On Roger Penrose's Even-Handed Marriage of General Relativity and Quantum Mechanics

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The simplest, most self-consistent path to unifying general relativity and quantum mechanics is reinterpreting classical mechanics' single-frame *xyzt* operators as emergent behaviors that lose resolution at the lower end, giving quantum mechanics, and transition smoothly into curved space at the high end.

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This is about: General relativity, Classical mechanics, Quantum formalism, Quantum gravity

I. INTRODUCTION

The text (only) of this Note began as a comment on an August 14, 2023 *Closer To Truth* (Instagram) post [1][2].

II. RELEVANT QUOTES

Robert Lawrence Kuhn: *"We're going to have to change General Relativity because quantum mechanics is more fundamental. Do you agree with that?"*

Sir Roger Penrose: *"People say [that since] there's no known contradiction between quantum mechanics and observed facts, [but] when you take into account … Einstein's cosmological constant Lambda … we [also] don't have any known conflict between general relativity and observed facts. So, it's one or the other. Well, I say it's not really one or the other. It's an even-handed marriage between one and the other."*

III. ANALYSIS AND OBSERVATIONS

Thank you, Sir Roger Penrose and Robert Lawrence Kuhn, for a beautiful defense of General Relativity!

Here's a related thought: What if quantum mechanics is nothing more than the tattered, ratty, low-resolution fringe of that most astonishing and profoundly impactful of all constructs in the natural world, that being the set of rules and behaviors we so causally, and often dismissively, call "classical physics?"

That is, instead of deifying the fuzziness of the quantum world by mathematically redefining it as sums of inaccessible infinities of exceedingly classical-like data storage, what if the deepest, most profound, and most complex relationship in the universe is its ability — always locally and inevitably somewhat approximately — to redefine its dynamics in terms of the marvelously simple, yet simultaneously unfathomably complex, operators that we so casually refer to as *x*, *y*, *z*, and (drumroll!) *t*?

It is this *xyzt* approximation, rather than its ratty lower edge of quantum uncertainty, that makes persistence, information, and history possible. From these properties, you get the simple, reliable, predictable rules of physics, math, and chemistry that make life and this discussion possible.

The bottom line is that I don't think we're even looking at this the right way. If you instead view our universe as a bubbling froth of finite mass, finite-boundary, constantly-interacting, multi-scale *xyzt* inertial frame instances, bound by causality and the rules of special relativity, then quantum mechanics and General Relativity become lower and upper boundaries at which the amazingly effective *xyzt* classical approximation becomes unsustainable, and the much stranger physics of the pre-*xyzt* deep universe begins to show through (FIG. 1, FIG. 2).

It is in that deeper pre-classical, pre-*xyzt* universe that the more profound unification of quantum mechanics and General Relativity resides — and that makes it challenging since our brains are hardwired to take maximum advantage of the *xyzt* classical approximation.

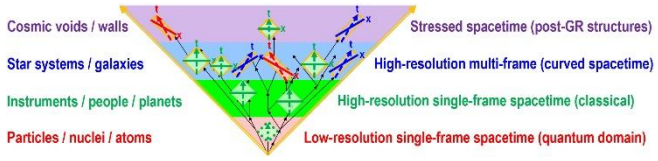

FIG. 1. The Spacetime Resolution Hierarchy (quick view).

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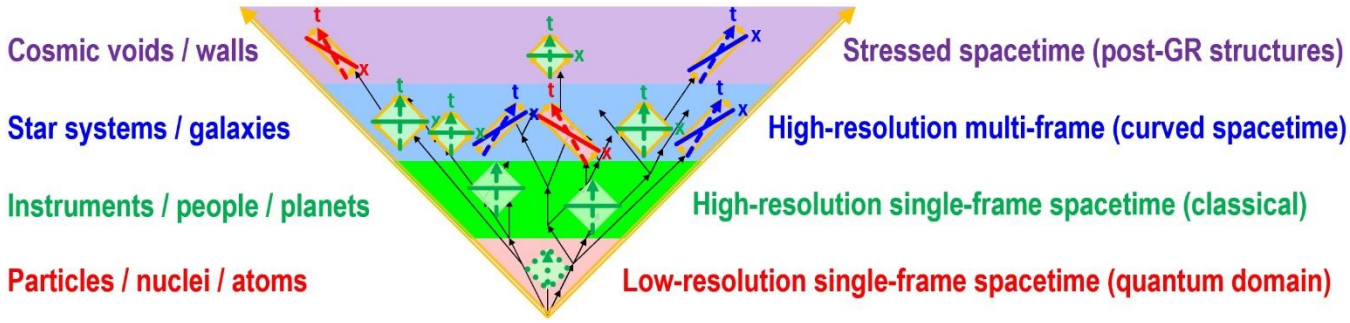

FIG. 2. The Spacetime Resolution Hierarchy (expanded view).

[1] R. L. Kuhn, "Explore quantum theory with physicist and mathematician Sir Roger Penrose," 14 August 2023. [Online]. Available: https://www.instagram.com/reel/Cv8ort-Ptcc/?igshid=MzRlODBiNWFlZA==. [Accessed 16 August 2023].

[2] T. Bollinger, "Comment: On Roger Penrose's Even-Handed Marriage of General Relativity and Quantum Mechanics," 15 August 2023. [Online]. Available: https://www.instagram.com/p/Cv8ort-Ptcc/c/17977246691390618/. [Accessed 16 August 2023].