Fragile Universe Hypothesis and the Continual Anthropic Principle

Peter F. Coin, 2015
peterfcoin@gmail.com

--Abstract—

A popular objection to the Many-worlds interpretation of Quantum Mechanics is that it allows for quantum suicide where an experimenter creates a device that *instantly* kills him or leaves him be depending the output of a quantum measurement, since he has no experience of the device killing him he experiences quantum immortality. This is considered counterintuitive and absurd. Presented here is a speculative argument that accepts counterintuitiveness and proposes it as a new approach to physical theory without accepting some of the absurd conclusions of the thought experiment. The approach is based on the idea that the Universe is Fragile in that only a fraction of the time evolved versions retain the familiar structures of people and planets, but the fractions that do not occur are not observed. This presents to us as a skewed view of physics and only by accounting for this fact (which I propose calling the Continual Anthropic Principle) can we understand the true fundamental laws.

-Personal Statement-

I like to think about big questions from time to time. A fancy that quite possibly causes me more harm than good. Every once in a while I come up with some idea and wonder "hey, this seems pretty good, I wonder if anyone is taking it seriously?" Usually, answering that results at worst in me wasting a couple days on google and blowing $50 on amazon before I find someone who's going down the same path and can tell myself. "Well, someone's got that covered".

This particular idea is a little more stubborn and the amazon bill is starting to get a little heavy. So I cobbled together this "paper" to get this idea out there and see where it goes.

--Preliminary reasoning--

-Will a supercollider destroy the Earth?-

A fringe objection to the latest generation of high energy supercolliders was they might trigger some quantum event that would destroy the earth such as by turning it to strangelets (merely an example). To assuage those fears it has been noted that since Cosmic Rays have been observed with higher energies then the collisions these supercolliders produce that if a supercollider were able to create such Earth-destroying events cosmic rays would have already destroyed the Earth. Since that hasn't happened physics must not work that way and we thus must be safe.

-A false application of the anthropic principle-

One may try to cite the anthropic principle as an appeal against the conclusion that physics disallows Earth-destruction by said mechanism. If the Earth were converted to strangelets, there would be no

observers on it. If the right sort of multiverse exists, some Earths will be lucky enough to escape this mode of destruction. Thus physics may still allow for strangelet destruction and supercolliders may still destroy the world. We can reject that objection by noting that if that were the case, it is far more probable that our planet would be alone in a sea of strangelet balls that were already converted by high-energy cosmic rays. Since we observe other worlds made of ordinary matter, we can be sure physics doesn't allow for the Earth to be converted into strange matter by interactions at Earth's energy level.

-Will a supercollider destroy the universe?-

Among the ideas on how supercolliders will destroy the world there are some that destroy not just the Earth but entire universe as well. A proposed mechanism is in triggering vacuum energy to collapse to a new lower energy state. By that mechanism the destructive event spreads out from the nucleation site at the speed of light and shreds the universe to something completely unrecognizable. In the same way cosmic rays rule out an Earth-destroying event it has said that this rules out a universe destroying event.

-Quantum immortality and suicide-

Quantum suicide is a thought experiment there is a device that measures a random quantum event, and kills an experimenter *instantly* upon one outcome, and leaves him alive upon the other. If Everett multiple worlds is true, then no matter how matter how many times an experiment is performed, the experimenter will only experience the outcome where he is not killed thus experiencing subjective immortality. There are some pretty nutty ideas about the quantum suicide and immortality, and this has been used as an argument against many-worlds. I find the idea of finding oneself for example perpetually avoiding fatal accidents or living naturally well beyond any reasonable time to be mistaken (see objections). I do however think that Max Tegmark came up with a good system of rules on his "crazy" page for how it might work: http://space.mit.edu/home/tegmark/crazy.html

The rules he outlines are: "I think a successful quantum suicide experiment needs to satisfy three criteria:

1. The random number generator must be quantum, not classical (deterministic), so that you really enter a superposition of dead and alive.
2. It must kill you (at least make you unconscious) on a timescale shorter than that on which you can become aware of the outcome of the quantum coin-toss - otherwise you'll have a very unhappy version of yourself for a second or more who knows he's about to die for sure, and the whole effect gets spoiled.
3. It must be virtually certain to really kill you, not just injure you."

-Have supercolliders destroyed the universe?-

Let's say that given experiment has a certain "probability" (by a probabilistic interpretation of QM) of producing said universe destructive event. This satisfies all 3 of Tegmark's conditions for a successful quantum suicide experiment. As such the experimenter might conclude that said event cannot happen. However, he would be mistaken, and a corresponding percentage of successor states would in fact be

ones where the event occurred. If the rules of physics are such that an event is allowed then we have a fundamentally skewed perceptions of what physics are.

