

COUNTER METHODS:

- a) Geiger - Muller tube counter
- Geiger tube is filled with inert gas like argon
- Central wire anode is maintained at a positive potential 800 to 2500V .

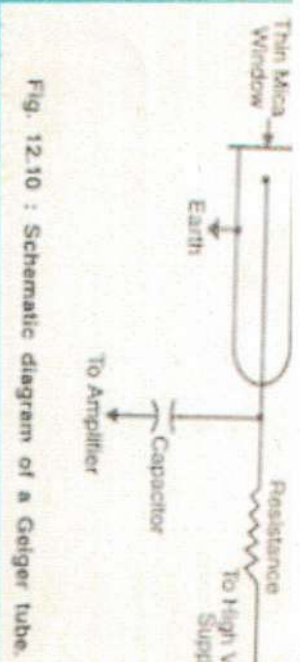
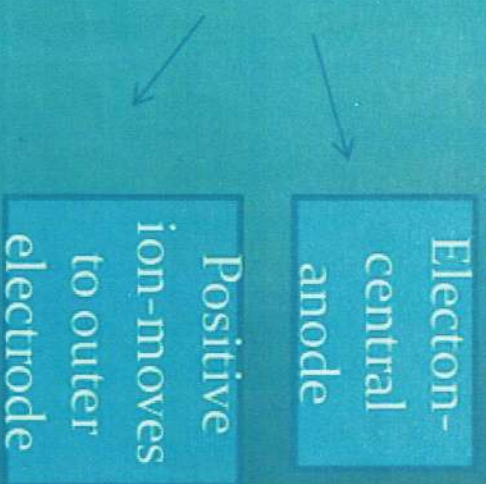


Fig. 12.10 : Schematic diagram of a Geiger tube.



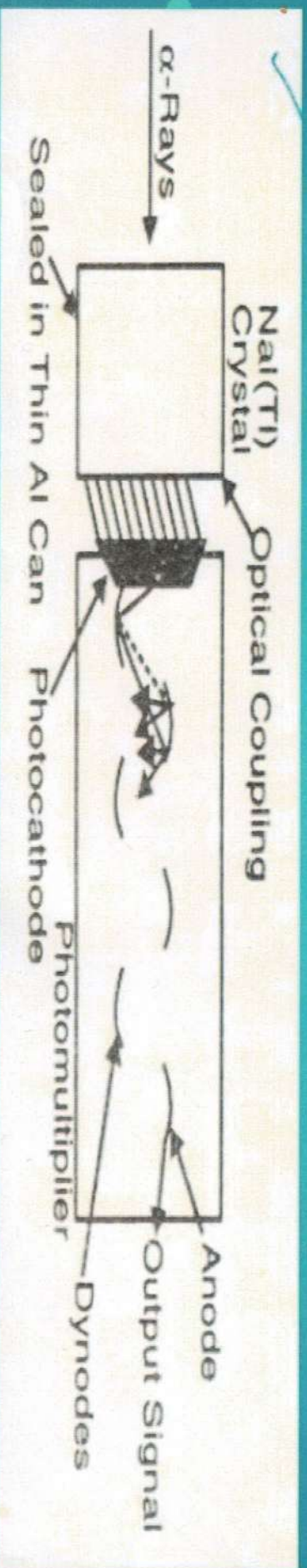
- The electron is accelerated by the potential gradient and causes the ionisation of large number of argon atoms, resulting in the production of avalanche of electrons that are travelling towards central anode

b) PROPORTIONAL COUNTER:

- Construction is similar to Geiger tube counter
- Proportional counter is filled with heavier gas like xenon and krypton
- Heavier gas is preferred because it is easily ionized
- Operated at a voltage below the geiger plateau
- The dead time is very short ($\sim 0.2\mu\text{s}$), it can be used to count high rates without significant error.

