

Quanta Encyclopedia Article

Quanta

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Light was once explained as a form of radiant **energy** that was continuous. More recently, however, light is described as existing in discrete units of energy, or infinitesimal packets, that are radiated from **matter**. The smallest quantity, or bundle, of light energy that is emitted is called a quantum of light energy. Quanta, plural for quantum, are light energy packets whose energy is directly proportional to the light **frequency**. Light of long wavelengths has low frequencies and consists of quanta with lower energy than light of small wavelengths and greater frequencies. For example, quanta from ultraviolet light are more energetic than quanta from infrared light.

Quanta are also called photons. When a **photon**, or quantum, collides with an **electron** of an **atom**, it may transfer its energy to the electron. When this occurs, the electron receives all of a photon's energy, and the quantum ceases to exist. The electron, now at a higher energy state, might occupy a more energetic, less stable orbital around the **nucleus** of the atom. If the electron then, returns to its original ground state orbital, a photon, or quantum, of light energy is released from the atom. The light has a frequency proportional to the energy release. This concept explains how neon gas emits light when its atoms' electrons are excited and then return to their original energy states. The branch of physics that examines the nature of quanta is called quantum **mechanics**, and has revolutionized the understanding of the way matter and energy interact.