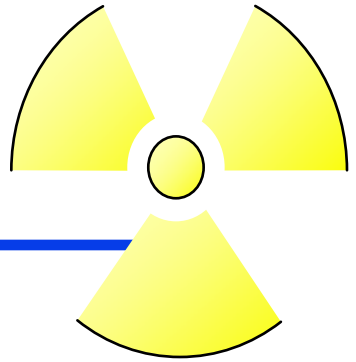
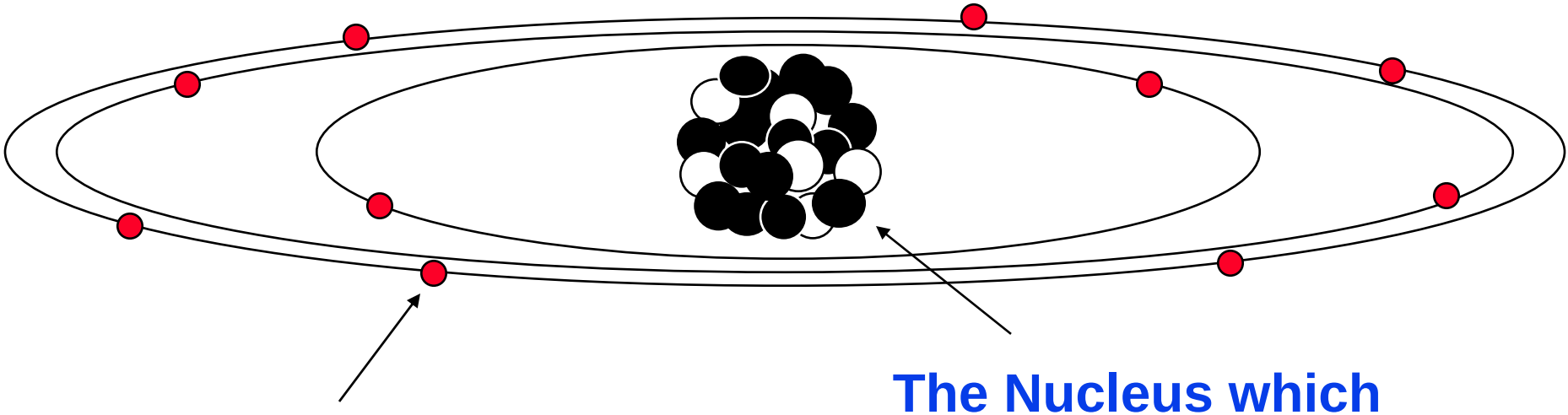
Radiation and Radioactivity



- Radiation: Energy in transit, either as particles or electromagnetic waves
- Radioactivity: The characteristic of various materials to emit ionizing radiation
- Ionization: The removal of electrons from an atom. The essential characteristic of high energy radiations when interacting with matter.

The Atom

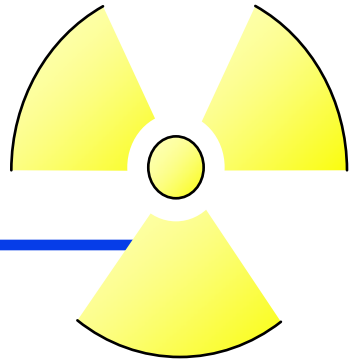
Example - Neon-20

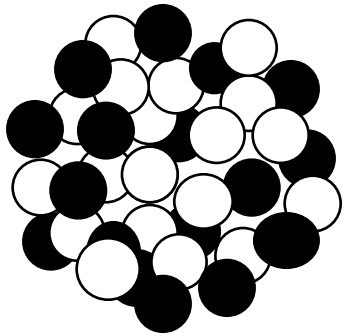


Electrons

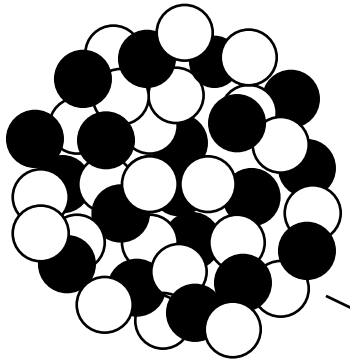
The Nucleus which contains neutrons and protons

