Quantum Realism: FAQ (2016)

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Quantum realism is the theory that the quantum world exists and creates the physical world as a virtual reality. Here are some short answers to common comments.

1. *A universe as big as ours must be real.*

Answer. It is only "big" relative to us.

2. *A universe that has been going for billions of years must be real.*

Answer. Again, only relative to us. With enough processing power, one could run a program of the entire history of the universe in a few seconds.

3. *It would take a computer bigger than the universe to simulate it.*

Answer. Physicists already speculate a multi-verse bigger than our universe, so why not? Actually, in this model the universe can be generated by a same size quantum universe because quantum processing is so powerful.

4. *So who is the programmer?*

Answer. I don't know. I guess everything is. Every choice we make changes the program.

5. *Computers need physical hardware so that processing based on the physical world can simulate the physical world is recursive. The argument is circular.*

Answer. A thing creating itself is circular but that a *non-physical* world creates the physical world is not. The definition of processing only requires a choice between states that needn't be physical. Quantum processing couldn't happen if it depended on the physical because what it does is physically impossible. There is no circularity because quantum processing isn't physical.

6. Can we hack into the system?

Answer. Quantum computers already do that. They tap into quantum processing based on qubits that is far more powerful than our processing based on bits.

7. *Is this like The Matrix, with Keanu Reeves as Neo?*

Answer. No. Neo escaped from the Matrix to another *physical world* so his reality base was still physical. In this case, the physical world comes from a quantum world that doesn't follow physical laws because it creates them. The laws of physics come from quantum laws that are processing laws.

8. This just defers the problem of fully explaining everything to another level, so it can't be a theory of everything (TOE).

Answer. The TOE dream that one day science will explain everything died last century when quantum theory destroyed determinism. We are not in a clockwork universe, so quantum realism is a *query of everything* (QOE) not a TOE.

9. So what creates the quantum world? This is just a "turtles all the way down" recursion.

Answer. You still assume you can observe objectively? We don't see reality objectively like a bird from above but like frogs on the ground are *embedded observers* who can't see relativistic time changes if they change our time too. We are sequestered in our reality as a game avatar is confined to a screen. We cannot see the quantum world because any attempt

causes a quantum collapse that gives a physical view like a click in a game. As far as we are concerned quantum reality *contains* our reality, so to speculate beyond that is pointless.

10. If virtual reality calculations are performed by "something" it would be a system like our Universe that needs an explanation so we are back to square one, so to speak.

Answer. The "something" you refer to is quantum reality so we aren't back to square one but one square further on, as quantum theory is one of the greatest discoveries every made. You are back to square one if you think everything is physical, but science is about accepting reality as it is not making it what we want. Where is it written that physics must explain everything?

11. *A theory that some other world is creating this world is not testable*.

Answer. Of course it is. A theory that there is a heaven is not testable but a theory that *this physical world is virtual* is testable. Physics tells us how the physical world behaves and computer science tells us how virtual worlds behave, so one can easily test if the physical world acts like a virtual reality. You just have to put the two disciplines together.

12. *It is all just meta-physics like the number of angels on a pinhead*.

Answer. Meta-physics is speculations about unknowable things but the virtual reality conjecture is about *this physical world* so it isn't meta-physics. It asks if our world acts like a virtual reality, e.g. did it *startup*, is there a *screen refresh rate*, are there *pixels*, and so on. It is the physics articles in Scientific American and New Scientist that are increasingly metaphysical speculations.

13. *This is just plain stupid and you're a moron.*

Answer. It's just a theory. No-one is forcing you to believe it.

14. You aren't an expert in physics, mathematics, philosophy or religion. You should leave physics to the physicists and philosophy to the philosophers. Let the experts decide.

Answer. Academic specialists create knowledge castles to resist new ideas, but specialization means that no-one sees the whole elephant. Physics needs help because nothing much has changed in the last fifty or so years. It's time to open up quantum theory to everyone for comment including computer people like me.

