

Photons are Nonexistent: A Conclusive Argument

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Abstract

In 1905, Albert Einstein proposed that light would be better explained by modelling electromagnetic waves as consisting of localized, discrete wave-packets. He called such a wave-packet a *light quantum*. In 1926, Gilbert Lewis coined the term *photon* for this presumed quantum of radiant energy. Quantum theory is irrelevant to the study of light, however, which propagates in steady waves rather than in packets or quanta. Photon theory is an invalid hypothesis based on faulty logic and misinterpretation of evidence.

Keywords: *Light; Photons; Particles; Electromagnetism*

Definitions

Light: Electromagnetic radiation of any wavelength that travels in a vacuum with a speed of 299,792 meters (186,282 miles) per second [1].

Photon: An elementary particle that is a quantum of the electromagnetic field, including electromagnetic radiation such as light and radio waves. Photons are massless [2].

Particle: A small, localized object that can be described by physical properties, such as volume, density, or mass [3]. Particles vary in size or quantity, from subatomic particles like the electron, to microscopic particles like atoms and molecules, to macroscopic particles like powders and granular materials.

Elementary Particle: A subatomic particle that is not composed of other particles [4]. The Standard Model lists 61 different elementary particles including electrons, leptons, quarks, fermions, bosons, protons, and neutrons. Photons are excluded from this Standard Model listing [5].

Something is seriously wrong with the definition of photon. Particles are tiny bits of matter that have mass and are localized (i.e., are part of physical objects). Photons are massless and nonlocalized (i.e., radiating everywhere) and thus cannot logically be particles. Photons are not subatomic and thus fall outside the scope of quantum physics.

The Photon Hypothesis

Visible light is electromagnetic radiation that can be perceived by the human eye. Visible light has wavelengths in the range of 400–700 nanometres (nm), corresponding to frequencies of 750–420 terahertz (THz), between the infrared (with longer wavelengths) and the ultraviolet (with shorter wavelengths) [6].

In 1905, Albert Einstein published a paper in which he proposed that light would be better explained by modelling electromagnetic waves as consisting of localized, discrete wave-packets. He called such a wave-packet a *light quantum* [7]. Einstein thus modified the description of a phenomenon to fit his preconceived notion. Light is ever-present electromagnetic energy that radiates in waves with steady amplitudes and frequencies. Quantum theory is thus irrelevant to the nature of light, which does not propagate in packets. In 1926, physical chemist Gilbert N. Lewis coined the term *photon* for this falsely presumed quantum of radiant energy [8].

Individual photons are merely inferred to exist because of their apparent effect on photoelectric systems. In a photo-multiplier tube, a *photon* strikes a metal plate and knocks free an electron, initiating an ever-amplifying avalanche of electrons. On a microscopic capacitor, an incident *photon* generates a charge that can be detected. In a Geiger counter, photons ionize gas molecules [9]. Such inference is seriously flawed, however. What is being observed in all three cases is electromagnetic energy moving electrons. There is nothing in these observations to indicate or even suggest that this electromagnetic energy could be in the form of elementary particles (photons). This is the logical error of circular reasoning, i.e., including the conclusion in the assumption, then using the assumption to prove the conclusion: it is assumed that photons exist, and measuring their effects is proof of their existence.

There is neither physical evidence nor logical reason for the existence of photons. Alleged *photon* particles are falsely presumed to exist because of faulty logic and misinterpretation of evidence.

Light Diffracts

In 1804, Thomas Young established the wave theory of light [10]. He did so by means of an interference experiment (predecessor of the double-slit experiment) in which he reflected sunlight with a steering mirror through a small hole and split the beam in half using a paper card. He also mentioned the possibility of passing light through two slits in his description of the experiment.

When light passes through a hole or slit, it diffracts. Diffraction is the interference or bending of waves through an aperture into the region of geometrical shadow of the aperture. The diffracting aperture becomes a secondary source of the propagating wave [11].

Particles (electrons, protons, atoms) that are fired as projectiles through a double-slit apparatus do not diffract. They are detected as white dots on a screen. Light diffracts. Particles do not. Thus, light cannot be comprised of particles.

When particles are allowed to build up one by one before passing through a double slit, however, an artificially induced diffraction pattern emerges [12]. Misinterpretation of these results became the basis of wave-particle duality theory, namely that quantum entities supposedly exhibit either particle or wave properties depending on the experimental circumstances. Light, however, is not a quantum entity. It is electromagnetic wave radiation. Particles are tiny bits of matter that are incapable of independent motion and thus have no intrinsic wavelike properties. To extract particles from matter and fire them through slits as projectiles is an artificial construct that is irrelevant to the study of light. Light is a continuous electromagnetic wave. Particles are matter. There is no duality.

Conclusions

Photon theory is a failed hypothesis. Alleged *photon* particles have falsely been presumed to exist because of faulty logic and misinterpretation of evidence. Double slit experimental results became the basis of wave-particle duality theory, namely that quantum entities supposedly exhibit either particle or wave properties depending on the experimental circumstances. Light, however, is not a quantum entity. It is electromagnetic energy that propagates in steady waves. Particles are tiny bits of matter that are incapable of independent motion and thus have no intrinsic wavelike properties. To extract particles from matter and fire them through slits as projectiles is an artificial construct that is irrelevant to the study of light. Light is a continuous electromagnetic wave. Particles are matter. There is no duality.

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