

# Gamma radiation



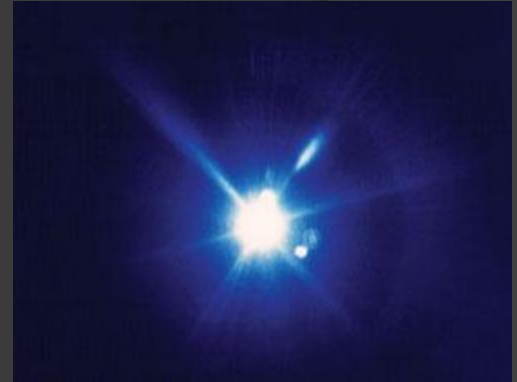
# Gamma radiation is

- Gamma radiation (gamma rays, gamma-quanta) - a kind of electromagnetic radiation with a very short wavelength -  $< 5 \times 10^{-3}$  nm and, therefore, pronounced corpuscular and wave properties mild.



*Gamma rays - a form of the very high energy*

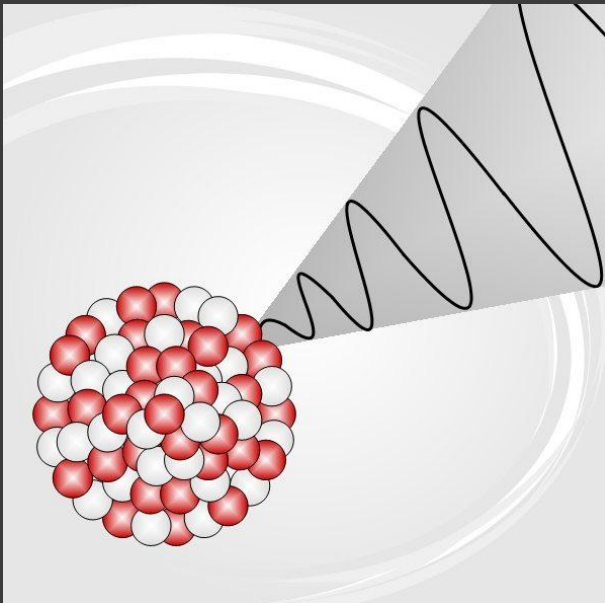
- ◉ Gamma-quanta are high-energy photons.
- ◉ On the scale of electromagnetic waves gamma rays bordered by X-rays, taking the higher frequency range and energy.
- ◉ Gamma radiation is emitted in transitions between excited states of atomic nuclei by nuclear reactions, as well as the rejection of energetic charged particles in magnetic and electric fields.
- ◉ Open Pol Willard in 1900 in the study of radium radiation.



Photon elementary particle, the quantum of electromagnetic radiation.

# Physical properties

- Gamma-rays, in contrast to  $\alpha$ -rays,  $\beta$ -rays are not deflected by electric and magnetic fields have greater penetrating power and energy at equal other conditions being equal. Gamma rays cause ionization of atoms of the substance



*Art illustration: the atomic nucleus emits a gamma ray.*

Gamma rays cause ionization of atoms of the substance. Main processes occurring during the passage of gamma rays through the substance:

- ⦿ The photoelectric effect - energy gamma ray is absorbed by the nucleus of the atom, and electrons are emitted from the outer shell of an atom.
- ⦿ Compton scattering (Compton effect) - gamma quanta scattered in the interaction with the electron, forming a new gamma rays at energies.
- ⦿ The effect of the pairing - gamma photon in the nuclear field is converted into an electron and a positron.
- ⦿ Nuclear photoelectric effect - at energies above a few tens of MeV gamma ray is able to knock out the nucleons of the nucleus.

# Protection



Protection against gamma radiation can serve as a layer of material. The effectiveness of protection with increasing layer thickness, density, material and content in it of heavy nuclei (lead, tungsten, depleted uranium, etc.) is increased

# Application

- ◉ Gamma radiation is used in the art (eg., Inspection), radiation chemistry (for initiating chemical reactions, eg., In the polymerization), agriculture and food industry (mutation to generate economically useful forms, sterilization products), medical (sterilization buildings, objects, radiotherapy)

**The End.**