15. *This theory is unproven*.

Answer. So is the physical realism alternative. Would you fail one candidate by a criteria the other also fails? Science should pick an alternative by testing the data not presumption. Why not let this alternative be tested by its predictions?

16. *This theory is based on assumptions.*

Answer. So is every scientific theory. The method of science is to assume an hypothesis then test it by physical world data. The reverse engineering method follows that approach.

17. *Denying the axiom that there is nothing outside the physical universe opens the floodgates to let anything convenient through, no matter how unlikely or even absurd.*

Answer. No floodgates open given you hold fast to the scientific method of forming theories, making predictions and testing them. To ask a question of the physical world *is* science. That the question happens to be "*Is the physical world a processing output?"* doesn't change that.

18. This theory would end science, as you can't study what you can't by definition see.

Answer. Not true. Physics studies quantum states that no-one can see and it still works. We studied gravity without seeing it.

19. *A theory that postulates the unseen is not scientific*.

Answer. That science is about the seen is *logical positivism*, a simplistic nineteenth century view now discredited in almost every discipline. Visibility is not a demand of science.

20. *This theory can never be decided*.

Answer. Not true. Science decided that our universe had a "big bang" beginning, so it can decide whether or not it is a processing output.

21. Eventually, all these impossible quantum paradoxes will be chalked up to faulty measurement. Right now, we just don't have the technology to fully detect quantum reality.

Answer. Not so. We are already incredibly exact, and better measurement won't change that viewing a quantum wave makes it collapse into a physical event.

22. Where is the reset button?

Answer. For us, every moment is a reset. This is why there is always choice as Victor Frankl explains.

23. Why doesn't whoever is running this simulation shut it off to save power?

Answer. Beats me. One must suppose a good reason. I guess it's important? Maybe they will one day.

24. *The theory contradicts Occam's razor.*

Answer. Occam's razor is to take the simplest theory to fit the facts. It favored an objective world in the nineteenth century but today when space bends, time dilates and quantum entities teleport it cuts the other way. Compare one quantum network and one Planck program with the five fields, thirty-eight particles, sixteen charges, fourteen bosons and twenty four result-fitted parameters of the standard model. Quantum realism is a *much* simpler theory.

25. *This is not mainstream physics*.

Answer. Of course it isn't. Nothing new ever is.

26. *This is a crazy idea*.

Answer. That doesn't make it untrue. New ideas are always crazy but science often advances by them. Even if this theory is wrong we might learn something.

27. *This is just another God theory*.

Answer. No it isn't. God theories don't limit God but reverse engineering the physical world does. Postulating beyond the physical universe doesn't make a theory a God theory, e.g. multi-verse theory isn't a God theory.

28. *So did God program the universe?*

Answer. The simulation hypothesis doesn't change the God argument one way or another. Maybe God is the programmer, or advanced aliens, or as Bostrom suggests ourselves from the future! Whether the simulation hypothesis is true or false, we can still argue about God!

29. *Does this model imply a phantom spirit world alongside the physical world?*

Answer. No it doesn't. Dualistic religions postulate a spiritual world alongside the physical world. Quantum realism like physical realism is a *monism* that has one reality. Unlike physical realism it calls the quantum world real and the physical world the phantom. In the observer-observed relation, it calls the observer real.

30. *How can everything we see be information!*

Answer. Neurologists already *know* that everything we see is information, as neurons are on-off devices like transistors. Yet quantum realism isn't *solipsism*, that everything is just a mind dream. It is that the physical world is an *interface* to reality that existed before humanity came along and still occurs even with no brains.

31. *Where are your equations?*

Answer. We have equations already, e.g. Schrödinger's equation describes a 3D processing wave. Physics is short of understanding not equations, e.g. that quantum waves are processing waves, quantum collapse is a processing reboot and entanglement is processing merge. The future is dynamic simulations not equations.

