

# Rochester physicist's quantum-'uncollapse' hypothesis verified

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In 2006, Andrew Jordan, professor of physics and astronomy at the University of Rochester, together with Alexander Korotkov at the University of California, Riverside, spelled out how to exploit a quantum quirk to accomplish a feat long thought impossible, and this week a research team at the University of California at Santa Barbara has tested the theory, proving it correct.

Quantum particles behave in ways that from our everyday experience seem utterly impossible. For instance, quantum particles have wave-like properties and can exist in many places at once. Why the objects we see around us every day—in what physicists call the "classical" world—don't behave this way despite being made of these very same strange quantum particles is a deep question in modern physics.

Most scientists have believed that the instant a quantum object was measured it would "collapse" from being in all the locations it could be, to just one location like a classical object. Jordan proposed that it would be possible to weakly measure the particle continuously, partially collapsing the quantum state, and then "unmeasure" it, causing the particle to revert back to its original quantum form, before it collapsed.

Jordan's hypothesis suggests that the line between the quantum and classical worlds is not as sharply defined as had been long thought, but that it is rather a gray area that takes time to cross.

In a recent issue of Nature News, Postdoctoral Fellow Nadav Katz

explains how his team put the idea to the test and found that, indeed, he is able to take a "weak" measurement of a quantum particle, which triggered a partial collapse. Katz then "undid the damage we'd done," altering certain properties of the particle and performing the same weak measurement again. The particle was returned to its original quantum state just as if no measurement had ever been taken.

Because theorists had believed since 1926 that a measurement of a quantum particle inevitably forced a collapse, it was said that in a way, measurements created reality as we understand it. Katz, however, says being able to reverse the collapse "tells us that we really can't assume that measurements create reality because it is possible to erase the effects of a measurement and start again."

Source: University of Rochester

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