Θεμα 1

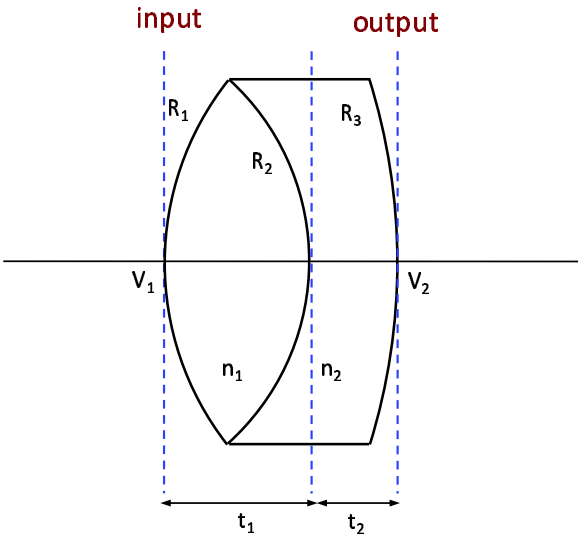

Figure 1: System of an achromat doublet lens. The input and output planes are shown.

(α)

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} = \begin{pmatrix} 0.9653 & 4.6160\,mm \\ -0.0100\,mm^{-1} & 0.9881 \end{pmatrix}$$

(β)

$B_{eq} = 0 \longrightarrow x = 292.1623\,mm$ real image, inverted $A_{eq} = m = -1.9554$

$$\begin{aligned} x &= 292.1623\,mm \\ m &= -1.9554 \end{aligned}$$

(γ)

$$
\begin{aligned}
p &= \frac{D}{C} = -98.8436\,mm \\
q &= -\frac{A}{C} = 96.5616\,mm \\
r = v &= \frac{D-1}{C} = 1.1876\,mm \\
s = w &= \frac{1-A}{C} = -3.4696, mm \\
f_1 &= \frac{1}{C} = -100.0312\,mm \\
f_2 &= -\frac{1}{C} = +100.0312\,mm
\end{aligned}
$$

(δ)

$$
s = 151.1876\,mm, \qquad s' = 295.6319\,mm, x = 292.1623\,mm \ \text{ and } \ m = -\frac{s'}{s} = -1.9554
$$

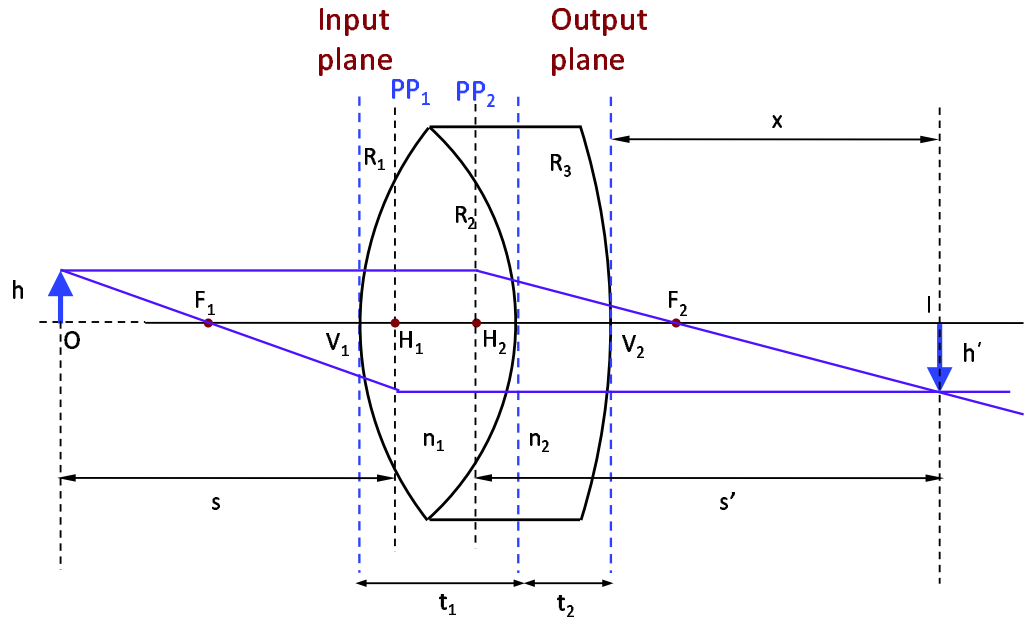

Figure 2: Ray diagram of the system of the achromat doublet lens. The distances shown are not in scale.

