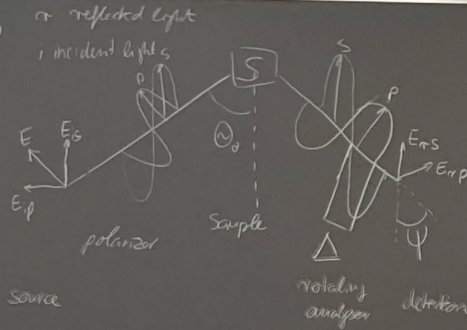


# Course 15 – surface characterization - ellipsometry-

amplitude ratio  $\Psi$   
phase difference  $\Delta$



$$v = \frac{c}{\lambda}$$

Complex refractive index

$$n^* = n + ik$$

$k$  extinction coefficient

$$n(\text{air}) \approx 1$$

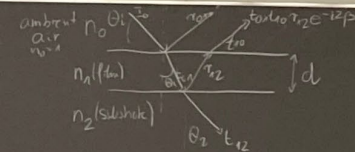
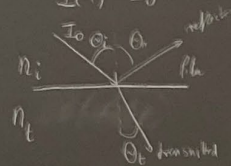
$\hat{=}$  loss of the wave energy

absorption coefficient

$$\alpha = \frac{4\pi k}{\lambda}$$

Beer's law

$$I(x) = I_0 e^{-\alpha x}$$



film phase thickness

$$\beta = 2\pi \left( \frac{d}{\lambda} \right) n_f \cos \theta_f$$

$$\Delta \equiv \delta_i - \delta_t$$

reflectance ratio

$$S = \tan(\Psi) e^{i\Delta} = f(\lambda, \theta, d, n^*)$$