C)SCINTILLATION DETECTOR:

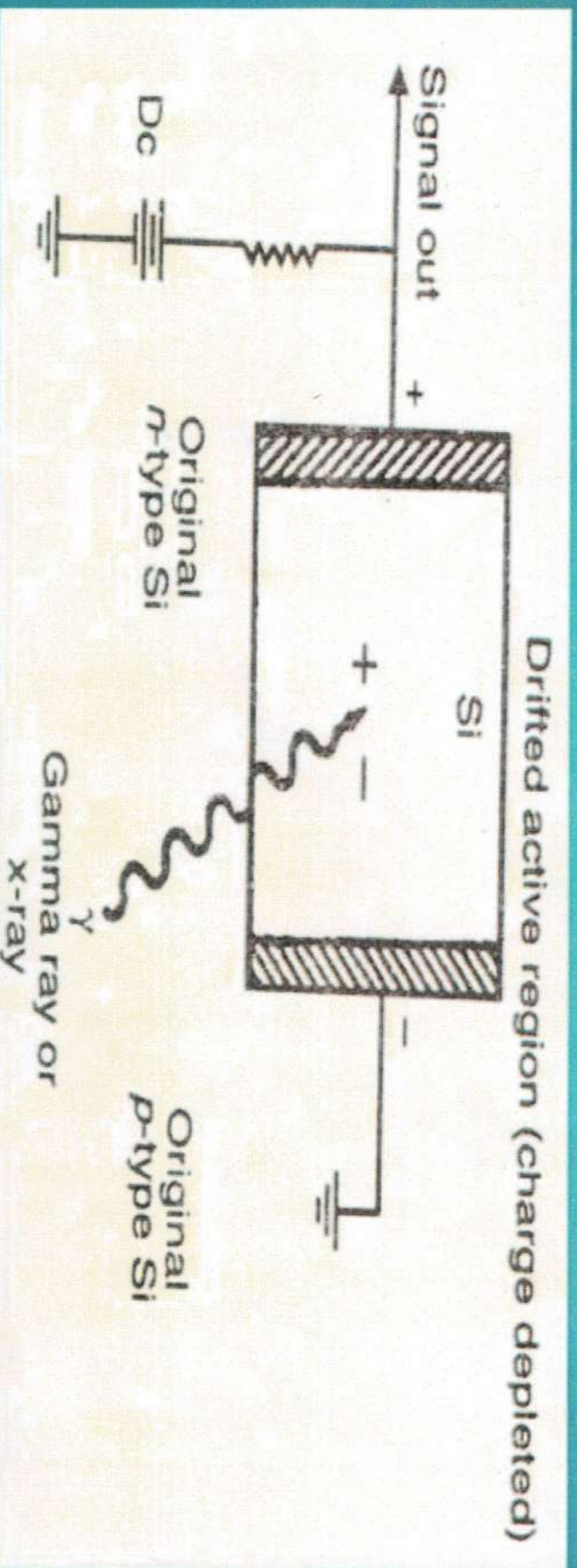
- In a scintillation detector there is large sodium iodide crystal activated with a small amount of thallium
- When x-ray is incident upon crystal, the pulses of visible light are emitted which can be detected by a photo multiplier tube
- Useful for measuring x-ray of short wavelength
- Crystals used in scintillation detectors include sodium iodide, anthracene, naphthalene and p-terphenol



d) Solid state semi-conductor detector

- In this type of detector, the electrons produced by x-ray beam are promoted into conduction bands and the current which flows is directly proportional to incident x-ray energy
- Dis advantage:
- Semi - conductor device should be maintained at low temperatures to minimize noise and prevent deterioration

e)semi-conductor detectors:



- When x-ray falls on silicon lithium drifted detector an electron (-e) and a hole (+e)
- Pure silicon made up with thin film of lithium metal plated onto one end
- Under the influence of voltage electrons moves towards +ve charge and holes towards -ve
- Voltage generated is measure of the x-ray intensity falling on crystal
- Upon arriving at lithium pulse is generated
- Voltage of pulse= q/c ; q -tot charge collected on electrode, c -detector capacity.