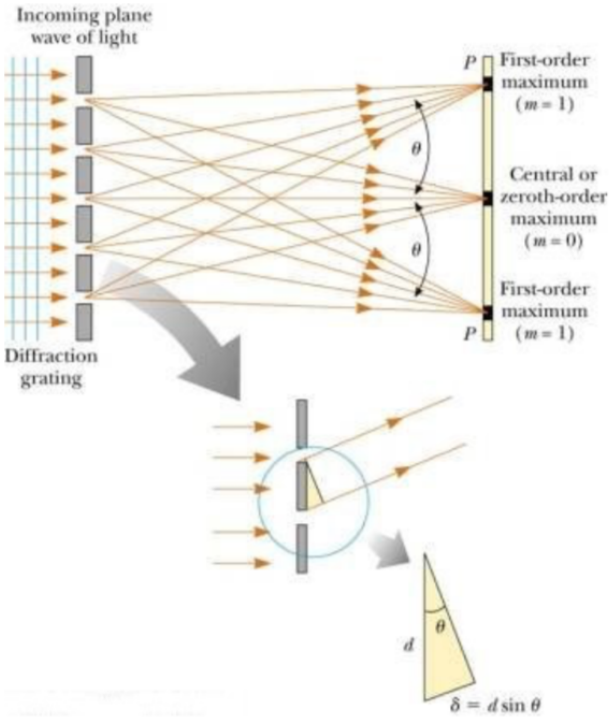
Lab 6 Spectrum of Mercury Tasks

Lab report due next Saturday by 5pm

The constructive interference of light passing through a diffraction grating produces intensity maxima at certain angles relative to the grating. The relationship between the spacing of the grating slits d, the angle at which the maxima are observed θ, and the wavelength of the constructively interfering light λ is given by $d \sin\theta = m\lambda$, where m is an integer index known as the "order" of the interference (see Halliday, Resnick, & Walker for a proof of this relation).

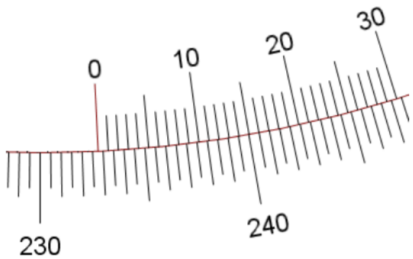


1. Use the intensity maxima produced by 589.3 nm yellow light from a sodium lamp to find the spacing of the supplied diffraction grating. Average the angles for corresponding orders on each side of the central maximum, make at least 3 distinct measurements of d and calculate the mean and standard error of your results.

2. Use the result for d from 1. to calculate the wavelength of at least 5 different color spectral lines from a mercury lamp. Again average the angles for corresponding orders. For each color you should find the wavelength from at least 3 different orders if possible. Use these measurements to find the average wavelength and standard error of each color. Compare your results with values for spectral lines in mercury found at

   `https://physics.nist.gov/PhysRefData/Handbook/Tables/mercurytable2.htm`

   and comment on sources of uncertainty that may account for any discrepancies.



Vernier scale reading an angle of 232° 46 ' (232 degrees, 46 minutes), or 232 + 46/60 = 232.766667°.