

What is a photon, really?

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Abstract

Our early training in physics encourages us to imagine photons as little pellets flying through the air, and to see wave-particle duality as a paradox. This view persists from the debates on quantum mechanics early in the 20th century. Much has happened in the past 80 years, however. Quantum optics and field theory have developed a very sophisticated mathematical formalism for treating photons, and this formalism affects how we view photons. Recently, physicist Carver Mead of Cal Tech published a book with a very persuasive mathematical argument of how to understand quantum jumps. He also argued that photons are not "real." In this talk, I will present, using only basic algebra, the main points of quantum optics and Carver Mead's view. These results also lead to a reconsideration of the EPR paradox.

Keywords: photons, quantum jumps, EPR paradox, quantum field theory

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