

News & Comments

Is Quantum Physics Capable of Explaining Consciousness?

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How our consciousness is formed is an important question in science. Physicist Roger Penrose teamed up with anesthesiologist Stuart Hameroff to propose a solution to the black hole mystery in the 1990s, before winning the 2020 Nobel Prize in Physics.

According to them, the brain's neuronal network forms an intricate network, and the consciousness it produces should obey quantum mechanics, which is the theory that explains how electrons move. According to them, this could very much explain human consciousness' mysterious complexity.

Classical mechanics can't allow brains to break free from 'one input, one output' constraints due to the quantum properties of cellular structures called microtubules. Their hypothesis, dubbed Orchestrated Objective Reduction (Orch OR), sits at the border of physics and biology but is complete enough to make scientific predictions.

Penrose and Hammeroff's Orch OR theory of consciousness is explicitly analyzed by physicist Catalina Curceanu from Italy in the new paper. As a result of reanalyzing Hammeroff and Penrose's most plausible scenarios, they concluded that almost none are plausible under the recent experimental constraints on quantum collapse. According to Curceanu, "This is the first experimental investigation of the gravity-related quantum collapse pillar of the Orch OR consciousness model." The team is very proud of their achievement.

Curceanu adds that all is not lost for Orch Or. It's just the beginning!" she says. Unlike Diósi's model, Penrose's collapse model did not predict spontaneous radiation, so it cannot be ruled out. A gravity-related collapse model is also briefly discussed in the new paper. In the FQXi-funded project, we are developing a revised model that could leave room for Orch OR theory," Curceanu says.

To investigate the implications of these refined collapse models for the Orch OR model, the team is preparing to test these new collapse models. "Connecting what is possible in the laboratory with perhaps the biggest mystery in the universe is exciting," says Curceanu.

KEYWORDS

Orch OR theory, Consciousness, Collapse models, Spontaneous radiation, Germanium detector, physics, brain, experimental physics, radiation, theoretical physics, microtubules, wave functions

