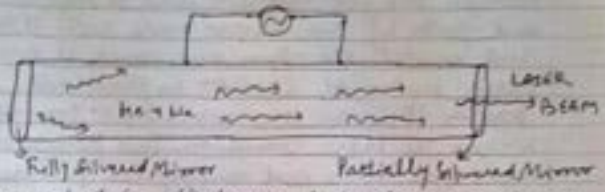


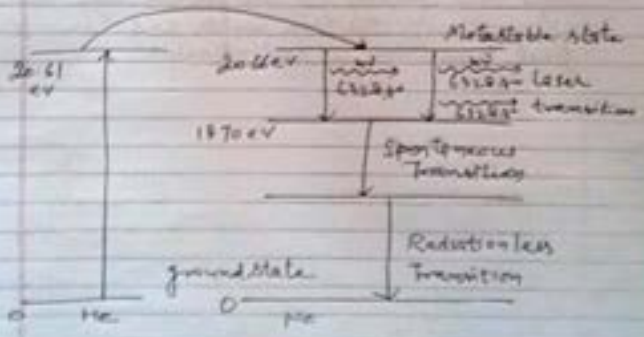
Helium Neon (He-Ne) Laser

Helium Neon laser is a four level gas laser & is superior than Ruby laser. It is continuous laser. In this laser population inversion is achieved by electric discharge. A mixture of (7 parts of He and 1 part of Ne) is contained in a glass tube at a pressure of 1mm of mercury.



An electric discharge is produced in the gas mixture by electrodes connected to a high frequency electric source.

Energy Level Diagram of 4 Level Laser



The electrons from the discharge collide with and pump the He & Ne atoms to metastable state 20.61 eV and 20.66 eV . He atoms help in achieving population inversion in the Ne atoms. When an excited Ne atom passes spontaneously from Metastable state at 20.66 eV to state 18.70 eV it emits a 6328 \AA photon. This photon travels through the gas mixture and is reflected back and forth by the mirror ends until it stimulates and excites Ne atom and cause it to emit fresh photon of 6328 \AA in phase with stimulating photon. This $20.61\text{ eV} \rightarrow 18.70\text{ eV}$ transition is known as laser transition. This process repeated again and again and multiply the photons and hence a strong laser beam is emerged through partially silvered end. From 18.70 eV level the Ne atom passes down spontaneously to a lower metastable state emitting incoherent light and finally to the ground state through collision with the tube walls and hence the final transition is radiationless.