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Einstein was wrong: Why 'normal' physics can't explain reality

The most ambitious experiments yet show that the quantum weirdness Einstein famously hated rules the roost – not just here, but across the entire universe



Dan Bejar

By Anil Ananthaswamy

IT WAS Dominik Rauch's birthday, and he was 2300 metres up a mountain in the Canary Islands when a freak winter storm nearly wrecked his PhD. It could have been worse. A few hundred metres away, his colleagues only just managed to scramble out as the wind picked up their aluminium-framed office container and slammed it against the dome of a nearby telescope, just above a steep drop.

"Nobody was hurt," says Rauch. "We were pretty happy." But the crystal they planned to use to prise out reality's secrets was broken beyond repair.

Their experiment atop the Roque de los Muchachos on the Spanish island of La Palma was just the latest and most ambitious of many that have probed quantum mechanics, the inscrutable theory that describes nature's most basic workings. With six telescopes, oodles of delicate optical equipment and the light emitted by galaxies billions of years ago, they aimed to test an assertion championed by Einstein: that the weirdness of quantum mechanics is just a cover for some deeper, hidden reality.

And test it not just for here and now, but for almost all time, and across virtually the entire observable universe. If any experiment could break quantum theory, this one could.

When quantum mechanics was formulated almost a century ago, it overturned two particularly cherished assumptions about the world's workings. First was realism. Unlike classical physics, which says the world exists independently of observers and observations, quantum theory strongly implies that reality does not exist, or at least cannot be meaningfully described, until it is observed.

The second problem was “non-locality”. This ...

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