Alpha Particle Radiation





Daughter Nucleus
Th-231



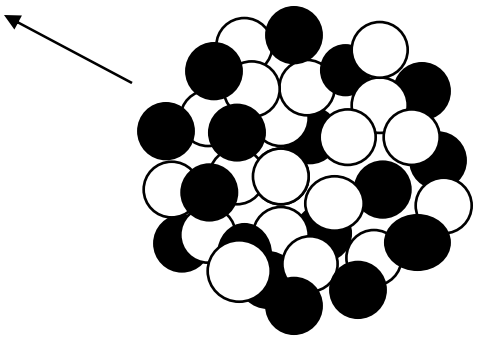
Parent Nucleus
U-235

$^{4}_{2}\alpha^{++}$

Alpha Particle (Helium Nucleus)

Beta Particle Radiation

Daughter Nucleus
Calcium-40



Parent Nucleus
Potassium-40

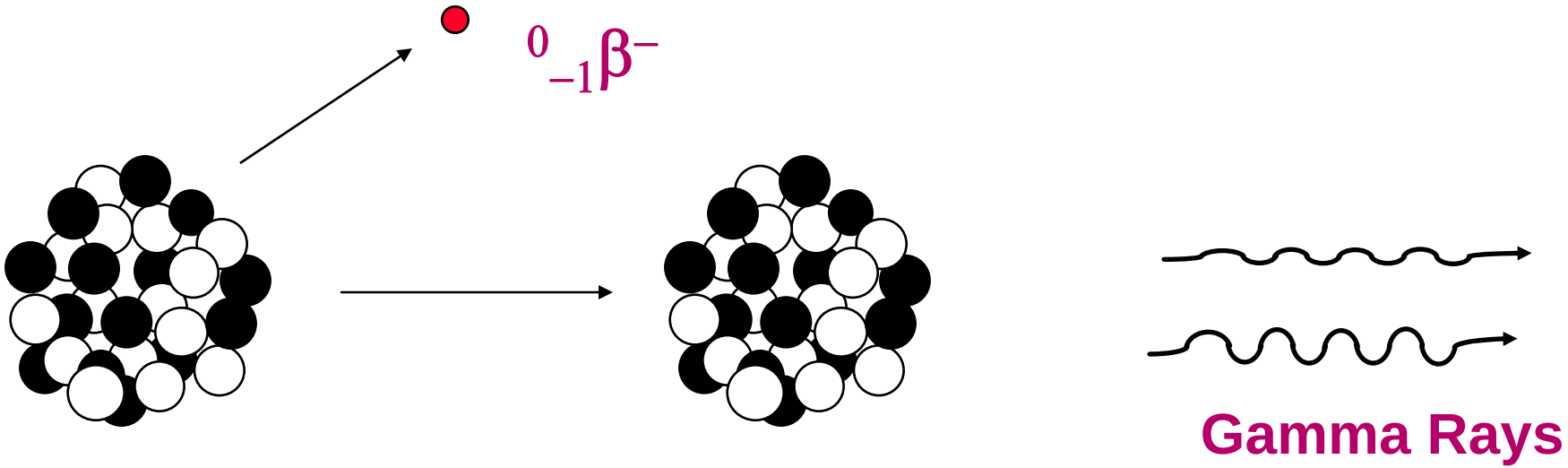
$^{0}_{0}\nu$

Antineutrino

$^{0}_{-1}\beta^{-}$

Beta Particle

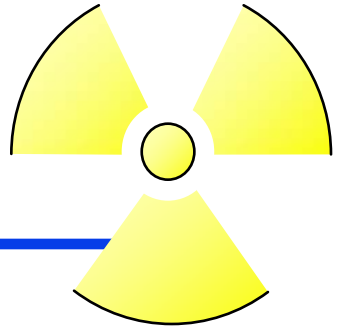
Gamma-Ray Radiation

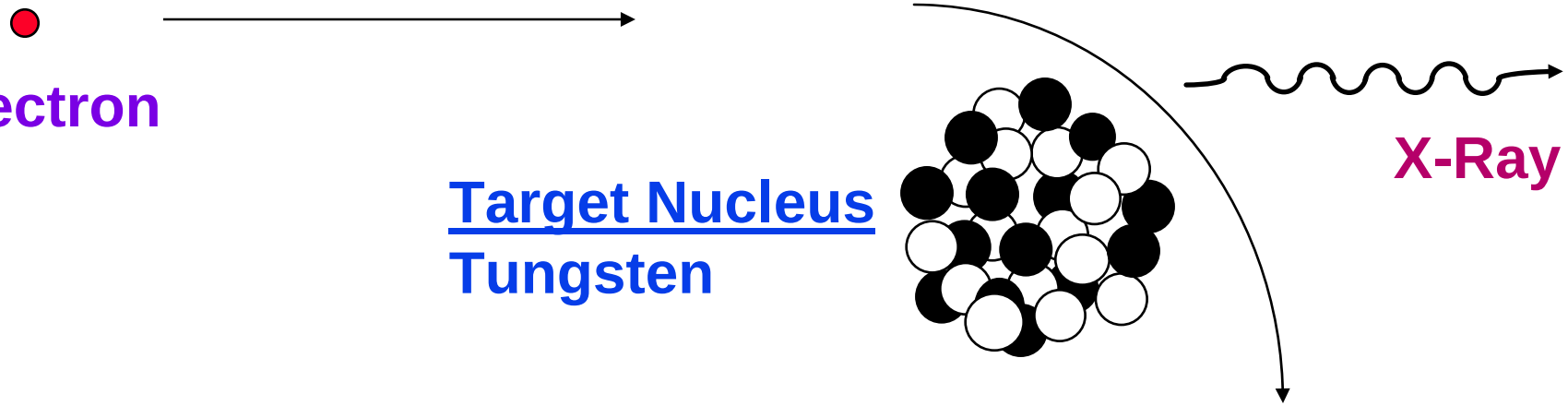


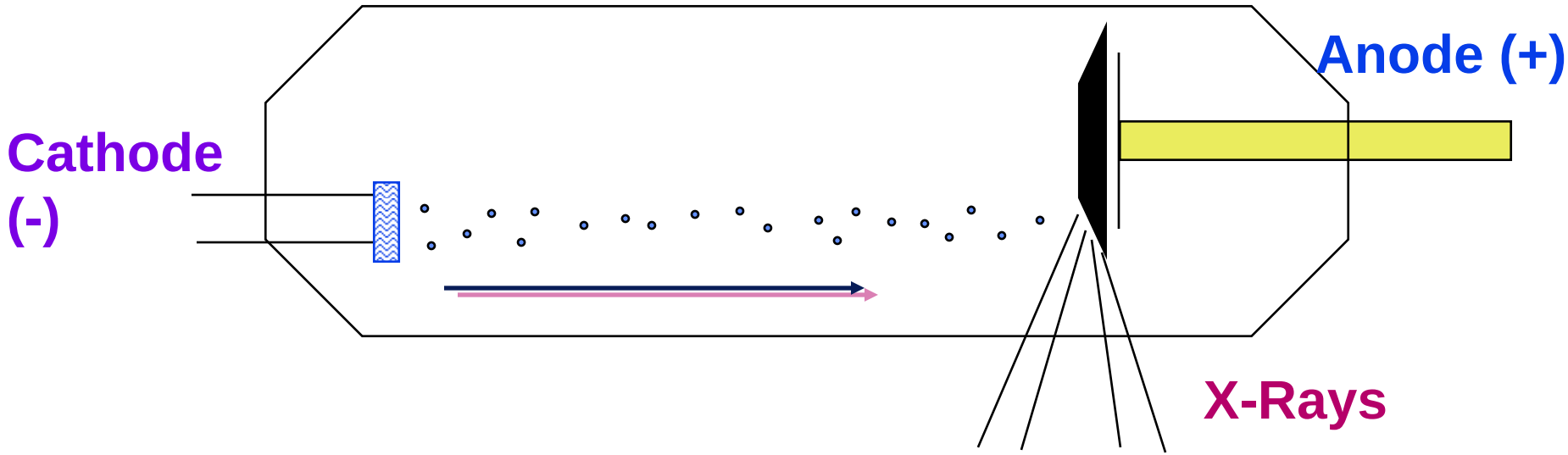
Parent Nucleus
Cobalt-60

