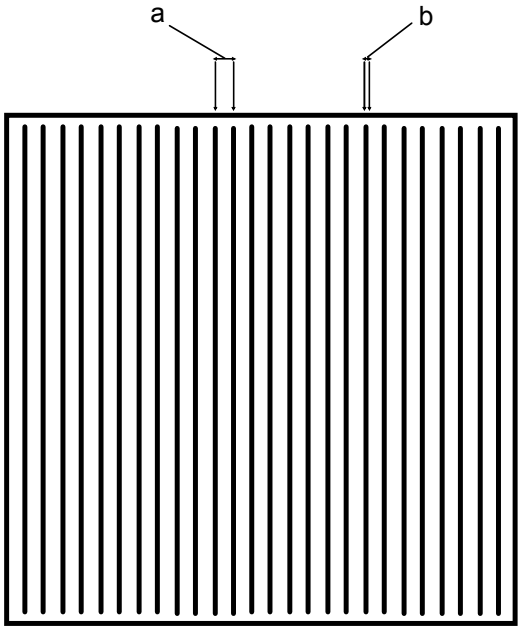


a = distance between slits

b = width of slits

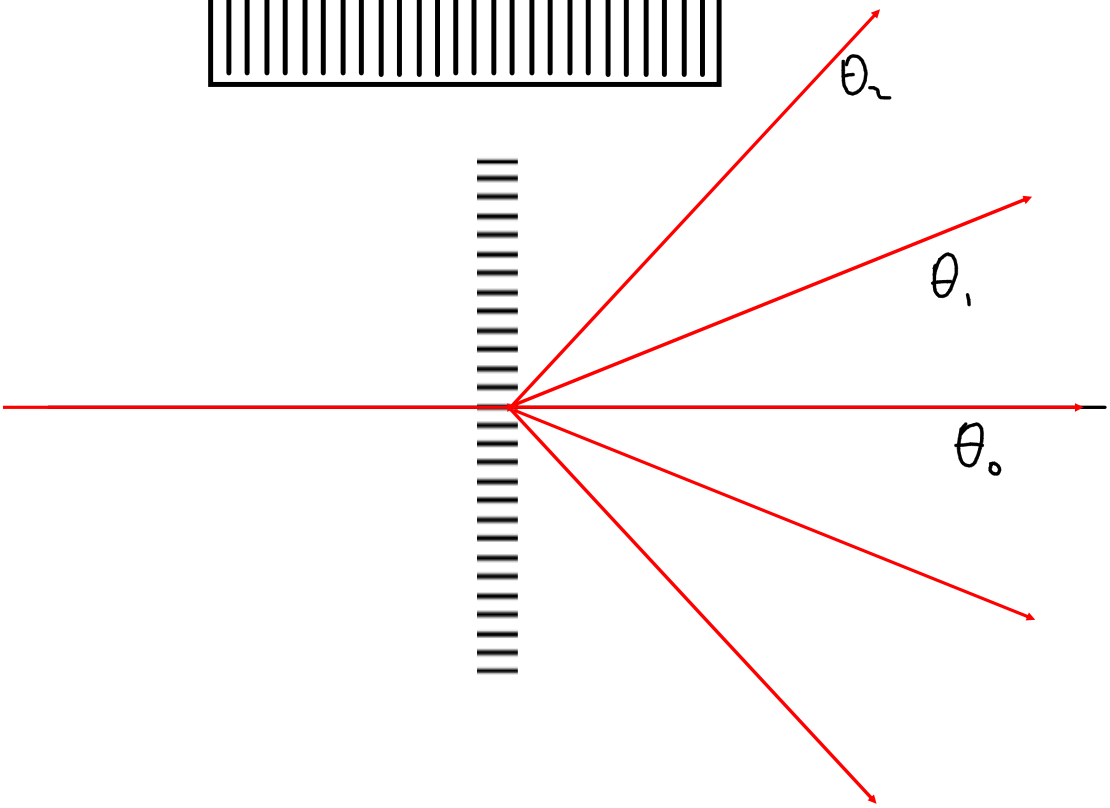
$N_{grat} = \frac{1}{d}$

grating equation:

