

Does God Play Dice?

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Speaker

Dr Luke A. Barnes



Luke A. Barnes is a senior lecturer in physics at Western Sydney University, with a Ph.D. in astronomy from the University of Cambridge.

His research focuses on cosmology, galaxy formation, and the fine-tuning of the universe for life.

He is the coauthor with Prof. Geraint Lewis of "A Fortunate Universe: Life in a Finely-Tuned Cosmos" and "The Cosmic Revolutionary's Handbook", both published by Cambridge University Press.

Abstract

A century ago, Albert Einstein wrote to fellow physicist, Max Born: "I, at any rate, am convinced that God is not playing at dice." Meaning that nothing in the world is ruled by pure chance.

But today, chance shows up all over physics. Heat naturally spreads out and things tend to become more mixed and disordered over time (an idea linked to the Second Law of Thermodynamics and the universe's distant "heat death"). Chaos theory adds another twist: even when the rules are fixed, tiny changes can lead to wildly different outcomes. Some things are effectively impossible to predict in detail: a mere butterfly can cause a tornado.

And Einstein is commonly considered to be wrong about the implications of quantum mechanics, which shows that the universe really does play dice. The universe is unpredictable because even nature doesn't know what will happen next.

A hundred years later, this lecture will take stock of what science says about chance and randomness. Has physics really settled the question of whether the universe is playing a game of chance?