the multi-level deep universe, all electrons look the same because they *are* the same. Each electron becomes a view — not a copy, but a view — of that single electron, mirrored almost infinitely through the fabric of splits and almost-collapses (e.g., hydrogen atoms versus positronium atoms) that create the visible complexity of the universe.

I love that emergent space makes walking through a door a quantum event in which matter conspires to create the data and history of that event. That's one of the deep universe's best-proven features since it's demonstrated by how giant molecules with complex internal states cannot "see" the difference between two nearby doors.

Emergent spacetime also pretty much requires a Chen-Carroll dual universe (a CCD universe? Heh!) since the most extensive pair production of all is the one in which the other half of every half-spin — every fermion in your body — has an antimatter, anti-energy partner that completes the spin in a universe that moves backward in time from our perspective. The pair has Boyle-Turok symmetry (BTS), universe-level CPT symmetry, minus the massive sterile neutrinos. The sterile neutrinos don't exist in our universe but are ordinary neutrinos in our partner universe — the half-spin partners of our neutrinos.

And yes, I know, how arrogant, whatever, sorry. Part of the problem is that once you dare to head down the path that spacetime is not just emergent but *finite and localized to your current inertial frame*, too many dangling threads start coming together with high cross-check values. That is, *the pieces start fitting together*. That's statistically rare.

My true pastime is spotting lousy, unverifiable assumptions messing up otherwise solid data. My greatest regrets have invariably turned out to be when I did *not* listen to a little voice that exclaimed, "That not work!" The last 50 years of physics, especially, is chock full of unapologetically unverifiable assumptions.

What's astonishing is how much the group dynamics of these efforts resemble theological elaboration forms of study than anything in science or experimentally grounded physics. This faith-first approach began to take hold about a century ago when formalists decided to remake the emerging quantum-and-relativistic world as residing within a fanatically still-classical "perfect" math image. Due to high matter density, that assumption works exceptionally well for physics firmly grounded in the local spacetime emulation, e.g., in a particle collider on Earth. But for understanding the deeper emergence underpinnings?

Sorry... that *not* work.