Daughter Nucleus
Ni-60

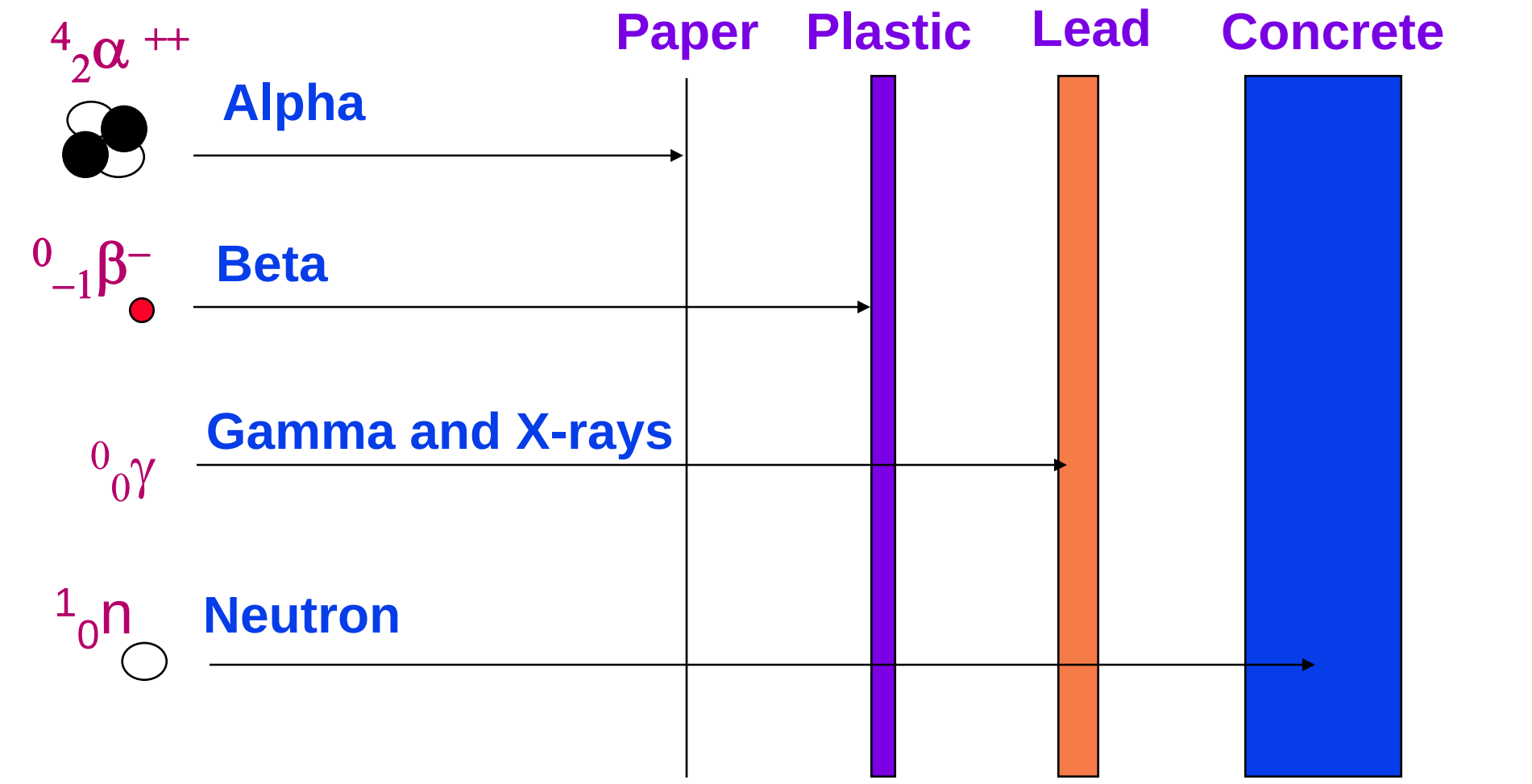
X-Ray Production (Bremsstrahlung)



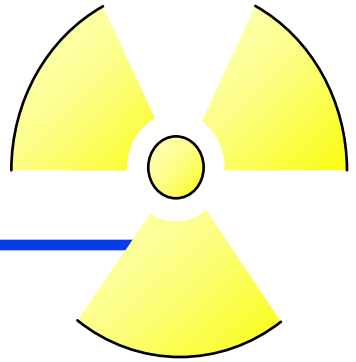




Types of Radiation



Measures of Radioactivity



Activity: The quantity of radioactive material present at a given time:

