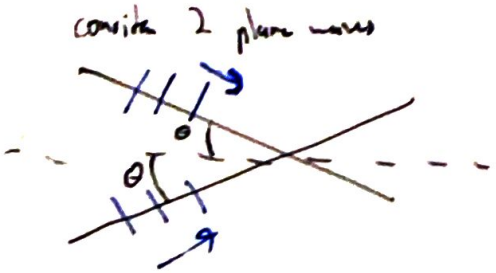
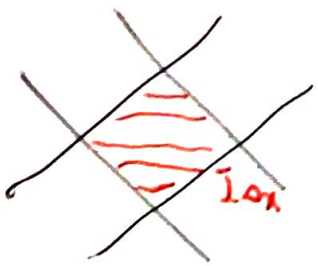


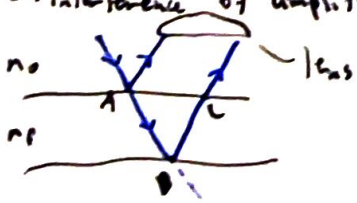
if $\Delta x \sin\theta = \frac{\lambda}{2}$ ⇒ constructive interference

so $\Delta x = \frac{\lambda}{2\sin\theta}$



Interference in dielectric films

↳ interference by amplitude division



To begin, normal incidence, ignore multiple reflections

$\Delta = n_s(2t)$

we figure the interference based on optical path difference

$(K(s_1 - s_2))$

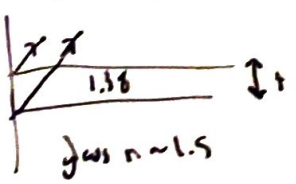
we may have phase changes on reflection: $n_f > n_0 \Rightarrow \pi$ phase shift
$n_s > n_f \Rightarrow \pi$ phase shift

} just like an extra half-wavelength $(\lambda/2)$

the phase shift due to the optical path difference is

$$\Delta\phi = k\Delta = k(2n_f t) = \frac{2\pi}{\lambda} 2n_f t$$

eg. if you wanted destructive interference with a film of MgF_2 on glass



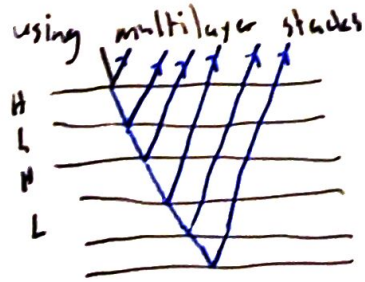
$n_{MgF_2} = 1.38$ @ 550 nm

need $2t\left(\frac{2\pi}{\lambda} n_f\right) = \pi$

don't need to worry about phase changes from reflection because you get 2π

$\Rightarrow t = 99.6$ nm

using multilayer stacks of dielectrics can get very high reflectivities



make these all interfere constructively

Start more complex than film interferometer

but just before that

Stokes' relations:

reflection coefficient transmission coefficient

$$r = \frac{E_r}{E_i}, \quad t = \frac{E_t}{E_i}$$