Twitter Thread by Sean Carroll

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Hugh Everett's birthday! Pioneer of the Many-Worlds Interpretation of quantum mechanics. Let us celebrate by thinking about ontological extravagance. I will do so by way of analogy, because I have found that everyone loves analogies and nobody ever willfully misconstrues them.

> The physicist Hugh Everett III was born #OTD in 1930. His \u201crelative state\u201d formulation of quantum mechanics, which we now call the \u201cMany Worlds Interpretation,\u201d was published in 1957. pic.twitter.com/ZqMsZcPJDG
>
> — Robert McNees, the bastegod (@mcnees) November 11, 2020

We look at the night sky and see photons arriving to us, emitted by distant stars. Let's contrast two different theories about how stars emit photons.

One theory says, we know how stars shine, and our equations predict that they emit photons roughly uniformly in all directions. Call this the "Many-Photons Interpretation" (MPI).

But! Others object. That is *so many photons*. Most of which we don't observe, and can't observe, since they're moving away at the speed of light. It's too ontologically extravagant to posit a huge number of unobservable things!

So they suggest a "Photon Collapse Interpretation." According to this theory, the photons emitted toward us actually exist. But photons that would be emitted in directions we will never observe simply collapse into utter non-existence.

The Photon Collapse Interpretation posits far fewer photons, and doesn't strain our credulity by suggesting that we believe in a huge number of unobservable entities. Clearly it is vastly preferable on the basis of Occam's Razor.

Wait, say the Many-Photons proponents. That's not simple. Who cares how many photons there are, or whether we can see them? What matters is the simplicity of the underlying concepts, and whether or not the predictions fit the data. Who cares if you can't observe every photon?

And this whole "collapse" thing is completely ad hoc. Not to mention clunky, unnecessary, and ill-defined. You aren't actually concerned with simplicity or scientific integrity, you're just reluctant to accept things you can't see for yourself.

Nonsense, insist the collapsers. Science is about what we observe. Positing unobservable entities is extravagant, wasteful, and undermines the very nature of science and the Enlightenment project. Who knows to what kind of hideous relativism it will lead?
https://t.co/G19NR7Hvwa

> HELL NO. This is an act of violence against the community.
>
> JAIL! pic.twitter.com/lx3JmrtS9f
>
> — George Wrighster III (@georgewrighster) November 9, 2020

I'm on the Many-Photon side of things. Simplicity is judged by your concepts, not how many entities are in your theory. Happy 90th, HEIII!