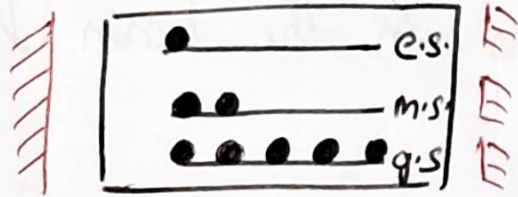
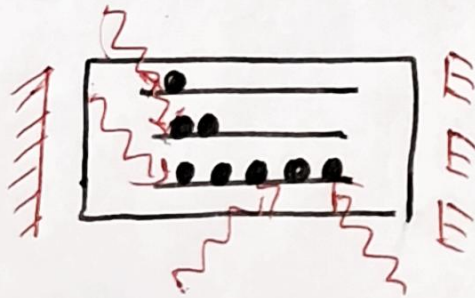


Lasing action



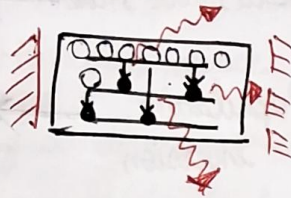
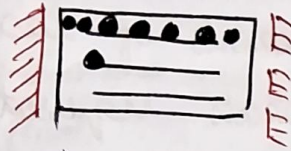
Normal state

↓ Pumping



Stimulated absorption

↓ after $\mathcal{O}(10^{-8}s)$



after $\mathcal{O}(10^{-8}s)$



after $\mathcal{O}(10^{-3}s)$



~ pho

Spontaneous emission

- Most photons not along resonator axis are lost
- Some photons along the resonator axis are trapped
- photons of other colours are

Inverted state

reabsorbed or lost

Stimulated emission

- emitted photons further stimulate other transitions leading to **GAIN/AMPLIFICATION**

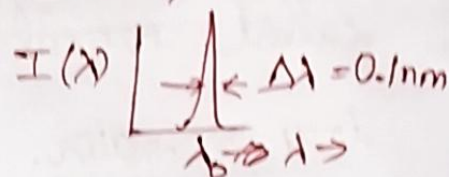
Lasing action occurs

- Due to the partially reflected mirror, a fraction of photons escape the resonating cavity.

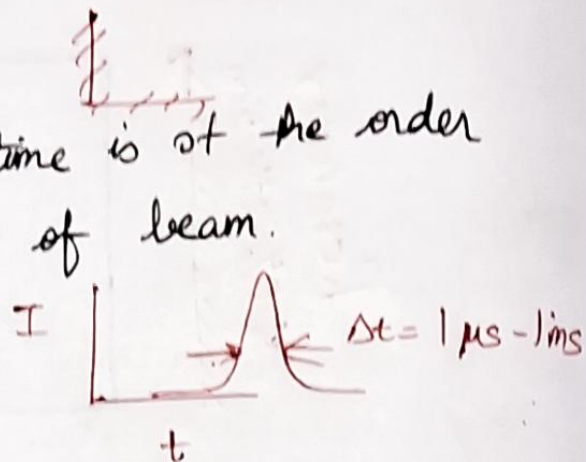
- multiplication of photons leads to highly intense beam

Lasing action leads to

Active medium → unidirectional
Pump → coherent
Resonator → monochromatic
→ high intense beam of photons.



Since the metastable state lifetime is of the order of $10^{-3} - 10^{-6}$ s, we get pulses of beam.



Laser - Characteristics

1. Unidirectional
2. Coherent
3. Monochromatic
4. High intensity
5. Low pulse width

- Coherent means photons in the beam have same phase
- Monochromatic beam consists of photons of single colour/wavelength.