Woit's Euclidean Twistors in Fragmented Euclidean Spacetime

Terry Bollinger
2023-11-24.21:35 EST Fri
https://youtu.be/9z3JYb_g2Qs&lc=UgxFV_NH3eSg6RzhwL94AaABAg

A Comment on the Theories of Everything with Curt Jaimungal (YouTube) post:
Peter Woit: Unification, Spinors, Twistors, String Theory (Nov 22, 2023)
https://youtu.be/9z3JYb_g2Qs

Casual reader, stop now and go on to the next comment! You have been warned! Peter Woit, your 2021 Euclidean Twister Unification paper abruptly caught my attention today after I (I think) understood better your interest in Euclidean twistors. Here's a Pierre Ramond line quoted in your paper:

"Should the Feynman path integral be well-defined only in Euclidean space, as axiomaticians would have it, then there seems to exist a very real problem when dealing with Weyl fields as in the theory of weak interactions or in its unification with QCD." Pierre Ramond. *Field Theory: A Modern Primer. Benjamin/Cummings* (1981).

First, the conclusion: Your Euclidean twister approach works because Euclidean space is not universal at all but fragmented into multi-scale regions in which quantum field theory connects participating matter and fields — but only for that region. Minkowski space falls apart into pair-wise relations between these regions, with each relationship setting a precise clock ratio that is the deeper explanation for twin paradoxes. The Poincaré symmetries hold absolutely, but only when a bit of matter from another Euclidean region passes through your clock system. All such metrical systems — local QFT-enabled Euclidean spaces and Minkowski pair-wise relations between those spaces — are light-cone limited in scope, meaning that any attempt to define "universal" spaces won't work.

Now bear with me for a moment as I say a few heretical things:

The Feynman integral is more than just "well-defined in Euclidean space." QFT methods *define* the local Euclidean space, including its best available approximations of points. The connection comes about because quantum field theories have no meaning if not applied to classically known start and end conditions, which attach them to the inertial frames of those conditions. Thus, every valid, experimentally meaningful invocation of QFT mathematics is also single-frame.

Physics, including QFT physics, is identical in every Euclidean inertial frame because every Euclidean inertial frame *creates* the narrower set of constraints we think of a spacetime. I'm not saying the larger cosmos has *no* distance or change metrics. It's just that those metrics are configurations of a more accommodating set of distance metrics that are roughly the squares of what we think of as distances and mix the concept of change with that of metrical distance. As Einstein noticed in 1905 in his use of a two-way-only definition of lightspeed (wow), *xyzt* spaces become experimentally meaningful only when they get enough "breathing room" to allow the completion of out-and-back signal loops. Those loops are the heart of the useful *xyzt* restriction, but they also necessarily limit them and result in complicated boundaries, overlaps, and dynamics.

My name for this cosmic collection of such regions is brecciated spacetime — a fragmented collection of multi-scale Euclidean/QFT regions, each of which, at best, expands in meaning no faster than its light cone. An interesting corollary is that even *writing x'y'z't'* is a math error. Such naïve metrics are expanding waves since they have no meaning in the universe outside the light cones of their initial creation.

In keeping with the geology analogy, each Euclidean/QFT region is a *clast.* Clasts can overlap and interact in overlap in weird and wonderful ways, especially at their lower limits of resolution and dimensionality, where they give rise to the Standard Model. Only *within* Euclidean clasts do quantum field theories apply strictly and predictively. Or, stating that the other way around, dense regions of QFT *generate* the detailed and precise Euclidean structures and orthogonalities we interpret as "normal" spacetime.

Attempting to apply QFT math without keeping its finite-energy, finite-mass clast leads to vacuum density catastrophes. Even Feynman was suspicious that something was wrong with his loops' infinite descent and, thus, endless computation. The alternative in clast QFT is to replace renormalization with finite-energy loop production. The always-finite-energy process instead runs out of gas at the most minute scales.

Getting back to your Euclidean twistor paper:

Minkowski spaces create conflicts because *universal Minkowski spaces do not exist.* What struck me today while trying to understand your new focus on Euclidean space is that in a brecciated universe, the only place where the Minkowski relations apply is between pairs of clasts, each of which defines *one* xyzt relation set.

Earth and a launched spaceship form such a Minkowski clast pair. However, it's a highly asymmetric pair due to the spaceship clast forming by acceleration (launch) from the Earth clast. Without further accelerations, the resulting Minkowski clast-pair relation *never changes.* What that means practically is that the original Earth clast in the pair *always* has faster clocks than the smaller and more recently created spaceship clast. The famous ambiguity of saying "both" are slower than the other is incorrect except in the very narrow case of isolated particles from the Earth clast passing through the interior of the spaceship. Such visitor particles run slower during transit through the other clast, but this local-only effect fails to consider the clasts' boundaries. Work that out entirely, and the Poincaré symmetries are preserved in every context and at every velocity without altering the big picture: The larger clast always has the faster time of the pair.

So, Peter Woit, by discarding non-existent universal Minkowski spaces, your 3D twistors should do better at capturing the Euclidean-only internal QFT symmetries, forming part of the definition of that Euclidean region. In terms of symmetry groups, the idea that xyzt is locally emergent necessarily also means that symmetry groups are also emergent, clast-bound, and non-fundamental, just like xyzt. The entire concept of symmetry groups needs a massive reexamination.

A solid peer-reviewed author you might find relevant is Piotr Żenczykowski. His 2019 *Quarks, Hadrons, and Emergent Spacetime* would be a good start.

As for anyone else on YouTube who has somehow managed to read this far, I now return you to your regularly scheduled YouTube Comments section!… :)