2.1

QUESTIONS ABOUT THE BIG BANG

0:11–1:12

A PROFOUND QUESTION

I think the real reason I got interested in astrophysics was to understand the Big Bang. That was the first really profound question that I realized was answerable, at least in principle, through mathematics and through scientific observations and that kind of discovery, that you could sit there with your pen and paper and then bring it to an observer and say, "These are the list of possibilities that we've predicted for the Universe."

And can you discriminate what's true from what's not true by actually looking at the cosmos? And today, we live in a time where cosmology, the study of the early Universe, is very precise in terms of what we know about the very early Universe, the first few minutes after the Universe began and what we know about the evolution of the Universe since.

And we're still surrounded in this bath of light that's left over from the Big Bang. It's cooler now because it's been... the Universe has been expanding in the 14 billion years since and it's cooled down but it's there. It's everywhere around us.

1:12–2:41

LOOKING FOR EVIDENCE

And we see galaxies are all moving away from other galaxies, so it's as though the space between them is stretching. And that's evidence that the Universe continues to expand after the initial Big Bang. And yet, there are really profound questions that we can't answer that I study, like, "What happened in the very first moment?" And, "Was there really nothing and then instantaneously something?" And, "When did that happen and why did that happen? Why did the Universe suddenly burst into existence?" Or, "Is that story just wrong? Are we just confused about that? Is it really the case that the Universe existed?"

It just looked very different and a small patch of space itself began to expand and grow and evolve and that that's what we mean by the Big Bang, this moment when a little tiny piece of a greater megaverse or multiverse began to expand into our Universe, our observable history.

And so, these are deep questions that we're still wrestling with and we don't yet know how to ask for evidence as to which one of these possibilities is true and I just hope that sometime in my, you know, scientific career in my lifetime, that we'll figure out a way to discriminate between these possibilities by actually looking at the Universe that's out there.