Text excerpt from the video and my comment in red

0:00

The standard way we think about quantum theory is that the **observer** plays a very important role. There's a complex mathematical apparatus, and this mathematical apparatus is, it engages in a form of silence about what's actually there, but what it does is it gives us a precise instrumentalist recipe for telling us what happens when you do certain things. When observers make what are called measurements on a quantum system, the theory gives us the probability of getting a certain kind of result, **that's what it does, but it doesn't tell us what happens in between.** So when you read a book on modern physics, you read a book on quantum mechanics, the book says, well, the reason this particular thing happens is because this electron goes this way and a photon comes off it and does that. In terms of the standard way that we teach and formulate quantum mechanics today, the form of quantum mechanics that you find in all the standard textbooks, it's all just for color. That's all just fairy tales. The theory just says that if you have an observer and he does this particular thing called a measurement, then the results will be with these probabilities and that's it. !! It doesn't provide anything else in terms of the physical picture. That's the standard way that we teach, you know, it's in the books, but of course people were unhappy with that picture for a very long time, and one of the things that Einstein was unhappy with about quantum theory, it wasn't the probabilistic aspect of quantum theory, it wasn't like, you know, God was playing dice with the universe. After all, one of Einstein's great breakthroughs was Brownian motion, right, which helped us understand the nature of atoms. It was, you know, one of the papers that was part of his great year, his **Annus Mirabilis** in 1905, so probability wasn't an issue. For him, it was that there was no metaphysical picture of what was going on there between the measurements. And you know, one concern that you might have is that maybe quantum theory is such a strange mathematical theory that whenever you try to propose some kind of physical reality, a so-called ontology, again the Greek word, right, because what's going on behind the scenes is going to be a kind of ontology that's not compatible
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with the mathematical apparatus, so the concern was too mathematical and mathematical determination. No picture that you could write down could be a picture that would be compatible with a working quantum theory, right? That was a concern that I think a lot of people might have had, and so the attitude was that we just shouldn't talk about what's going on, and this became known as the Copenhagen Interpretation. The Copenhagen Interpretation just says that our brains can't understand what's going on between **measurements**, all we can talk about are measurements, the measurements are made by large classical objects like us, which follow the classical laws of physics, and we don't understand **what's going on between measurements**. We have the mathematical apparatus for that, but we can't actually visualize it or write down a picture of it, and that means we're trying to fill in the picture, we're trying to fill in the picture. Let me break down this one word that I think could mean two things, that what happens between measurements is two types of in-between times, there's an in-between in quantum time, if you will, there's an in-between, of course, of observations, but in quantum space there's also an in-between, and

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real numbers are a beautiful thing, but they can be completely fictitious, because the physics of the real universe doesn't hold. **??** And then there's another one, I don't like the whole simulation hypothesis at all, a terrible, terrible hypothesis. But- I've known too many computer programmers, so I'm skeptical. However, one interpretation of quantum physics is that there's just too much to count, and so you don't calculate something, you're kind of, you have a lazy computer, and that physics is basically lazy counting. And... and that's why there's all these uncertainty principles.(*) http://www.hypothesis-of-universe.com/docs/c/c_028.jpg ; https://www.hypothesis-of-universe.com/docs/eng/eng_165.pdf ; ; It doesn't involve calculating everything. Yeah, sure, yeah. Right. Right. And it's only when you try to look up the variable that actually calculates it. Can you refute that idea? Excuse me? Can I introduce you? Of course, of course. I had a good observation here. What's your name? Shresh. Introduce yourself. It's hard to tell ||from the "no video" text|| who's talking and what's talking. I'm a freshman at Northeastern. I recently started working in media. I was a researcher and I was starting to get into all this, but what I was working on a few days ago was actually inspired by your tweet about Lagrangian subvariants. That's very cool. You know, this must be a very pleasant moment for you, right? Inspire the younger generation is so cool. What the student is referring to is my post on Lagrangian submanifolds that went viral on Twitter, LinkedIn, and Substack. Feel free to follow me on Twitter at ToeWithKurt on LinkedIn. You can add me by searching for **Curt Jaimungal** and you can visit Substack at CURTJAIMUNGAL.org. The links are in the description. That's very cool. You know, this must be a very nice moment for you, right? Inspiring the younger generation is so cool. So I have a GitHub repo where I had a bunch of Python notebooks that I was working on. I used a programmatic synthetic approach to try to prove some laws of nature using Lagrangian submanifolds. And it actually worked. Like, I proved conservation of energy and, you know, both from classical mechanics and quantum mechanics. And honestly, it was interesting because I don't think the in-between really counts, like you said. Because if you're able to calculate, like, functions of, like, natural laws, functions of natural laws, from such a probabilistic approach, it's so weird that you can end up with both approaches, like on the macro and quantum scales. So I think it's completely unsolved, the gaps between everything we know. In space, in time or in computation? From a computational perspective. Cool. Yeah. I'm Abhiram. Introduce yourself. I'm an experimentalist. Introduce yourself. I'm an experimentalist. Can you explain what you mean by not calculating in between? !! Like, all quantum mechanics does is do something in between, right? It tells you, OK, in between you have a wave, it propagates according to the Schrodinger equation and then it interacts with a multi-particle, multiple, I don't know, you know, degree-of-freedom system, whatever classical system it is. Nice to meet you. That's a very good question. Thank you. There are some seats in the back. See the red line coming up and sitting on the white chair over there? The white cube. Yes. I'll repeat the question. Yeah. Yeah. The question was. Notice there are a few more chairs. Let me repeat the question. The question was, what the hell do I mean when I say quantum theory doesn't say what happens between measurements? There's going to be a jump straightening of the curvature of the dimensions - that's my opinion. **I mean the Schrödinger equation** and the wave functions and all that stuff,
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right? What did Heisenberg mean when he talked about the Copenhagen interpretation. So he wrote about Copenhagen, he coined the term, the Copenhagen interpretation. It's a chapter in

