Gamma Radiation Encyclopedia Article

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Gamma **radiation** is the emission of photons, the quantized units of **light**. The particles generally known as gamma rays are at the highest **energy** end of the **electromagnetic spectrum** and have the shortest **wavelength** and highest **frequency**. However, any electromagnetic wave emitted from a radiation reaction can be called **gamma decay**. Gamma radiation occurs when the **nucleus** of an **atom** decays from a higher energy state to a lower energy state. It often follows alpha or **beta decay**. Usually, the lifetime for gamma radiation to occur is quite short, but occasionally there will be a long-lived stable state called an isomer. Some common atoms that emit gamma radiation are isotopes of cobalt and cesium.

High-energy electromagnetic radiation was discovered by Wilhelm R(ntgen, and he won the Nobel Prize in physics for it. Later exploration and classification of the types of radiation occurred in the laboratories of Antoine-Henri Becquerel and Pierre and **Marie Curie**.

Gamma radiation is the least damaging type of radiation when it comes in contact with human cells, but it also has the greatest capacity to penetrate vital organs, since it has a longer stopping distance than any of the other forms of radiation. It is commonly used for identifying isotopes from their decay patterns, also known as nuclear spectroscopy. Each **isotope** that shows gamma decay will emit gamma rays of specific energies and specific half-lives, with no two patterns of energy and **half-life** alike. For example, it became clear that the element of atomic **weight** 118 had been synthesized when a "machine-gun-like barrage" of gamma rays came out of the resultant atom as it decayed in energy.

Since its discovery, gamma radiation has opened the door to greater human understanding of physics on all scales, from the atom to the entire **universe**. It provides insight into the past as well as being a solid basis for current experiments. While it must be used very carefully to avoid damage to human tissue, gamma radiation is used and explored in almost every branch of physics.