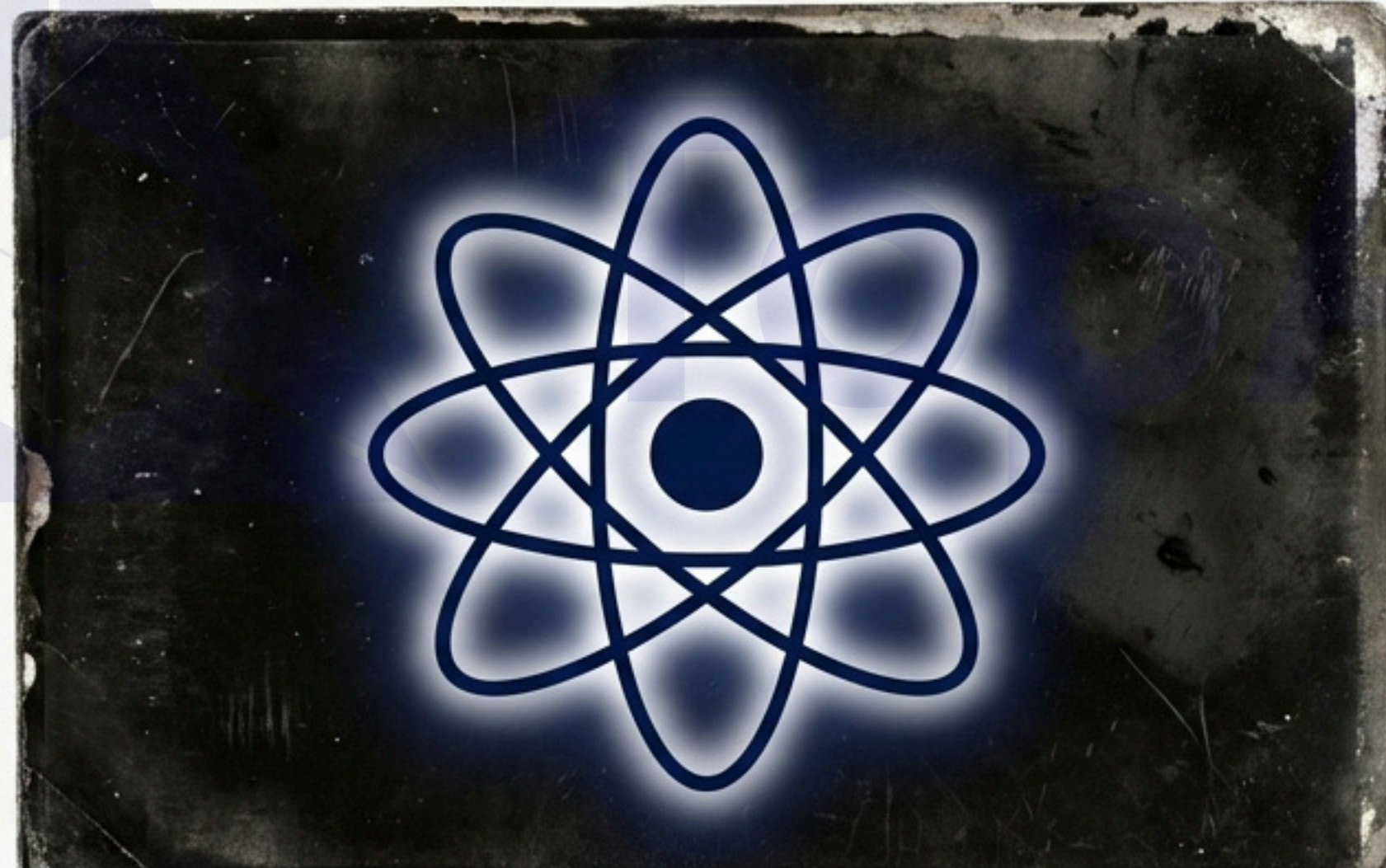


CLASS 12 PHYSICS • CHAPTER 13.6

The Accident That Revealed Radioactivity



A Fortuitous Discovery in the Dark



Name: A. H. Becquerel

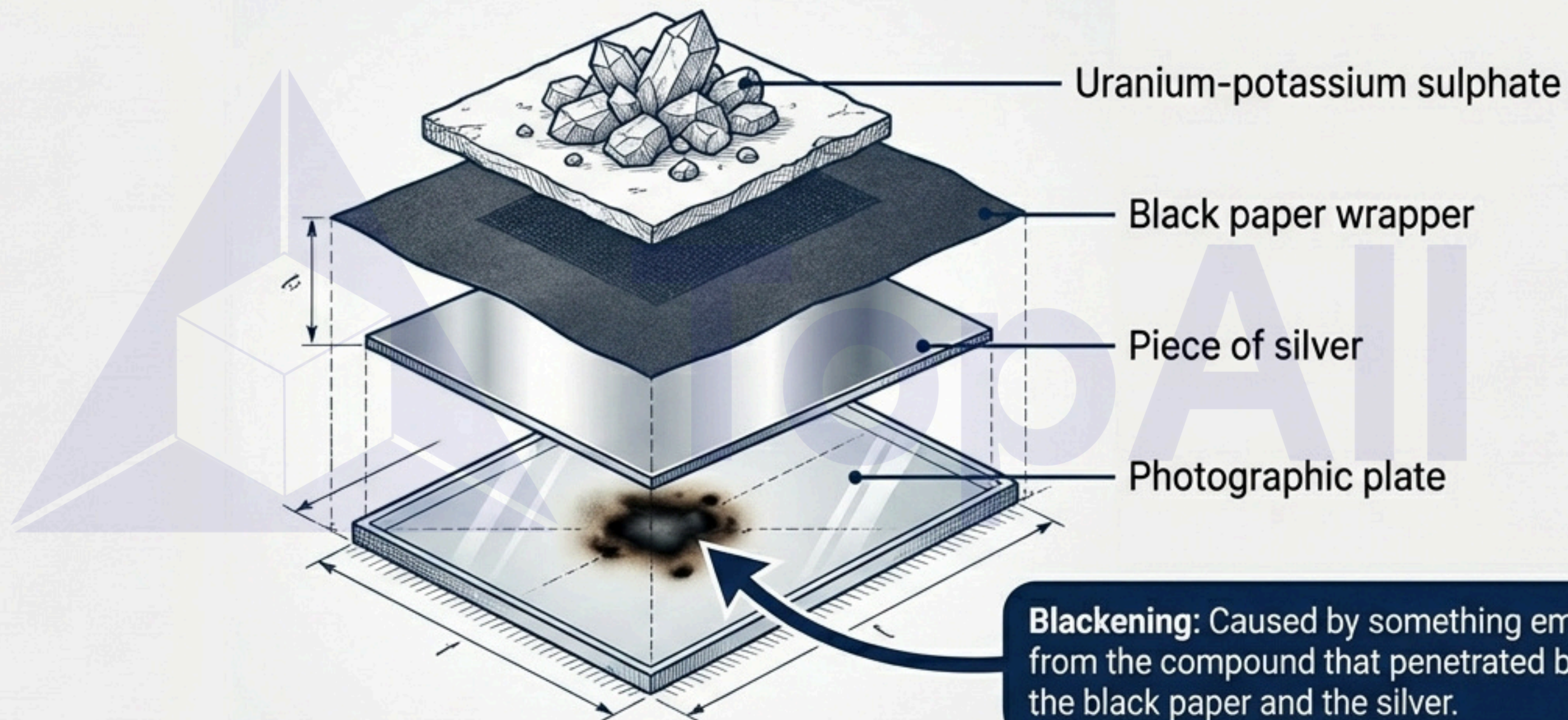
1896

Initial Focus: Studying fluorescence and phosphorescence of compounds irradiated with visible light.



Becquerel illuminated pieces of a uranium compound, wrapped them, and stored them away. Upon developing the photographic plate hours later, he expected nothing. Instead, he found it distinctly blackened.

