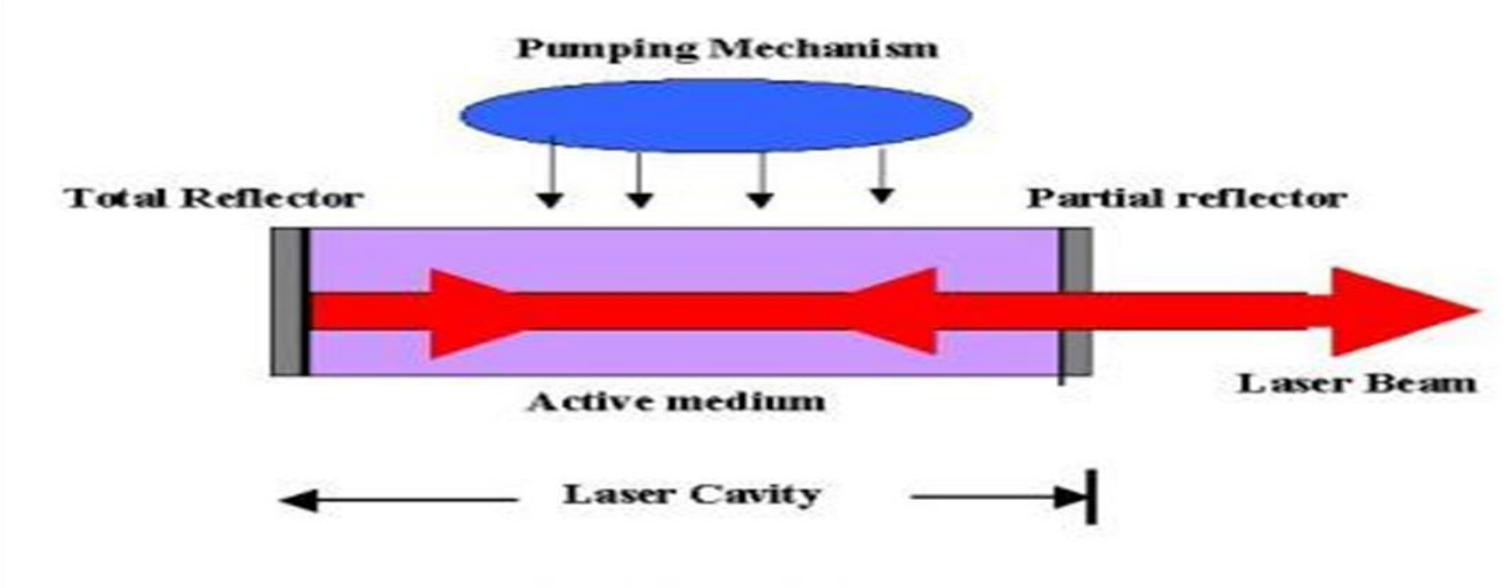
Main Components of Laser

- A pump source/Energy Source
- Active medium.
- Optical resonator/ cavity



Pump Source/Energy Source

- Provides energy to the laser system
- Examples: electrical discharges, flashlamps, chemical reactions.
- The type of pump source used depends on the active medium.

  →A helium-neon (HeNe) laser uses an electrical discharge in the helium-neon gas mixture.