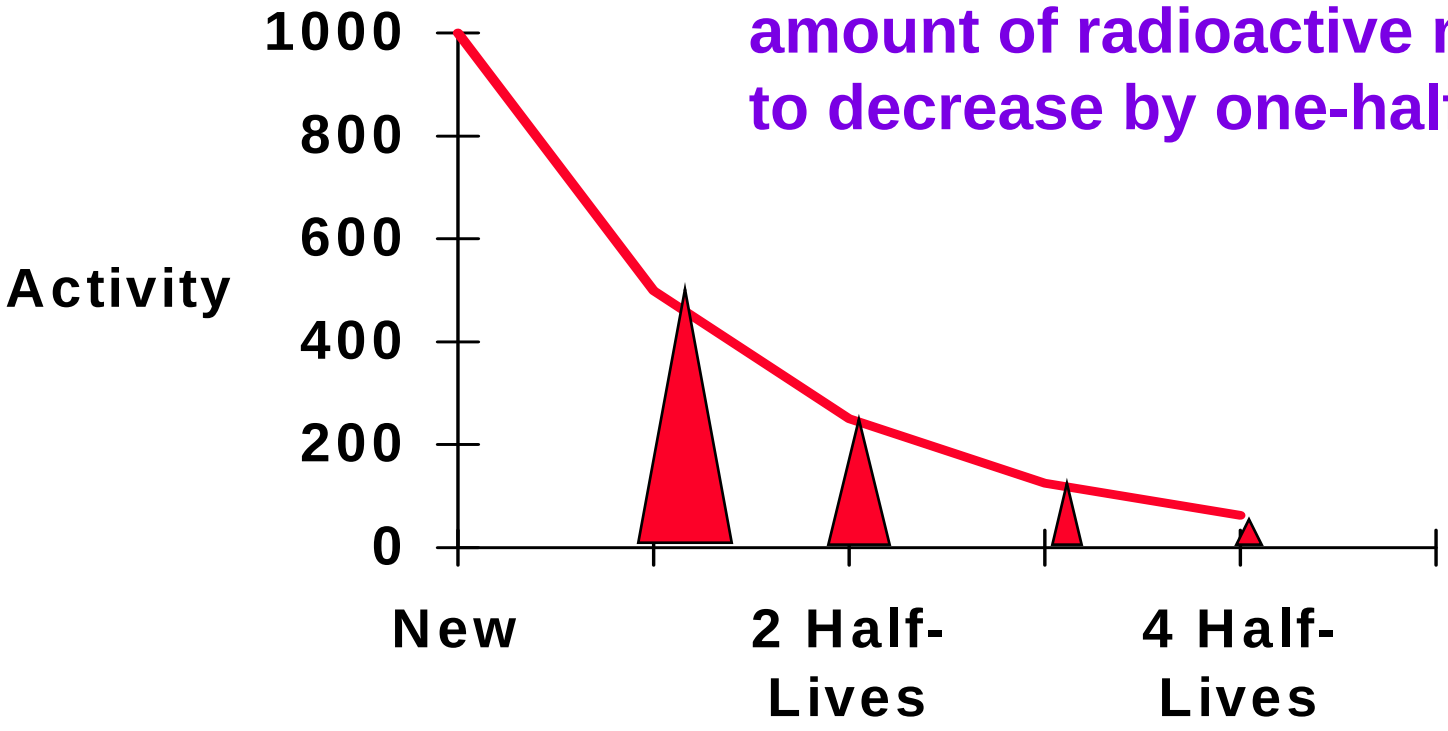
- Curie (Ci) : 3.7×10^{10} disintegration per second (dps)