The Setup That Captured Invisible Rays





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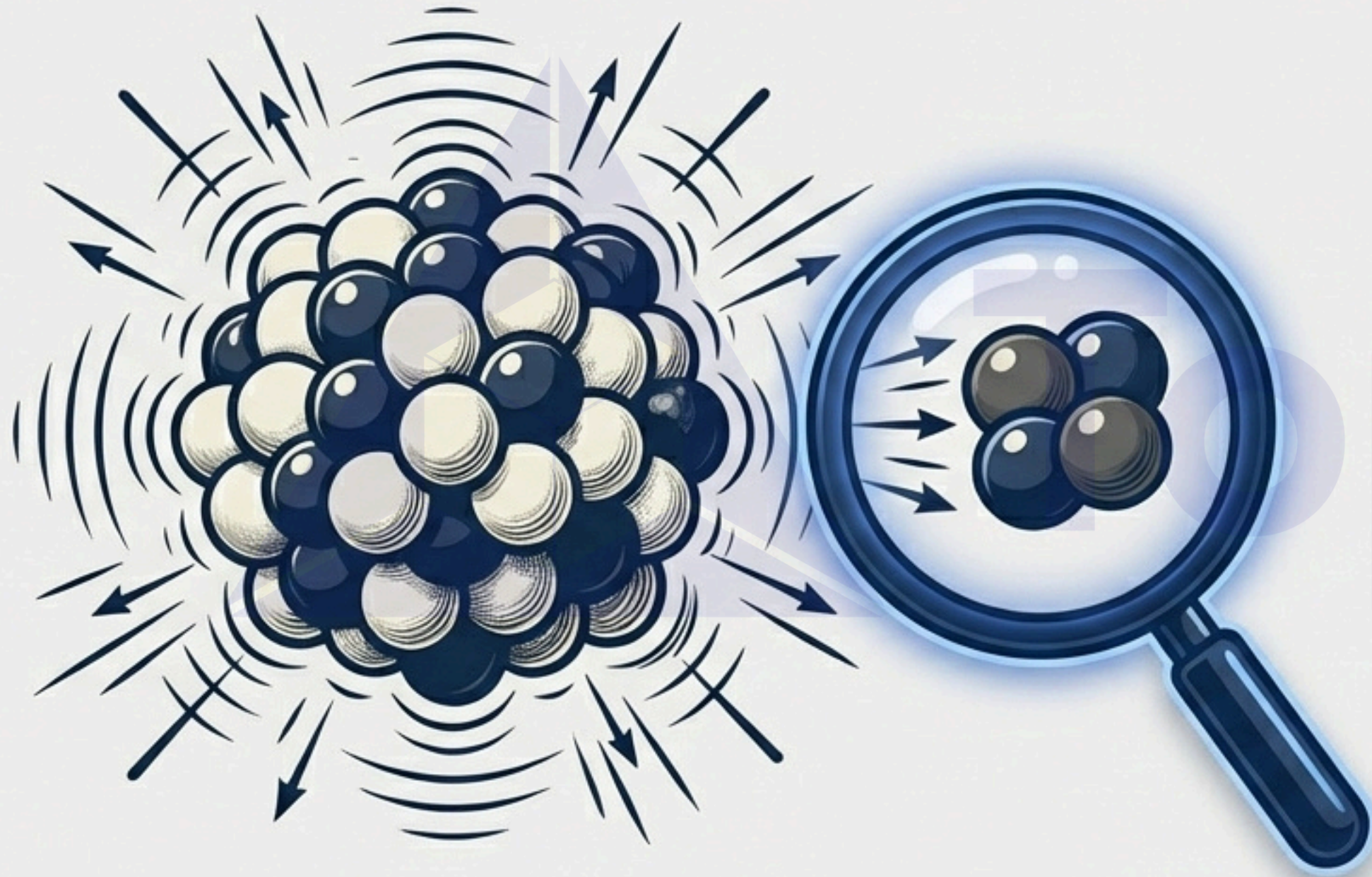
Defining Radioactive Decay



Subsequent experiments proved this was not a chemical reaction, but a nuclear phenomenon.