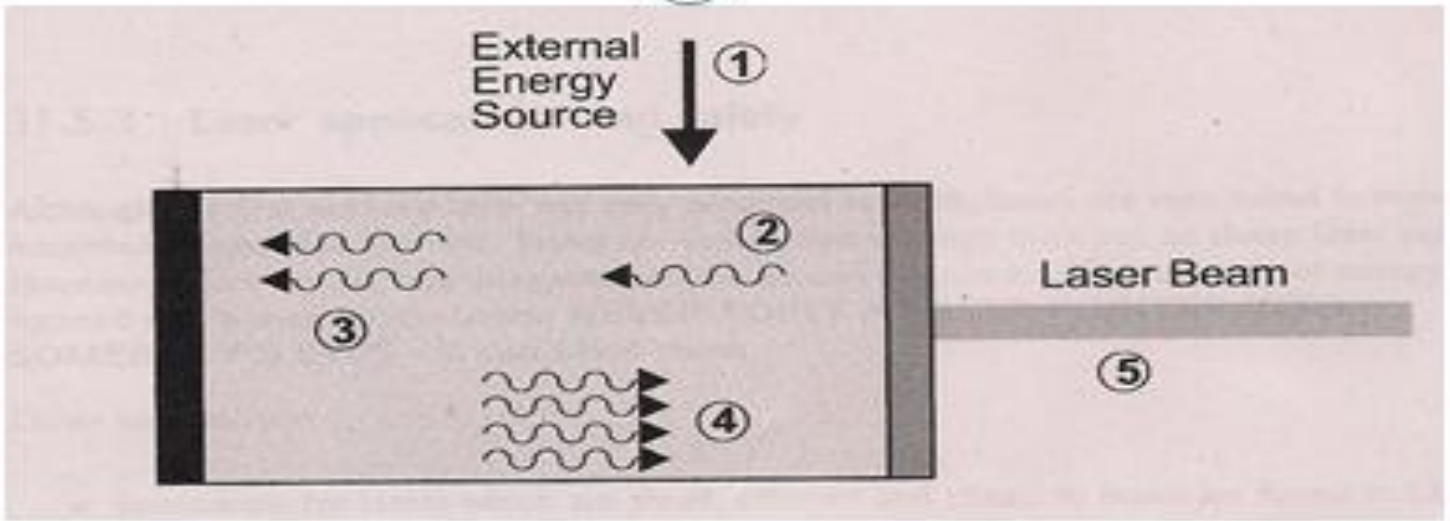
Active Medium

- Major determining factor of the wavelength of operation of the laser.
- Excited by the pump source to produce a population inversion.
- Where spontaneous and stimulated emission of photons takes place.
- Example:
  solid, liquid, gas and semiconductor.

Optical Resonator

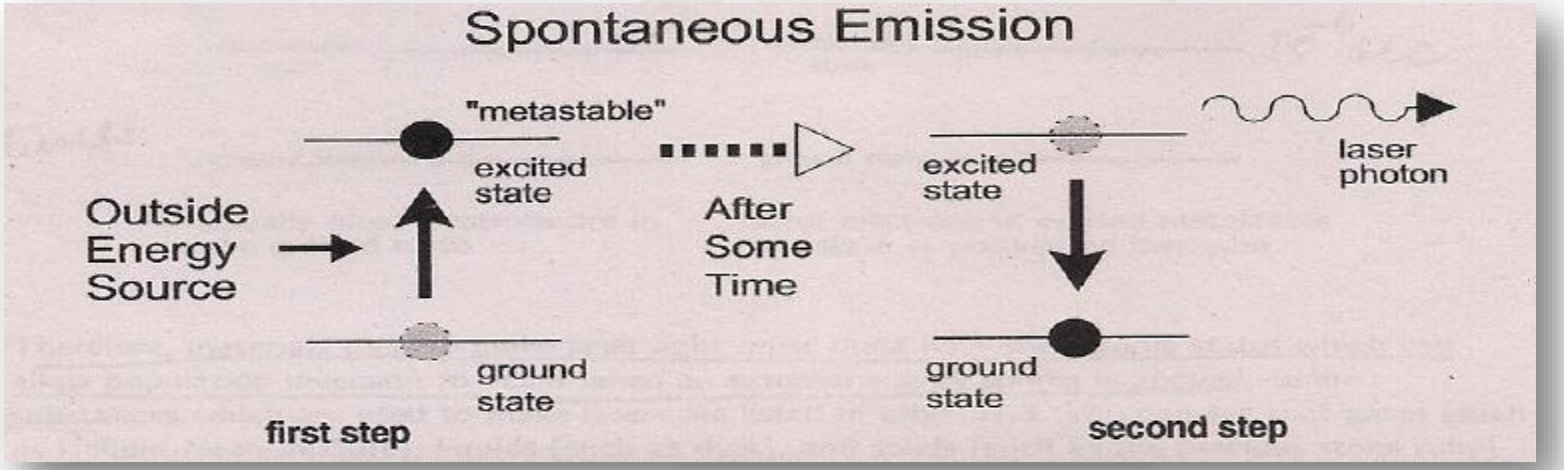
- Two parallel mirrors placed around the active medium.
- Light is reflected by the mirrors back into the medium and is amplified .
- The design and alignment of the mirrors with respect to the medium is crucial.