  or

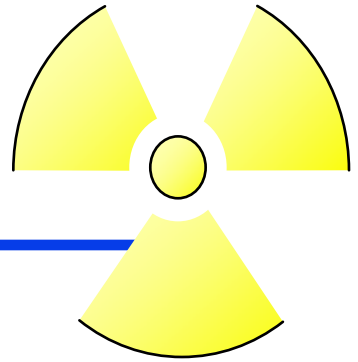
- Becquerel (Bq): 1 dps

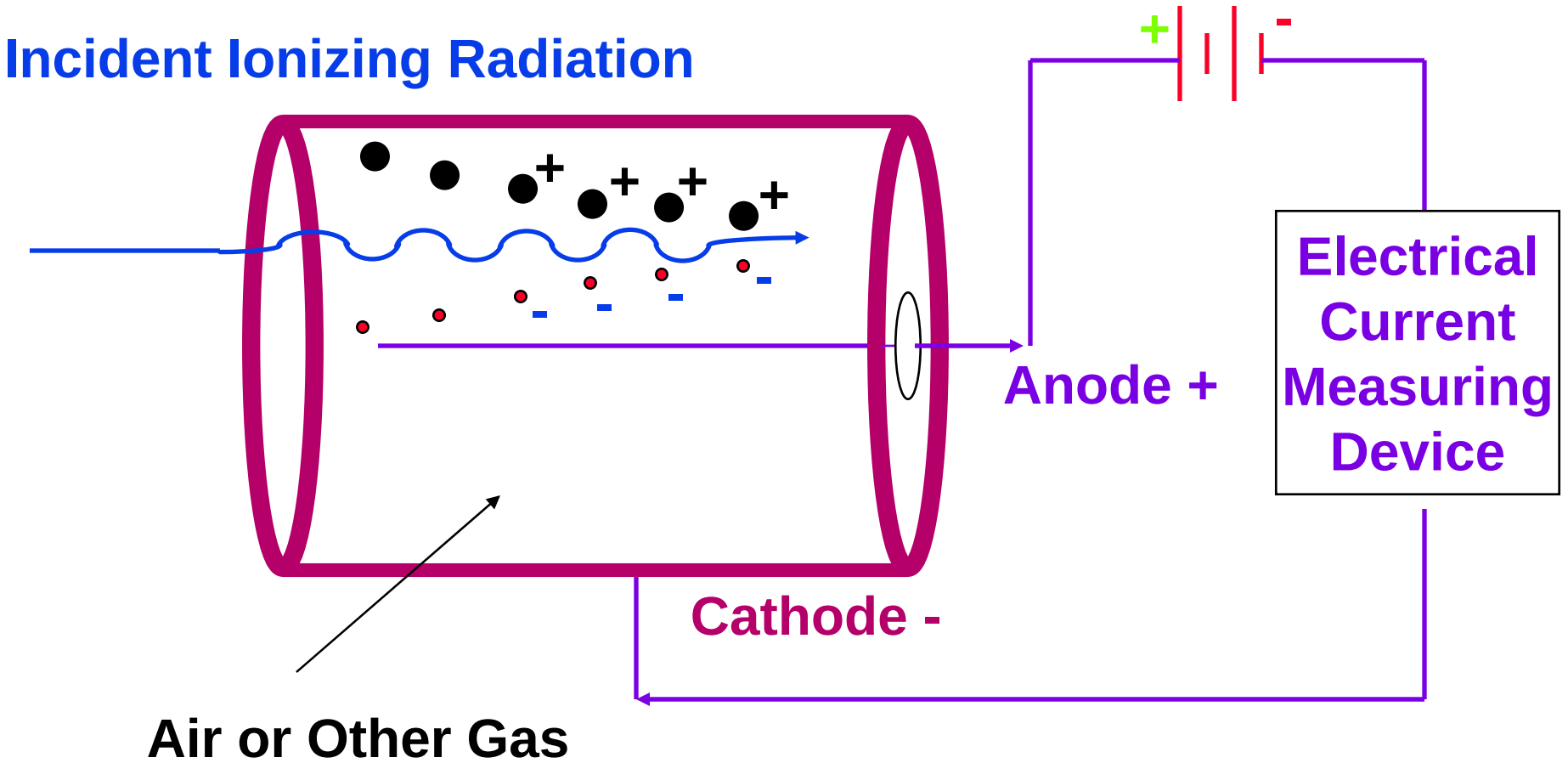
Half-Life

The time required for the amount of radioactive material to decrease by one-half



Radiation Detection
Gas Filled Detectors





Radiation Detection
Scintillation Detectors