Radioactivity occurs when an unstable nucleus undergoes a spontaneous decay to reach stability.

Alpha (α) Decay



In α -decay, the unstable nucleus emits a helium nucleus.



- It consists of exactly 2 protons and 2 neutrons.

Beta (β) and Gamma (γ) Decay

Beta (β) Decay

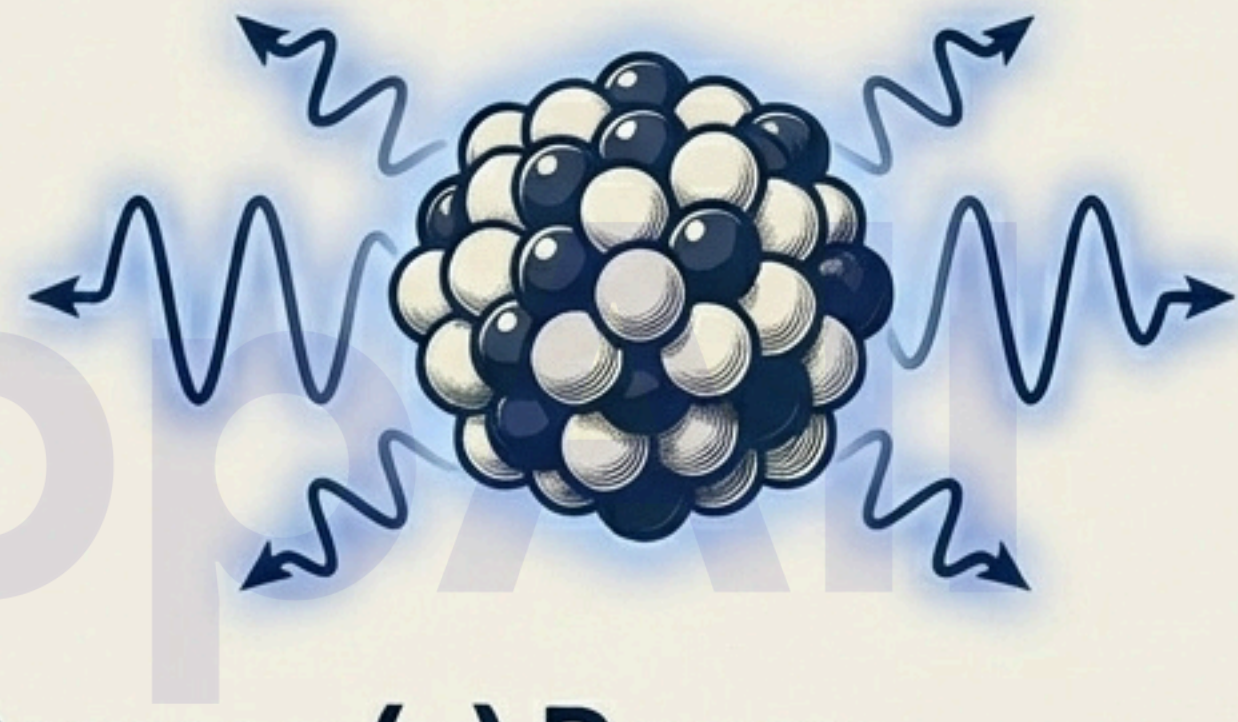


Beta (β) Decay

Emits an electron or a positron.

Note: A positron has the exact same mass as an electron, but with an exactly opposite positive charge.

Gamma (γ) Decay



Gamma (γ) Decay

Emits high-energy photons (hundreds of keV or more). No change in the number of nucleons.

Master the Decay Types

Key Takeaway: Radioactivity is the spontaneous nuclear decay of unstable nuclei. Becquerel's 1896 accident proved these emissions can penetrate opaque materials.

Decay Type	What is emitted?	Nature
α Alpha	Helium nucleus ${}^4_2\text{He}$	2 protons + 2 neutrons
β Beta	Electron or Positron	Same mass as e^- , negative or positive charge
γ Gamma	High-energy photons	Electromagnetic wave / energy $\geq$ hundreds of keV



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