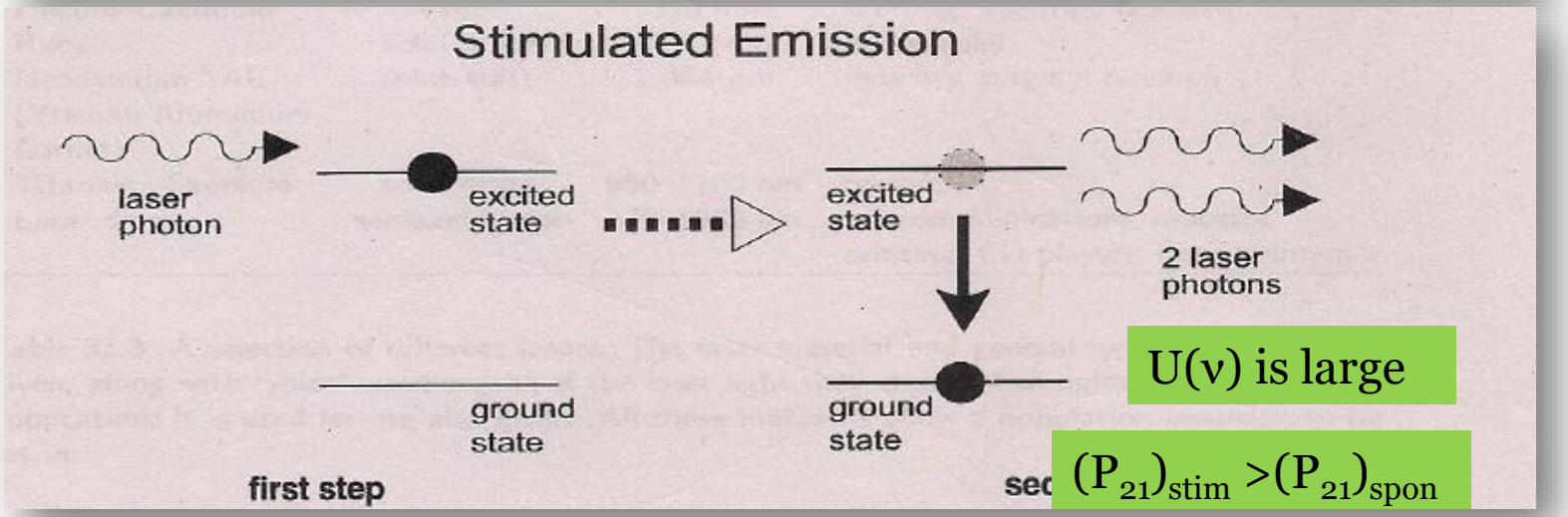
Contd..



