Everett's Cat (and Two More MWI Issues)

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https://youtu.be/433tAfO4dbA&lc=UgwNHCWUi12pASP50ip4AaABAg

A Comment on the Sabine Hossenfelder (YouTube) post:
The Many Worlds Interpretation of Quantum Mechanics -- And why I don't believe it (Oct 21, 2023)
https://youtu.be/433tAfO4dbA

Nice video! I especially liked your zeroing in on how MWI fails to solve the non-locality issue. One quibble, two additions:

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(1) When MWI supporters use the word "probability" to superpose multiple universes without adding mass, they subtly invoke wave collapse. That's because "probability" is an operator that assumes the existence of discrete, well-defined outcomes. Once you invoke one of those, the wave restarts.

In radio frequency encoding theory — which, if you think about it, is necessarily the electromagnetic subset of any MWI universal wave function — the carrier wave maintains finite energy by *continually* losing higher-frequency harmonics as it propagates. They become pure noise, nothing more than uncontrollable static incapable of holding a signal.

That is why your local finite-bandwidth FM station cannot broadcast infinitely many songs in parallel, and it is why you cannot encode infinitely many versions of yourself onto your finite-mass body. All those other versions of you turn into probabilistic noise, better known as heat.

An interesting question to ask MWI folks is why their version of "energy" has infinite signal capacity while all of us poor rubes in labs, engineering, and crowded bandwidth environments are stuck with this dang-nab finite signal capacity version. For the record, I've never gotten an answer, even from folks who understood what I was asking.

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(2) If mass is finite across the multiverse, a fascinating implication is that all universes must observe the *same* gravitational structure *at every level of detail.*

Think about that!

Not only must every universe have identical star, planet, and asteroid locations, but also identical mountains, oceans, and valleys since all of these have detectable gravitational profiles. Getting more personal, if I set up a gravitational torsion experiment in a lab, every version of me in every universe must do the *same experiment* simultaneously.

Mathematically, this turns into an interesting signal integration problem: If all universes share a weak gravity signal, how similar must they be to ensure each sees a gravity signal that is entirely consistent with their physics?

The surprising answer is this: All universes in a shared-mass multiverse must be identical *down to the outcomes of every quantum event.*

Otherwise, you could set up an Everett's Cat experiment in which a single quantum event could kill or not kill a cat in a lab with sufficiently precise gravitational monitoring to detect whether the cat's body did or did not fall. Since all labs must see the same outcome, all must also share the same quantum event that determined the cat's fate.

Thus, Everett's Cat shows us that every universe in an Everett multiverse must have *identical* outcomes to every quantum observation. The need for identical quantum event outcomes undercuts the very premise of how such universes arise in the first place and leads to a simple conclusion: There is no multiverse.

(Sidenote: The gravity-signal-integration argument is new this morning, so I'll be sure to add an Everett's Cat paper or note over at Apabistia Press.)

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(3) Finally, the biggest problem with Everett's thesis was his radical violation of the lightspeed limit when describing how two new universes arise from a single quantum event.

All events in actual physics impact the surrounding universe through light ones that expand at c. You can undoubtedly postulate *two* universes arising from one binary quantum choice, but you are postulating two *light cones* coming out of that event. The rest of the universe cannot see the alternatives until the two light ones propagate the changes out to it…

… which could take *billions* of years!

So why did Everett assume "instant" new universes? It was a dumb math error: He took the non-physical simplicity of the Hilbert space model as a given and *assumed* its perfect states were there for the plucking. In the real, light-speed-bound universe, such states have no meaning until those light cones finish propagating billions of years later.

Despite its intimidating reputation, Hilbert space is nothing more than a collection of "states" that, like vertical (y) and horizontal (x) in classical space, are unique from each other. The formalism is nothing more than a data structure, meaning it doesn't address *how* those unique states came into existence.

That's where Everett, with his lack of hands-on lab experience, made his rather catastrophic error: He just thought, "Hey, if I can write down a *formula* for an infinity of universe states… wow, it's math, so those states *must* be real!!"

That was a most unfortunate error. The glamor of a Hilbert space formalism covered up Everett's lack of understanding of lab physics, and the ensuing set of highly mathematical papers — all, alas, founded on a dumb but subtle math error — added unmerited credence and weight to it. A sad history, indeed.