-It's not a bug it's a feature!-

If we presume such events could occur, we have no idea how frequent they are. There's no necessary reason why they need to be confined to rare high energy experiments and cosmic rays. Perhaps it dictates more basic and fundamental interactions. For instance certain events within an ordinary atomic nucleus could create a universe-destroying event. Even if these events occur at an astonishing rate, so long as there's a situation where the event doesn't occur (or is "undone" before the runaway effect can occur), it would not be contradictory with our observation. The presumption that these events don't occur may be preventing us from understanding a simpler law that describes physics in a certain situation in favor of more complex theories that limit behavior to that which we can observe.

--Fragile Universe Hypothesis--

-Introduction-

Because of this preliminary reasoning I am postulating what I call the "Fragile Universe Hypothesis". The core idea is that our universe is constantly being annihilated by various runaway events initiated by quantum phenomena. However, because for any such event there's always a possible path where such event does not occur, and since all possible paths are realized we are presented with an illusion of stability. What we see as persistent structures in the universe (chairs, planets, galaxies) are so only because events that destroy them by and large destroy us as well. What we may think are fundamental laws of our universe, are merely descriptions of the nature of possible futures consistent with our continued existence.

-Core theory-

The hypothesis can be summarized as postulating the following:

1. For a given event at Time T there are multiple largely non-interacting future successor events at T + ε (i.e. Everett Many Worlds is either correct or at least on the right track)
2. There are some events where some (but not all) successor events trigger runaway interactions that destroy the universe as we know it. Such events expand from the origin at C and immediately disrupt the consciousness of any being it encounters.
3. We experience only a subset of possible futures and thus have a skewed perspective of the laws of physics.
4. To describe the outcome of an experiment we must first calculate possible outcomes then filter out those that result in observer destruction (call it the "continual anthropic principle")

--Possible objections--

-"If I get destroyed I die and will no longer have experiences. This is at face value absurd"-

I'm sympathetic, and I'd say this requires a stretch of imagination to consider. But do note that under this hypothesis, no one will ever have an experience that isn't followed by a successive experience (see quantum immortality for discussion of death). So from our perspective our existence will go on unimpeded. As an example, consider a video game save. The game file can be saved, copied, compressed, decompressed, moved from medium to medium (with some files being deleted after being copied to a new location). We say that the game continues so long as someone plays at least one copy of the file. Likewise for us, we say life (or the universe as we know it) goes on so long as at least one successor continues.

-"This sort of reasoning would result in having to accept absurdities like quantum immortality"-

I don't think so. Quantum immortality (the idea that many worlds guarantees one immortality as there will always be some future state in which one continues to exist) presumes that personhood is an all-or-nothing thing. In reality a person is more of a fragmented collection of mental processes. We don't suddenly stop having experiences as we die, rather the fragments unbind, some live on in the memory of others or in those experiencing the products of our expression, while others fade out. A destructive event of the kind proposed would absolutely be an all-or-nothing affair. Either everything goes, or nothing goes.

-"This isn't science. What testable predictions are you making? Heck you don't even have a solid theory"-

Point taken! This is, at this point, speculation, but I think at this point it might have the sort of elegance that good theories have. The questions that I have are:

1. Has this ever been seriously considered? (I've done some homework but undoubtedly not enough).
2. Are there any conceptual defeaters that make this a nonstarter?
3. Could some theories be made simpler by postulating a fragile universe and continual anthropic principle?
4. Could those hypothetical theories make testable predictions?
5. Have those tests been consistent with the theory.

My objective in writing this is to provide an argument against 2, and starting to look into 1 and 3. 4 and 5 are essential to good science as well too, but we're simply not at that point yet.

--Final Thoughts--

-The Copernican Principle for Many worlds-

When we moved the Earth as the center of the solar system, the orbits of the other planets became simpler and clearer. Perhaps physical law can be made simpler and clearer when we move the futures we will experience away from the center of possible futures. And like the solar system's habitable zone, perhaps only a small portion of futures are habitable.

-Why confine the Anthropic Principle to the past?-

Current models of cosmology limit the impact of the Anthropic selection on the cosmos to the past: string landscapes, bubble universes or cosmic branes, these things all got fixed at some set of values 13 billion years ago and the selection effect does no more work at the cosmic scale. Perhaps the selection effect is more fundamental then that. Could it be that instead 13 billion years ago is when the anthropic selection merely switched from being creative in sowing our cosmic seeds to conservative in allowing them to grow?

-- An (incomplete) selection of Books I've found helpful and inspiring --

Bostrom, Nick. *Anthropic Bias: Observation Selection Effects in Science an Philosophy*. New York: Routledge, 2002.

Drescher, Gary L. *Good and Real: Demystying Paradoxes from Physics to Ethics*. Cambridge, MA: MIT Press, 2006.

Green, Brian. *The Hidden Reality*. New York: Knopf, 2011.

Holt, Jim. *Why Does the World Exist?: An Existential Detective Story*. New York: W. W. Norton & Company, 2012.

Parfit, Derek. *Reasons and Persons*. Oxford: Oxford University Press, 1984.

Tegmark, Max. *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*. New York: Vintage Books, 2014.

Wolfram, Stephen. *A New Kind of Science*. New York: Wolfram Media, 2002.