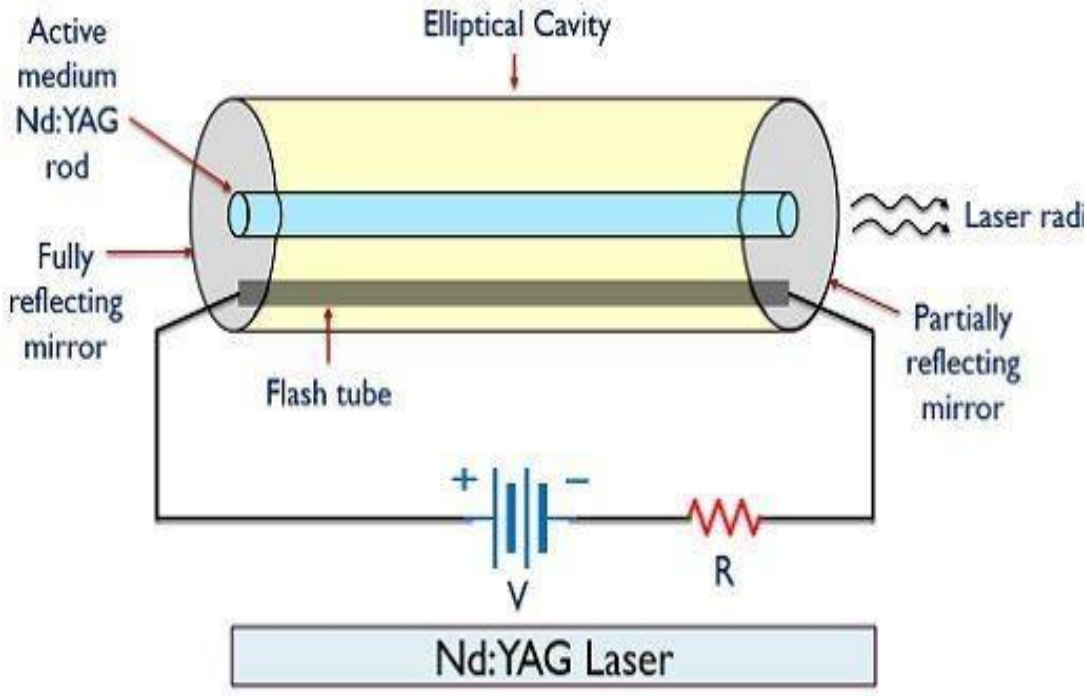
Nd- YAG Laser

(Four –Level Solid State Laser)

PRINCIPLE

- The active medium Nd-YAG rod is optically pumped by Krypton flash tube.
- The neodymium ions (Nd) are raised to excited energy levels.
- During transition from metastable state to ground state, a laser beam of wavelength 1.064 um is emitted

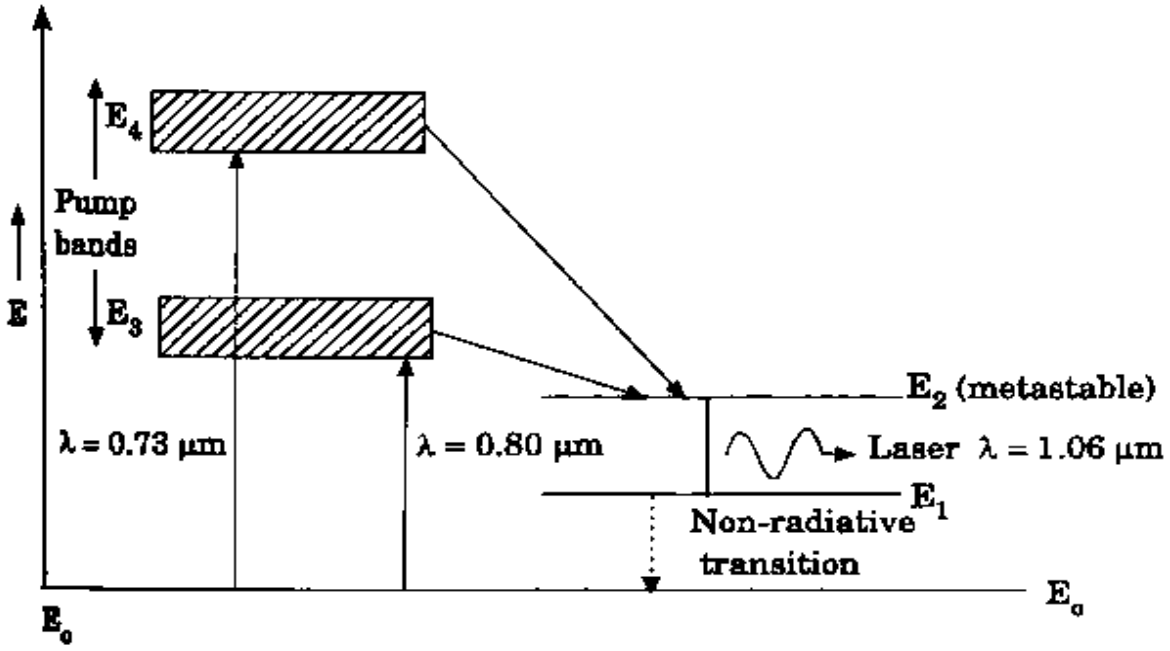


CONSTRUCTION

- The active medium Nd-YAG crystal is cut into a cylindrical rod.
- The ends of this rod are highly polished and optically flat and parallel.
- Krypton flash tube and laser rod are placed inside an elliptical cavity
- It consists of two mirror, one is fully reflecting and another one is partially reflecting mirror.

- They are used to form optical resonator

Working:



When the Krypton flash tube is switched on the Nd^{3+} ions present in the energy state E_0 gains energy and moves to energy state E_4 and E_3

Nd ions come to lower energy state E_2 from E_4 and E_3 without radiating any photon.

Thus population inversion is achieved between E_2 and E_1.Now ions come to lower energy state E_1 by releasing photons.

Now they move back and forth between mirrors to grow in strength and produce laser