his book Physics and Philosophy from 1958. And as he described it, he said, well, classical objects, they have physical reality. We understand what they are. They are formulated in terms of objects that live in three-dimensional space. But we don't have mental architecture to understand the reality of what happens to quantum mechanical particles, small particles. **Large particles** (macro-objects in the macro-universe, stars, galaxies) behave according to gravity, according to OTR. But **small objects elementary particles** are "nodes-balls of dimensions" in the foam of boiling vacuum, this environment behaves linearly and so there is an unnecessary G-constant. **So how does OTR (non-linear) go to QM (linear)???, is exactly what everyone is asking…** So we use this mathematical formalism, but this formalism is not real. It is not physical, yes, it is a vision on paper. The wave function is just mental construct, just a piece of mathematics. Yes, the wave function here represents the state of "boiling chaotic vacuum", https://www.hypothesis-of-universe.com/docs/c/c_415.gif ; .. the state of changing curvatures of dimensions is a foam of dimensions in which "knots" (on a dimension) are formed by the packing of dimensions, such knots-cocoons-packages-balls, which then behave like elementary particles of matter. Quantum physics is about "knotted - packed balls - cocoons traveling "through dimensions" unpacked... https://www.hypothesis-of-universe.com/docs/c/c_425.jpg ; https://www.hypothesis-of-universe.com/docs/c/c_275.gif ; This is it in 3+3D space-time. **You have to imagine that "plumpness of vacuum foam" in a "more perfect" version**. And why "wave"? Well, that's simple, because the string gets wavy https://www.hypothesis-of-universe.com/docs/c/c_418.jpg ; There is actually no wave function anywhere. Why not? And so, but let me turn the question back to you. So, classic, classic, classic, classical motion. In the macrocosm, but not in the microcosm. Are you suggesting that you believe that the wave function is a physical entity, like a chair is a physical entity? No, that's a bad example… macro-objects and micro-objects "are still just objects", but what is the essential difference here is the environment, that space-time which is **a)** sometimes **smooth**, and **b)** other times in microscopic space-time on Planck scales is **foamy**…, don't look for the mystery in/in objects, but in/in space-time…; foamy space-time = plasma right after the big bang, was the environment where all elementary particles were produced and produced by "packaging" dimensions... and today there is also such an environment "foam of dimensions = boiling vacuum" on Planck scales all around us, but "new particles" are no longer produced there, only those pairs of particles and antiparticles. I can return the question to you. Okay. The gravitational field, i.e. "smooth curvature of space-time" for example, or anything else, any field, watch out!, another field is not/may not be "smooth" https://www.hypothesis-of-universe.com/docs/c/c_461.jpg ; is it a real thing or not, right? You were taught. In ninth grade that there is a field, and what it tells you is if you put a particle in that electric field, there is a force that is measurable. Yes, yes. It is a field, a real thing. I'm going to take a stand and say that right now I think that fields are metaphysically real. My astonishment. No! Every field is a state of curved 3+3D dimensions… Fields are localized intensities that =are distributed= physically, metaphysically. They are real in the same way that I think chairs are real or that you are real. Now, I mean, yes, it's easy to take that stance now. I agree with you. And then, we're not in ninth grade now, we are. Yes. But there's a reason for that. But there is, but there's a reason for that. The reason I think fields are physically real, just like chairs, is that fields are intensities in physical space. ? One time the author says that fields are metaphysical and the second time that they are real…what is that, why? And you can, you know, spread energy and signals through physical space. And so I have good reason to think

that they are physical things. Why don't I think that wave functions, these Schrödinger wave functions, are physical things? Where do Schrödinger wave functions live? In the complex world of mathematics. Not just the complex world. No, no. They live inside, in mathematics. They live in our minds. (people are alternating here in the debate, but it's hard to separate their expressions). They live in our minds, maybe, but if they supposedly were to live in some reality outside our minds, where would that be? New update. Started Substack. Currently, there is writing here about language and ill-defined concepts, as well as some other mathematical details. There is much more written there. This is content that is not anywhere else. It is not in Theories of Everything. It is not on Patreon. Full transcripts will be placed there at some point in the future. A few people ask me, hey **Curt**, you've talked to so many people in the fields of theoretical physics, philosophy, and consciousness, what are your thoughts? While I remain impartial in my interviews, this **Substack** is a way to get a glimpse into my current thoughts on these topics.
10:00

Thanks also to our partner The Economist.

Josef Navrátil, I forgot to write down the web address … 03/24/2025

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I already found it, “aa 436“ → https://www.hypothesis-of-universe.com/docs/aa/aa_461.pdf

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