32. *Physics has equations that work. This is enough. It doesn't need meaning.*

Answer. Bohr began this *carry on calculating* approach to save physics from despair. If you are happy with that then fine, but why stop others wondering what it means? Meaning is important to people.

33. *The equations of physics work incredibly well so they must know.*

Answer. That an equation works doesn't make its interpretation true, e.g. center-of-gravity calculations work but an object's mass isn't at a point. Don't confound equations that interpolate with theories that extrapolate. Physics hasn't really predicted anything for over fifty years. It "predicted" top and charm quarks but that was like predicting the last move in a tic-tac-toe game - obvious. Other predictions like proton decay, WIMPS and massless neutrinos failed. "Predicting" virtual particles that work invisibly, like gluons, gravitons, W bosons and the Higgs, doesn't count. Devising equations *after* the facts then fitting their terms to transient resonances in billions of accelerator collisions is the new version of reading tea leaves.

34. I don't think the world is a fake.

Answer. Neither do I. It is a *local reality* not a fake. A local reality is real as long as you stay within it, so a pixel man can stub a pixel toe on a pixel rock. If you're playing Monopoly, Monopoly money lets you buy Monopoly houses, but you can't buy our houses with it. The physical world is fake in the sense that it is only an interface, yet it *mediates* quantum reality. There is a real world "out there" generating experiences - it just isn't the one you see.

35. What exactly is the processing "grid" you propose? What is a "node" made of?

Answer. The grid is the "… *primary world-stuff*" as defined by Wilczek p74. The quantum network is like our networks but based on qubits not bits. A node is just a network processing point. People don't accept quantum theory because it doesn't follow physical laws, but what creates a law isn't itself bound by it.

36. I am not a pixel!

Answer. Neither am I. If I log on to The Sims as a character and look around I see pixels but that doesn't make *me* a pixel. If I *identify* with my avatar I might *think* I was made of pixels, but even then I wouldn't be. If you figure out what "I" is made of let me know. Indeed tell everyone, as no-one in science today will say.

37. *If the physical world is virtual, we don't really exist!*

Answer. In any computer game the player avatar is made of pixels that are locally real but don't exist outside the game. Yet the observer is always outside the game looking in. A virtual reality needs an observer hence fundamental physics has the observer paradox. We think only we observe but maybe *everything is observing everything else* and we differ from animals and computers in *self-awareness* not in consciousness (Whitworth, 2009). So we exist as observers making choices but our physical body avatars only exist as pixels.

Quantum realism is that quantum reality exists, not that nothing exists, which is *nihilism*.

38. Whoever is playing my character is pretty boring.

Answer. Sorry about that. Have you tried all the options? Every moment is a choice.

39. I feel like we are in a Sim game and my player is the worst gamer in history.....

Answer. I doubt it. That you are talking means that today you have eaten and avoided being eaten, so you're a biological success! In the army, a day where someone isn't trying to kill you is a good day. It's all relative.

40. *This contradicts common sense.*

Answer. Common sense also told us that the earth was flat and the sun went round the earth.

41. How does *observing* turn quantum reality into physical reality?

Answer. What we call observing is actually *interacting* so we see a thing when a photon from it *interacts* with our eye. Processing waves interact if they overload part of the host network causing a reboot. So when we observe a quantum wave we interact with it, and call the resulting reboot quantum collapse and the merged program restart entanglement. Just as a click brings up a new screen in a game, so any *query* of quantum reality gives a physical event.

42. *If our bodies don't really exist, being just virtual pixels, then basically we can do what we want - robbery, murder, rape - as it's all just a simulation.*

Answer. People who see the world as real already do all those things! And as pixels affect pixels you still get consequences, i.e. karma. In fact those who really see the physical world as unreal like the Lord Buddha or Sri Ramana Maharshi never do such things. You are describing what ignorance will do, but it does that anyway.