Θεμα 2

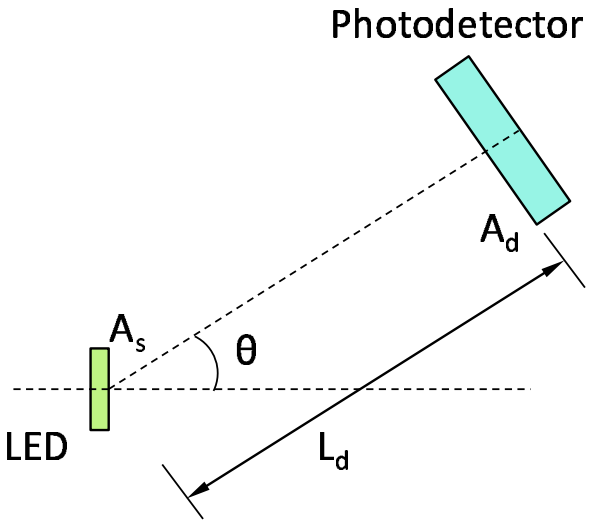

Figure 3: The LED measurement setup.

(α)

$$
\begin{aligned}
I_1(\theta_1) &= 0.1488\, lm/sr, \\
I_2(\theta_2) &= 0.2739\, lm/sr, \\
I_3(\theta_3) &= 0.3892\, lm/sr.
\end{aligned}
$$

(β)

$$
\begin{aligned}
L_1 &= 0.1511\, lm/sr\ mm^2, \\
L_2 &= 1.0582\, lm/sr\ mm^2, \\
L_3 &= 0.4142\, lm/sr\ mm^2.
\end{aligned}
$$

$\underline{\Theta\epsilon\mu\alpha \;\; 3}$

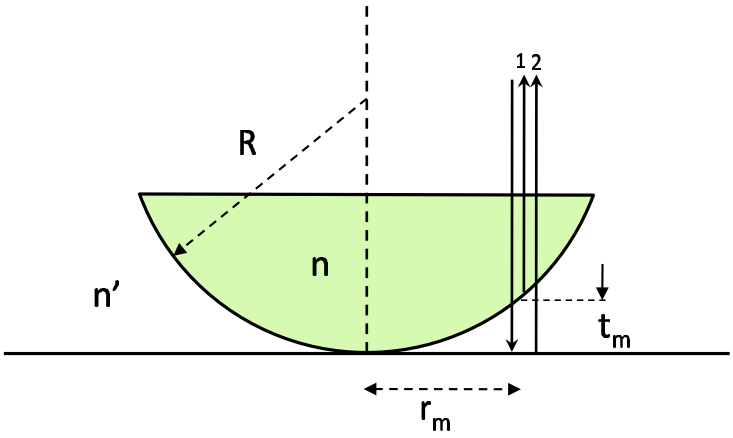

Figure 4: Newton rings setup.

(α)

$$R = 500.265\,\mathrm{mm} = 0.500265\,\mathrm{m}$$

(β)