1—pumping to raise atoms to an excited state
2—spontaneous emission emitting a photon
3—encounters with another excited atom causing stimulated emission
4—building up of more and more photons due to reflections
5—laser beam

Laser action





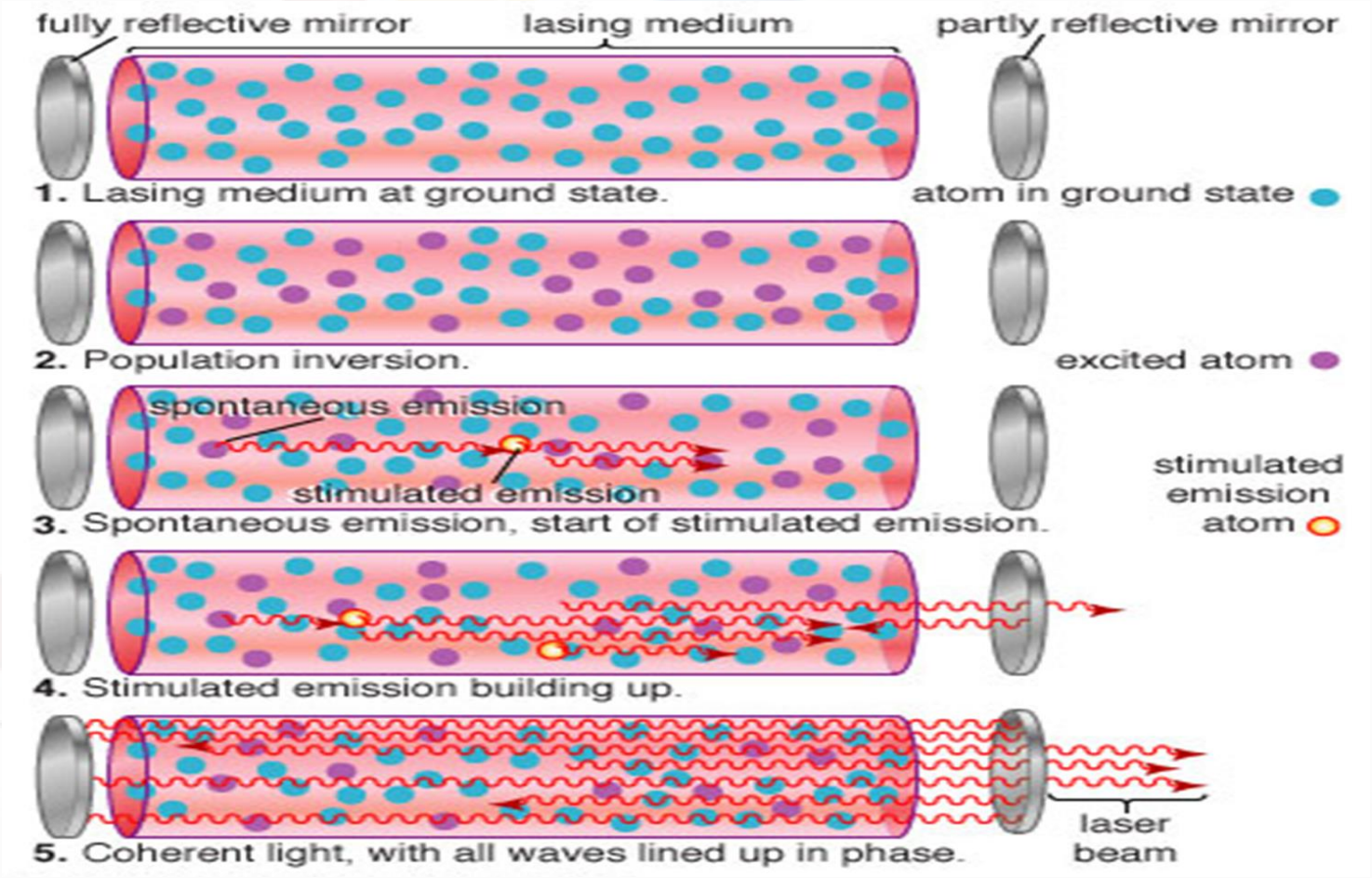
$N_2 > N_1$

$P_{21} > P_{12}$

U(ν) is large

$(P_{21})_{stim} > (P_{21})_{spon}$

Laser Principle:



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