43. *This is not a new idea.*

Answer. True. It goes back at least to Plato's prisoners in a cave taking shadows on the wall to be reality. Recent advocates of the simulation hypothesis include Conrad Zuse, Edward Fredkin and Tom Campbell. Buddhism, Sufism, Gnosticism, Hinduism and Taoism all argue that the world is illusory.

44. *Why would anyone create a simulation of a whole universe like this?*

Answer. We can only guess. Perhaps reality wanted to know itself and this was the only way? People see evil for example in earthquakes that come from the movement of tectonic plates without which the whole earth would be covered in water and we wouldn't exist. If "evil" only arises if there is no other way, it's not necessary if other options are provided, e. g. we could "vent" tectonic pressure.

45. *This theory makes no difference in practice.*

Answer. Of course it does. If matter comes from light the money spent colliding protons would be better spent colliding light. The $30 billion Higgs project just found another failed species in an already overflowing particle zoo. Why spend money looking for proton decay that doesn't happen, gravitons that don't exist or WIMPs that are imaginary? If this wasted money was spent on other things the world would be a different place today.

46. *Is this the end of science?*

Answer. No. Science works fine in a local reality because all it needs is information. If NPCs in The Sims for example did science they could test if their world was virtual, as we do now.

47. *Are paranormal powers like healing and precognition implied?*

Answer. They aren't ruled out, but if you built a virtual world would you let players flout the rules? I don't see too many holes in this system, e.g. some want to be downloaded into another brain/body to cheat death but still the result is a *clone* not you. Nature already did cloning. My identical twin brothers are clones but still live quite separate lives. People want to live forever but that isn't the deal. The atoms we currently occupy are just on loan. Everything taken must be given back.

48. Could the experiments at CERN start a new big bang?

We alter physical states not quantum states just as online Sims change their world not ours. The creation of our universe was a once-only event that generated all the free processing of our universe, and since then the system has operated at extremes beyond anything we know and survived. Our experiments can harm ourselves but not what made our virtual reality.

49. *If this is a virtual reality, who made the rules?*

Our laws of physics derive from the nature of the quantum network, e.g. the speed of light reflects its refresh rate. Physical laws come from quantum laws, so if another bubble universe began elsewhere in the quantum bulk the same laws of physics would apply, although it could be an anti-matter universe.

50. *Why does it feel so real?*

Because it is. The interaction is real even if the physical is virtual. The error is not realism but physical realism, i.e. to think we can have and hold physical things.

51. *Who cares if the steak is virtual if it tastes good?*

Who cares if the earth is round not flat? If you just want to walk to the next village it doesn't matter, but if you want to go to another country it does matter. Likewise to experience life you don't need quantum realism, but to understand it you do.

52. *Is some "Other" creating this virtual reality as Fredkin suggests?*

If you mean other than the physical world then of course. If you mean other than what is around us then no. The quantum reality creating physical reality isn't on some planet far away but right here now, all around us. There is no "elsewhere" other than here or time other than now if time and space are illusions.

53. *What is a quantum wave?*

A quantum wave is a 3D quantum processing wave. A processing wave is a program spreading instances on a network, e.g. a unit circle program gives a sine wave. Quantum processing is based on the qubit not the bit. The basic quantum wave is light and if matter is light entangled, everything physical is quantum waves. Quantum waves "collide" when they overload the network causing a local node or point to reboot and restart the programs involved.

54. *Modern physics works fine already doesn't it?*

No actually it doesn't. Fundamental physics is in big trouble. For over fifty years its predictions like proton decay, gravitons, massless neutrinos and WIMPs failed and hopes like super-symmetry and string theory amounted to nothing. The physics articles in Scientific American today are mainly "Maybe" speculations written to create hope. The equations work but for physics to go fifty years with no breakthrough is unprecedented. Currently physics theory is going nowhere and struggles to explain particle masses, charge, spin, gravity, space, time, neutrino mass, particle families, quark links, dark matter and dark energy, i.e. almost everything.