

Partie 1:

1. $f'_1 = f'_2 = 10 \text{ cm}$, $e = 5 \text{ cm}$

$$\Delta = e - f'_1 - f'_2 = 5 - 10 - 10 = -15,0 \text{ cm}$$

$$f' = \frac{-f'_1 f'_2}{\Delta} = \frac{-10 \times 10}{-15} = 6,67 \text{ cm}$$

2. $\frac{1}{f'} = (n-1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$ $R_1 = -R_2$ car équiconvexe

$$\frac{1}{f'} = (n-1) \left(\frac{2}{R} \right)$$

$$R = 2(n-1)f' = 2(1,523-1)500 \cdot 10^{-2} = 0,523 \text{ m}$$

Partie 2:

1. On observe des interférences en cercles (anneaux)

$$\begin{aligned} 2. \textcircled{a} \delta &= S_1 - S_2 \\ &= (Lx + 2x\eta_1 + x\eta) - (Lx + 2x\eta_2 + x\eta) \\ &= 2(x\eta_1 - x\eta_2) \\ \delta &= 2e \end{aligned}$$

$$\begin{aligned} \delta &= 2(20,07 - 20,0) \\ \delta &= 0,140 \text{ cm} \end{aligned}$$

$$\textcircled{2} \quad \frac{\varphi}{2\pi} = \frac{\delta}{\lambda}$$

$$\varphi = \frac{2\pi\delta}{\lambda} = \frac{4\pi a}{\lambda}$$

$$3. \quad \Delta\delta = 2\Delta a = 2 \times 5,33 \cdot 10^{-5}$$

$$\Delta\delta = 1,066 \cdot 10^{-4} \text{ m}$$

$$\textcircled{1} \quad \lambda = \frac{\Delta\delta}{N} = \frac{1,066 \cdot 10^{-4}}{200}$$

$$\lambda = 533 \cdot 10^{-9} \text{ m}$$

$$\lambda = 533 \text{ nm}$$

② La couleur du laser est vert. (Vert YAG)

Partie 3 :

1. Avec ce réglage on observe des franges.

$$2. \quad \begin{array}{ll} i_0 = 1,20 \text{ cm} & \lambda_0 = 632,8 \text{ nm} \\ i_0 = 1,01 \text{ cm} & \end{array}$$

$$\lambda = \frac{i_0 \cdot \lambda_0}{i} = \frac{1,01 \cdot 10^{-2} \times 632,8 \cdot 10^{-9}}{1,20 \cdot 10^{-2}}$$

$$\lambda = 532,6 \cdot 10^{-9} \text{ m}$$

$$\lambda = 532,6 \text{ nm}$$

Partie 4 :

1. $I = I_0 \cos^2(\alpha)$

2. $E_{r_{30^\circ}} = E_{r_{max}} \cos^2(\alpha)$

$$= 45 \cos^2(30^\circ)$$
$$E_{r_{30^\circ}} = 33,75 \text{ W.cm}^{-2}$$

3. $E_{r_{90^\circ}} = 45 \cos^2(90^\circ)$

$$E_{r_{90^\circ}} = 0 \text{ W.cm}^{-2}$$