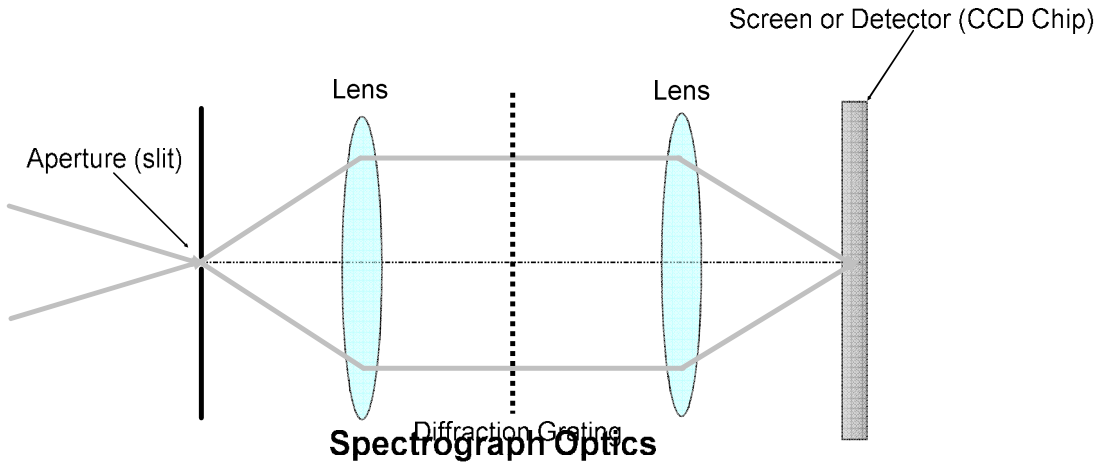
$$d \sin\theta_m = m\lambda$$

m = order of principal maximum

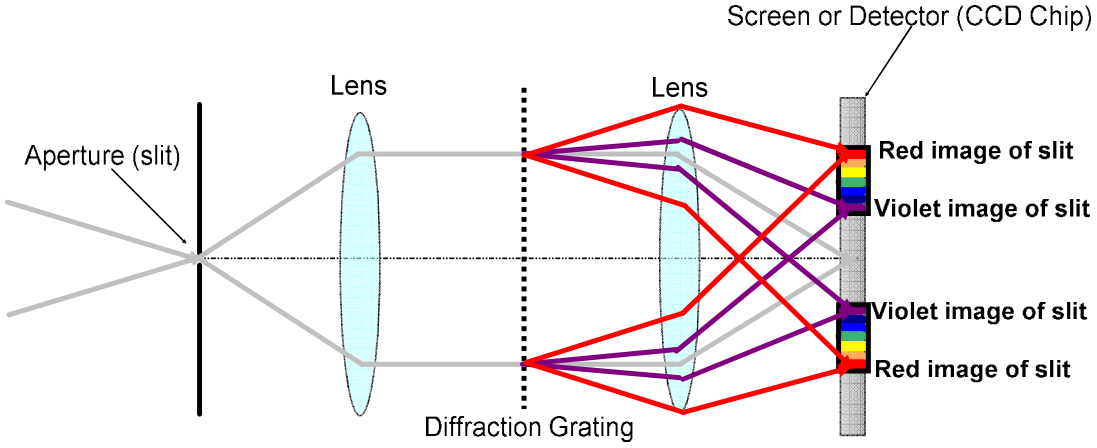
λ = wavelength



Spectrograph Optics



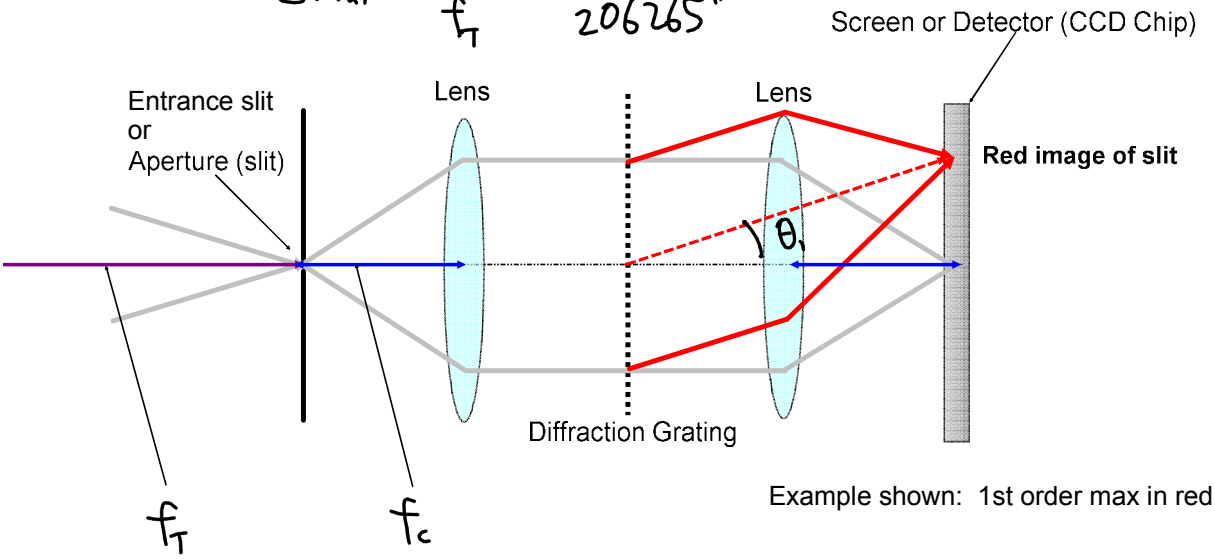
Spectrograph Optics



Entrance slit linear width: Δw

Spectrograph Optics

Entrance slit angular width: $\Delta w_{rad} = \frac{\Delta w}{f_T} = \frac{\Delta w''}{206265''}$



Example shown: 1st order max in red light

f_T focal length of telescope

f_c focal length of collimating lense

Limit of spectrograph resolution: $\Delta\lambda_{min}$

(minimum resolvable wavelength difference)

Equation for limit of spectrograph resolution:

$$\Delta\lambda_{min} = \frac{dw''}{206265''} \frac{f_T}{f_c} \frac{\cos\theta_1}{M_{grat}}$$

$\Delta w''$ = slit angular width (at telescope focal plane)

M_{grat} = lines/mm of grating (note: this means the wavelength units are in mm)