

Does quantum entanglement turn Rowlands' 'principle of duality' into a 'law'?

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Abstract. Physical laws are observed, never proven. Newton's universal law of gravitation and his three laws of motion, in what is now called classical mechanics, were used to take astronauts to the moon and return them safely to earth. Theories about the origin of gravity and whether gravitational forces are dual to the electric force, fundamental, quantum, entropic, induced, emergent, curved spacetime or just fields like electromagnetism are still under investigation. We know that general relativity is a geometric theory, not a law, about gravity. In the book *Zero to Infinity: The Foundations of Physics*, Peter Rowlands asserts that physics is "founded entirely on the principle of duality." Wave-particle duality is one of the most fundamental portrayal of quantum objects. Photons behave like a classical particle or a wave or both depending on the apparatus used to measure them. Objects like photons, electrons, neutrinos and even molecules have been shown to be in superposition and entangled. This paper will investigate whether entanglement applies to the dualities characterized by Peter Rowlands as being foundational to physics and whether his 'principle of duality' is really a physical law.