L7RUBYS

Calculation of amplification constant for a Ruby laser

Induced absorption of level 3 must be larger than spontanious emission from state 2

$\lambda := 6943 \cdot 10^{-10} \cdot m$ $c := 3 \cdot 10^{8} \cdot \frac{m}{s}$ $h := 7 \cdot 10^{-34} \cdot W \cdot s^2$

$\tau sp := 3 \cdot 10^{-3} \cdot s$ $\nu := \frac{c}{\lambda}$ $\nu = 4.321 \times 10^{14}\, s^{-1}$

$cc := \frac{c}{1.78}$ $cc = 1.685 \times 10^{8}\, m\, s^{-1}$

$\Delta\nu := 2 \cdot 10^{11} \cdot \frac{1}{s}$ at 300 K

$glvo := \frac{1}{\Delta\nu}$ $glvo = 5 \times 10^{-12}\, s$

Call nn = n2 - n1*g2/g1

$nn := 5 \cdot 10^{23} \cdot m^{-3}$ using a Flashlamp for pumping

$$\varepsilon\nu := nn \cdot \frac{cc^2}{8 \cdot \pi \cdot \nu^2 \cdot \tau sp} \cdot glvo \qquad \varepsilon\nu = 5.045\, m^{-1}$$

It is $\varepsilon\nu$ =.05 cm-1

This is the gain of the beam per length in cm