$$n' = 1.33136$$

$\Theta\epsilon\mu\alpha$ 4

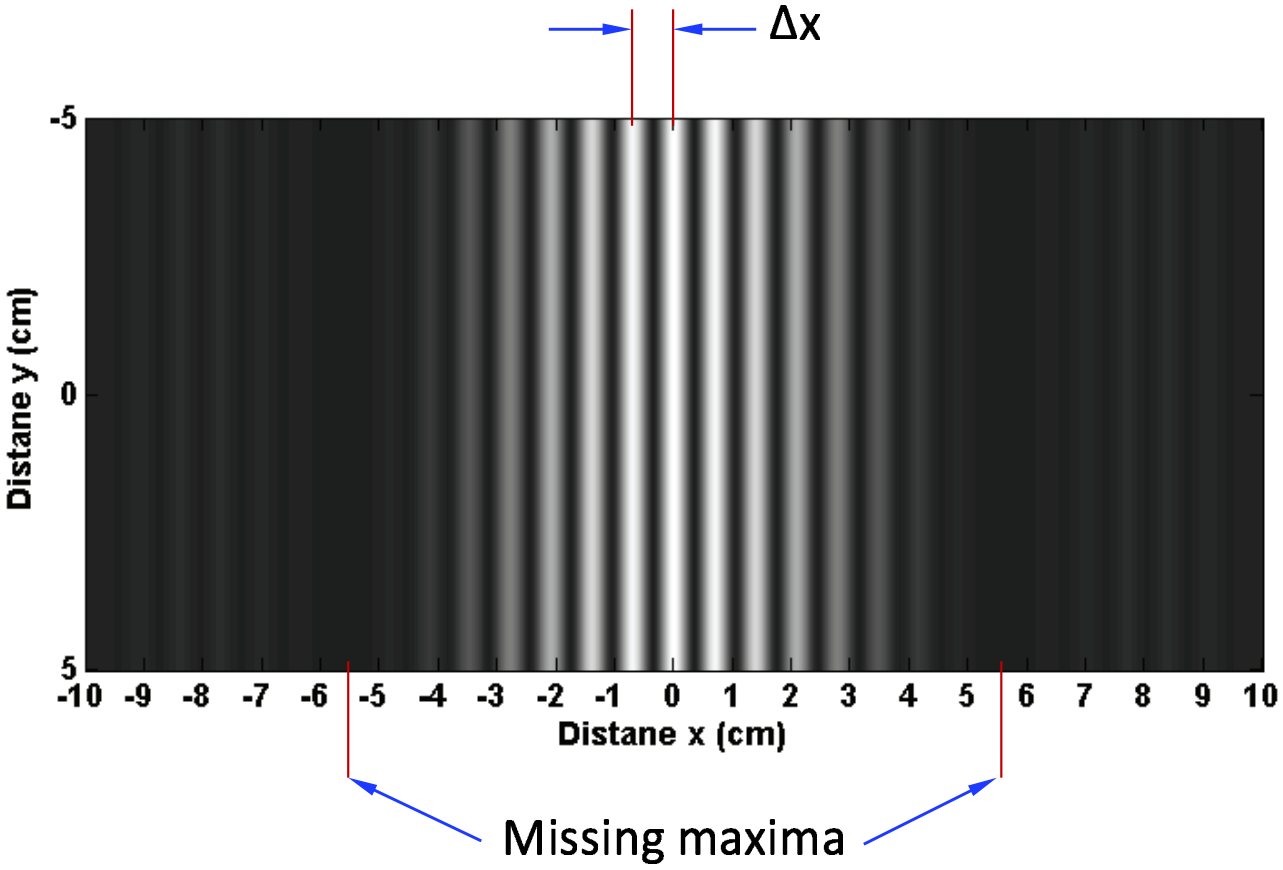

Figure 5: Interference pattern recorder at the screen size as function of x.

(α)

$$\lambda_0 \simeq 559.3\,\mathrm{nm}$$

(β)

$$s \simeq 29.375\,\mu\mathrm{m}$$

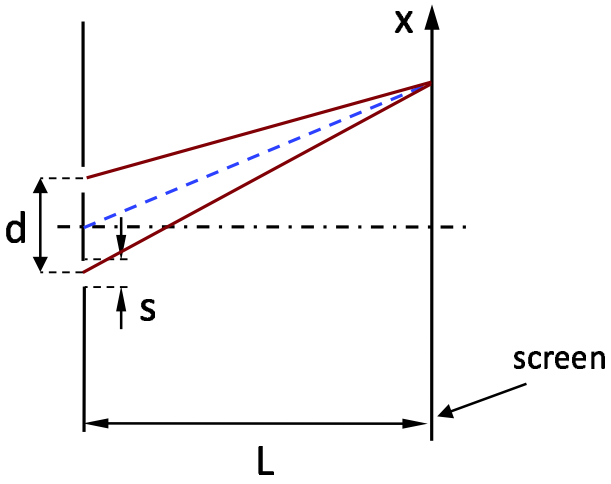

Figure 6: Schematic of the two-slit interference setup.