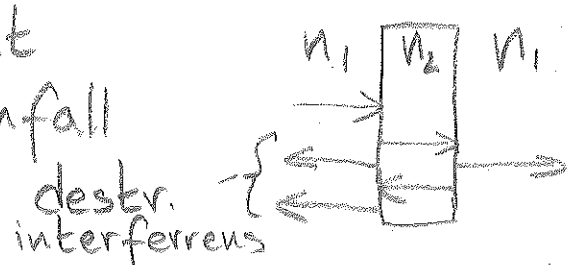
Föreläsning 7 13/04-15

Tunna skikt

-Normalt infall



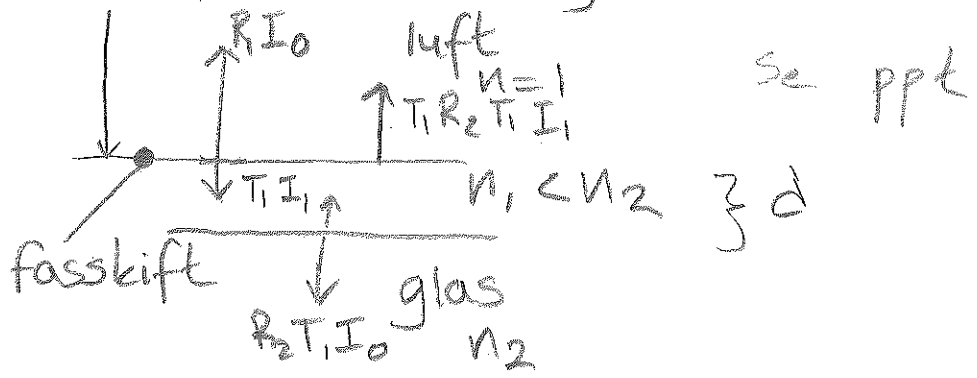
Reflektion från luft till glas

Reflektans i en yta:

$$R = \left(\frac{n_2 - n_1}{n_2 + n_1}\right)^2$$

Objektiv har 18 linser $\Rightarrow$ 36 ytor

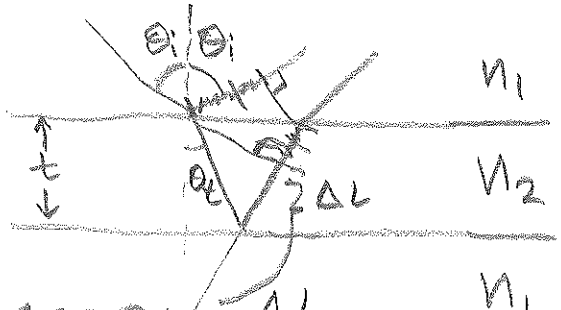
Antireflexbehandling / Flerskiktsbehandling



Se ppt

$2n_1 d = \frac{\lambda}{2} + m\lambda \Rightarrow$ minsta tjocklek

- Infall med en vinkel

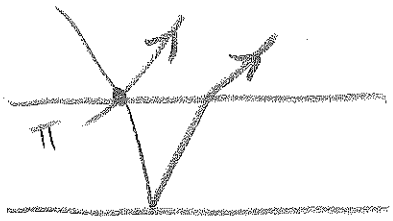


De markerade derade linjerna har lika optisk väglängd.

$$\cos\theta_t = \frac{\Delta L}{2t \cdot n_2}$$

$$\Delta L = 2n_2 t \cos\theta_t$$

Uppgift



Normalt infall

$n=1$

$n=1{,}52$

$n=1$

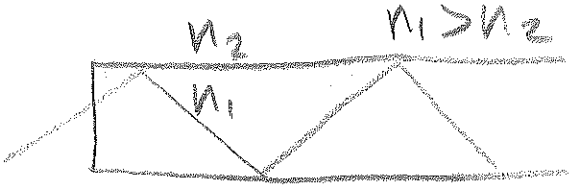
Konst int:

$$2nd = \frac{\lambda}{2} + m\lambda$$

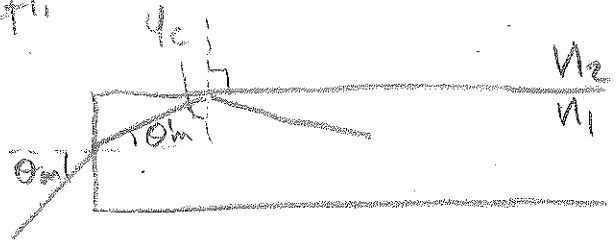
$m=0 \Rightarrow \lambda = 4nd = 462\,nm$

$m=1 \Rightarrow \lambda = \frac{4}{3}nd = 154\,nm$

Fiberoptik



Totalrefl.



Totalrefl.

$$n_1 \sin\varphi_c = n_2 \sin 90^\circ \qquad n_0 \sin\theta_m = n_1 \sin\theta'_m$$

$$\varphi_c = \sin^{-1}\left(\frac{n_2}{n_1}\right) \qquad \theta'_m = 90^\circ - \varphi_c$$

(numeriska apperaturen)

$$N.A = n_0 \sin\theta_m = n_1 \sin\theta'_m = n_1 \sin(90^\circ - \varphi_c) = n_1 \cos\varphi_c$$

$$\sin^2\varphi_c + \cos^2\varphi_c = 1$$

$$\cos\varphi = \sqrt{1 - \sin^2\varphi_c}$$

$$\sin^2\varphi_c = \frac{n_2^2}{n_1^2}$$

$$N.A = n_1\sqrt{1 - \frac{n_2^2}{n_1^2}} = \sqrt{n_1^2 - n_2^2}$$

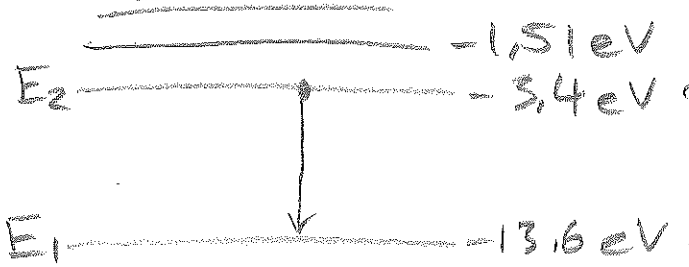
Laser

1s
1w
$\lambda = 500\,nm$

$E = n\frac{hc}{\lambda}$

$\Rightarrow 2{,}5 \cdot 10^{18}$ fotoner/s

Väte



Övergång mellan E_2 o E_1

$= -\frac{13{,}6}{2^2} - \left(-\frac{13{,}6}{1^2}\right) = 10{,}2eV$

$E_n = \frac{13{,}6}{n^2}$ eV , $n = 1, 2, 3 \ldots$ $\Rightarrow \lambda = 122nm$

Sannolikheten att hitta e⁻ $|i\rangle$ vid T

Boltzmann fördeln. $P_i = P_1 e^{-\frac{(E_i - E_1)}{k_B T}}$

$k_B T \approx \frac{1}{40}$ eV i rumstemp.

$T = 273 + 20 = 293k$

$\frac{P_2}{P_1} = e^{-\frac{(-3{,}4 + 13{,}6)}{k_B T}} = 4 \cdot 10^{-176}$