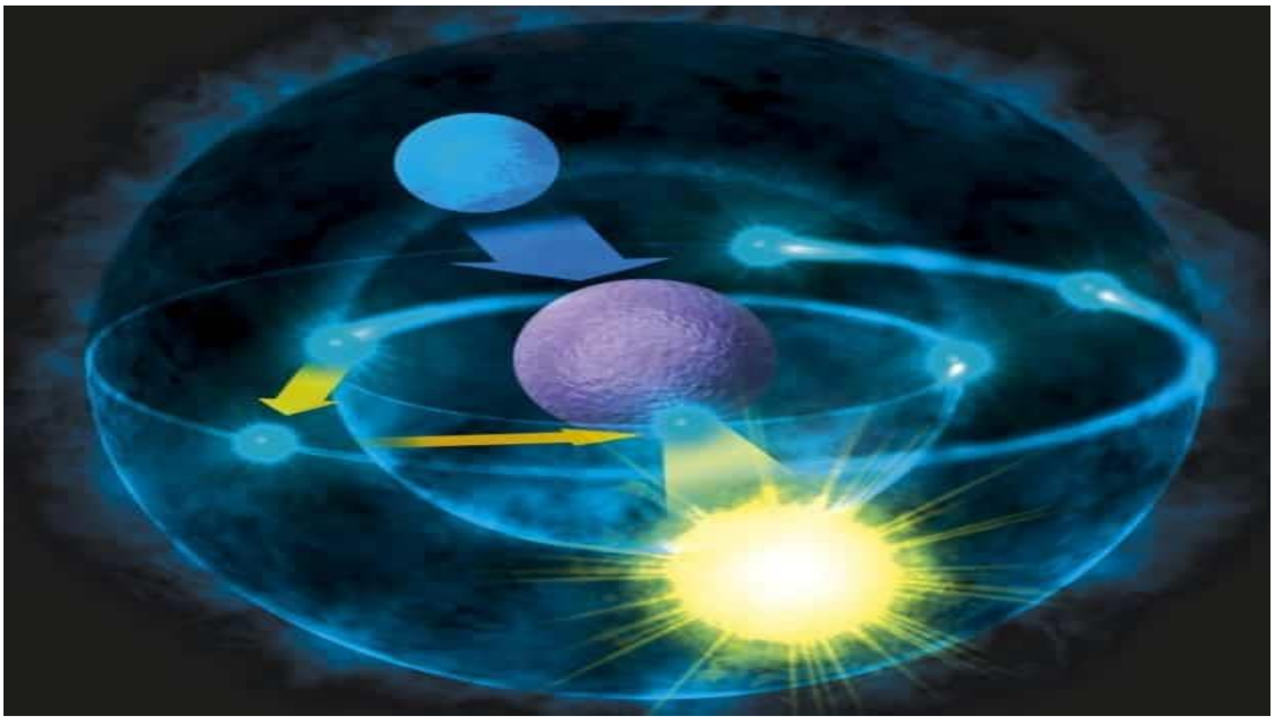
More than one reality exists, shocking study says



Shocking study says more than one reality exists

A shocking new study suggest that, at a quantum level at least, two different versions of reality exist. The new study comes from the idea brought to the forefront in Eugene Wigner's friend scenario, which states that two people could see the same photon, or light particle, and have different observations of the photon. Even though the observations, and the conclusions drawn from those observations, are different, they would both be correct.

If you've ever questioned the nature of your reality, a new study suggests that there are actually two different versions of it — at least at the quantum level.

The pre-published study, found in arXiv, sheds new light on the complex idea that two people could see the same photon, come to different conclusions about the photon, yet still both be correct.

"In quantum mechanics, the objectivity of observations is not so clear, most dramatically exposed in Eugene Wigner's eponymous thought experiment where two observers can experience fundamentally different realities," the researchers wrote in the study. "While observer-independence has long remained inaccessible to empirical investigation, recent no-go-theorems construct an extended Wigner's friend scenario with four entangled observers that allows us to put it to the test."

PHYSICISTS MAY HAVE FOUND A WAY TO 'UNTANGLE' INFORMATION TRAPPED IN A BLACK HOLE

They continued: "In a state-of-the-art photon experiment, we here realize this extended Wigner's friend scenario, experimentally violating the associated Bell-type inequality by 5 standard deviations. This result lends considerable strength to interpretations of quantum theory already set in an observer-dependent framework and demands for revision of those which are not."

One of the study's co-authors, Martin Ringbauer, told Live Science that "you can verify both of them," adding that theoretical advances were needed before they were able to prove Wigner's hypothesis, which was first proposed in 1961.

"Theoretical advances were needed to formulate the problem in a way that is testable. Then, the experimental side needed developments on the control of quantum systems to implement something like that," he told the news outlet.

To test the idea, the researchers designated "two different laboratories, each involving an experimenter and their friend," introducing two pairs of entangled photons, which allowed for their fates to be intertwined. They also introduced "people" (who were not real, but rather represented observers) to measure one photon in the pair, record their results and repeat the process for the second photon using quantum memory.

In 1961, when Wigner introduced the idea that would eventually become known as "Wigner's friend," only one scenario was used. With the new experiment, it was doubled and the results that Wigner had first discussed more than 50 years still rang true.

Quantum mechanics gives detail on how the world works at a scale so small that the rules of physics do not apply, Live Science added. With the new findings of the study, the field of quantum mechanics may change if measurements are not the same for everyone.

"It seems that, in contrast to classical physics, measurement results cannot be considered absolute truth but must be understood relative to the observer who performed the measurement," Ringbauer told Live Science. "The stories we tell about quantum mechanics have to adapt to that."