There is No Vacuum, Only Energy Relations

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[Email Excerpt]

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The question amounts to this: To get a vacuum, do you need two somethings or only one something with relations?

Because you once contacted me, I now know you and your friends. But your friends, especially the ones in Israel and England, have more contact with you and know you better than I do. Also, they know me mainly through my connection with you.

Map that out, and you get a cluster of short ("closer") arrows on your side of the pond [and hmm, is there a nickname for pond + Mediterranean? The "extended pond," perhaps? The "pond plus"?], plus longer ("farther") arrows to me. Yet I can "see" the space of relations you have there — it looks similar to me from here since I know something of whom you know and don't know.

The space in which you draw such maps is the space of relationships. It's not a stand-alone substance since it has no meaning outside of the *somethings*. In this case, those "somethings" are the *people* who interact with each other over time to give it consistency and definition. Take away the people, and you have a literal nothingness, an absence even of the meaning of what the space *was* or *did*, let alone its content.

That is all the vacuum is. It is the set of relationships created by energy and mass. Without those relationships — without the energy and mass defining them — it reverts to the most vividly complete form of nothingness. While the relations are vastly more detailed than human relationships, the principle is no different, and the absences are no less comprehensive.

The concept of a completely blank vacuum is not as new as it seems. It's the deeper reason why Einstein's 1905 special relativity assertion that "every frame sees identical physics!" worked so unexpectedly well. It's why no one, to this day, has found an aether in which electromagnetic vibrations cross space or an aether that breaks down at sufficiently high energies, which even Roger Penrose used to think, though he doesn't anymore.

Thus a photon emitted billions of years ago on the other side of the universe *does not vibrate the medium of some unimaginably vast volume of vacuum*, which is how quantum field theory (QFT) describes its expansion over time. That version of QFT inevitably leads to an infinitely precise and, thus, unimaginably information-filled vacuum. Otherwise, how can it possibly preserve and propagate the infinitesimally tiny vibrations of all those single photons crossing through it?

The reality, says Terry at least (and I'm right about this, so who cares), is more straightforward and much weirder.

The first point is that since a photon's emission involves creating a momentum pair between the photon and the particle or atom that emitted it, it's *not* a quantum event that "may or may not" have happened. It *happened* and cannot "un" happen except in a few exceptional cases where the photon reflects and returns quickly, undoing the emission. Those quickly become vanishingly unlikely, and the emission becomes an entirely historical event.

From its start, Schrödinger's cat thought experiment is simply wrong on this point. Schrödinger assumed, for good reasons at the time, that his radioactive particle emission was an "uncollapsed" wave function. Recognition that *momentum pair formation* is identical to observation is the starting point for getting out of this unfortunate situation. Momentum pair formation tells each side where the other is. This energy exchange is historical information, making it an observation — period. Even a tiny linear momentum exchange such as a photon emission is all that's needed to collapse *both* wave functions of *both* sides of the momentum pair, including any human observer's wave function. Get this "observation is ubiquitous" point wrong, and you end up multiverses full of fevered-fat Schrödinger's cats and many a copy, some quite sloppy, of you and me.

Enough on that; that's just setting the stage. Once emitted, what does the photon do?

Quantum field theory says it expands an ever-expanding volume of field-bearing vacuum with increasingly weak vibrations. That's impossible if the vacuum is absolute nothingness, the absence of relationships. But getting rid of the QFT vacuum also eliminates the need for infinite information densities in the void, which is nice.

The next phase of physics (n-pop, so I like acronyms, guilty!) needs to be simpler and, to me, a lot more interesting: The photon *becomes a hermit* for a few billion years. It sits in its tiny private version of a particular light-speed version of xyzt space. The energy relations of the photon at emission defined that space and its behavior. With the right start, it can remain lost for a very long time.

The problem, however, is that the rest of the universe still *remembers* the photon. The universe is infinitely unforgiving on the issue of energy and other quantum-number debts. Those same debts entangle the universe with itself so that over time, the obligation of the photon is "remembered" by particles and atoms at just the correct distances and combinations of properties. It can still slip by, but sometimes, if the combination hits *just so*, such as in the JWST, the photon starts behaving as a true wave within the optics and is then absorbed by an electron, allowing its energy to rejoin the rest of the universe.

Do you think this needs more elaboration?

Oh yes, and that is quite an understatement! That whole issue of "the right combination of properties" for seeing and absorbing the photon — essentially, for suddenly remembering the lost photon — is at the heart of how quantum uncertainty works. All of this has yet to get mapped out. As a principle of unwavering faith, everyone has for about a century now asserted that quantum uncertainty results from magically perfect and smooth functions producing, by definition, perfect randomness. Ironically, that is a profoundly paradoxical statement if you look closely at all the implications of "perfect" smoothness.

The causes of quantum uncertainty deal with how the matrix of relationships, many dating back to the very beginnings of the universe, interact to recapture lost bits of energy and matter. There's also an entangled negative-energy universe involved in all of this, so it's not going to be a simple resolution. But it will be an *exciting* resolution that should lead quickly to experiments showing that quantum wave collapses are not as random as has been assumed for the last century.

By the way, no kidding, I *promised* myself I'd keep this answer short this time. Well, now, we can both see how well *that* worked!

Cheers,
Terry

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