

Generation and Applications of Ultrahigh-Intensity Laser Pulses

Problem Set 8

1. Outcoupling mirror for a 1 W YAG-Laser cavity

Assume we want to build a $P_{out} = 1$ W Nd:YAG-laser ($\sigma = 4.1 \cdot 10^{-19} \text{ cm}^2$, $\tau = 1.2 \mu\text{s}$), using a laser crystal, $L_A = 10$ cm, $A = 20 \text{ mm}^2$ and a pump with $R_P = 1 \cdot 10^{28} \frac{1}{\text{m}^3\text{s}}$. What minimum reflectivity should the outcoupling mirror have, in order to achieve the aimed for output power? Assume that there are no losses inside the active medium and on the second cavity mirror.

2. What color?

Why is it generally harder to run blue lasers than red ones? *Hint: Look at the Einstein coefficients.*