ALEX SPORNI - XSPORN01 - 204633

1. $\Delta N_i^* = \frac{\gamma}{\sigma \cdot l}$; $\gamma = \frac{\gamma_1 + \gamma_2}{2} + \gamma_i = \frac{0,01 + 0,01}{2} + 0,01 = \frac{1}{50} = 0,02$

a)

$$\Delta N_i^* = \frac{0,02}{8 \cdot 10^{-25} \cdot 0,06} = 4,1666 \cdot 10^{23}\ m^{-3}$$

b) $$W_b^* = \frac{\Delta N_i^*}{N_\Sigma - \Delta N_i^*} \cdot \frac{1}{\tau_{21}} = \frac{4,1666 \cdot 10^{23}}{2 \cdot 10^{25} - 4,1666 \cdot 10^{23}} \cdot \frac{1}{0,2 \cdot 10^{-3}} = 106,3812\ s^{-1}$$

c) $W_{b\,min} = 0$ → nemá n leórie

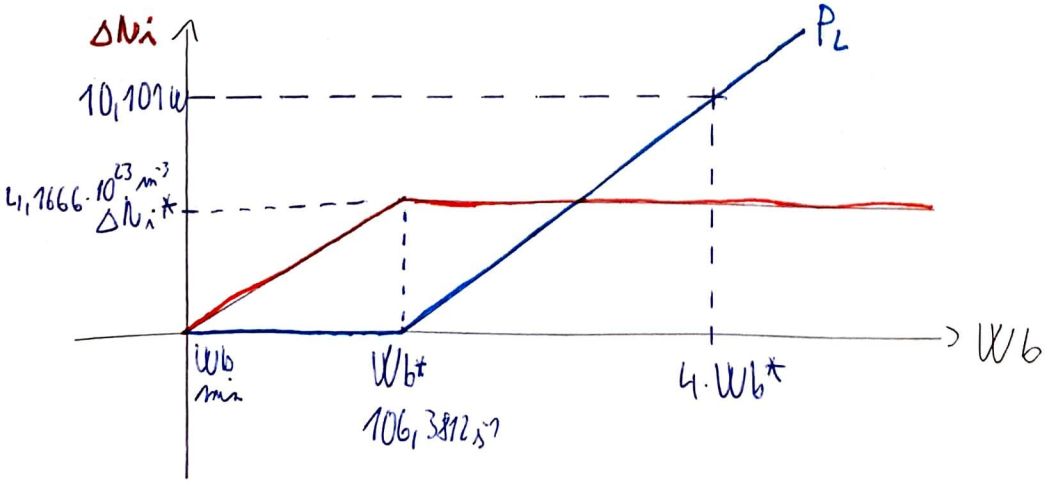
$$W_{21} = 2 \cdot \pi \cdot \nu_{21} = 2 \cdot \pi \cdot \frac{c}{\lambda}$$

$$W_{21} = 2 \cdot \pi \cdot \frac{3 \cdot 10^8}{615 \cdot 10^{-9}} = 3,0649 \cdot 10^{15}$$

d) P_L pre $W_b = 4 \cdot W_b^*$

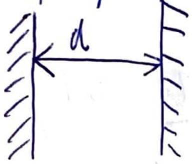
$$P_L = \frac{V_g \cdot \hbar \cdot W_{21} \cdot \gamma_2}{2 \cdot \sigma \cdot l \cdot \tau_{21}} \cdot \left(\frac{4 W_b}{W_b^*} - 1 \right) = \frac{2 \cdot 10^{-8} \cdot 1,0546 \cdot 10^{-34} \cdot 3,0649 \cdot 10^{15} \cdot 0,01}{2 \cdot 8 \cdot 10^{-25} \cdot 0,06 \cdot 0,2 \cdot 10^{-3}}$$

$$\cdot \left(\frac{425,5248}{106,3812} - 1 \right) = 10,101\ W$$



(2.) - máme planparalelný rezonátor => rozlíšenie je nekonečné $R_1 = R_2 = \infty$

$d = ?$



$$V_f = \frac{c}{2d}$$

$$3\cdot10^9 = \frac{3\cdot10^8}{2d}$$

$$2d\cdot3\cdot10^9 = 3\cdot10^8$$

$$d = \frac{3\cdot10^8}{2\cdot3\cdot10^9}$$

$$d = \frac{1}{20}\ m$$

Vzdialenosť zrkadiel v planparal. rez. je $\frac{1}{20}$ m = 0,05 m = 5 cm

Zobrazenie zrkadla vieme z teórie, že pri planparal. rezon. je ∞

XSPORNO1