

Phys 375 - Homework #7

1) (3 points) The grating in your lab spectrometer is misaligned so that the incoming beam of light has an angle of incidence of one degree. The true normal to the grating points to 56 degrees on the angular scale marked on the telescope side of the spectrometer. If the wavelength of the light is 589 nm (one of the lines of the sodium yellow doublet), and the grating spacing is 1.6 microns, at what angular positions will you find the peaks for orders -1, 0, and 1?

2) (3 points) What is the angular separation in second order between light of wavelengths 400 nm and 600 nm when diffracted by a grating of 5000 grooves/cm?

3) (3 points) Find the wavelengths emitted by the Hydrogen atom for the three transitions between $n = 2, 3,$ and 4 and the ground state ($n = 1$). In what part of the electromagnetic spectrum do these wavelengths lie?

4) (3 points) Repeat question 3 for transitions from $n = 3, 4, 5,$ to the $n = 2$ state.