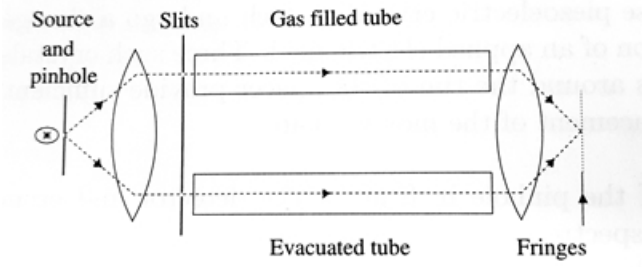
Homework #6 (due Oct. 7)

Each problem is 10 points

Problem 5.4: Two optical flat glass plates are viewed in light of wavelength 633mm. Straight line fringes are seen, spaced apart at intervals of 1.5cm across the surface. What is the angle between the plates?

Problem 5.7: The figure shows a Rayleigh refractometer. Light from coherently illuminated slits goes through separate hollow airtight arms of length *L* each with glass entry and exit windows. The separate beams are brought together by a lens with fringes appearing in the image plane. Both arms are initially evacuated and gas is introduced slowly into one arm. This causes the fringes to move across the field of view; up or down in the diagram. If *m* fringes pass through the center of the field while the gas is entering, show that the refractive index of the gas, *n*, is given by $n-1= m\lambda/L$?



Problem 6.7: If a diffraction grating is immersed in water how does this change the angular position of the maxima?

Problem 6.8: If alternate slits of a grating are covered with a later of transparent material that has an optical thickness 0.5 wavelengths longer than that of the same thickness of air what will be the effect on the diffraction pattern?

Special problem. Take a picture of a thin film/bubble (soap, oil, any other material) that is approximately 120nm thick (you can just point out of a specific area of the film that is that thick). You will need to lay down the argument why you think so. E-mail me the picture, if it is easier than print it out.