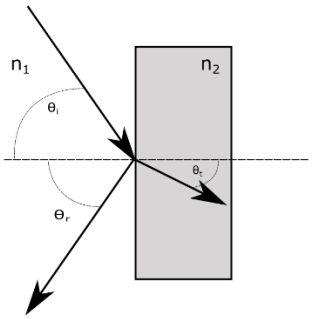
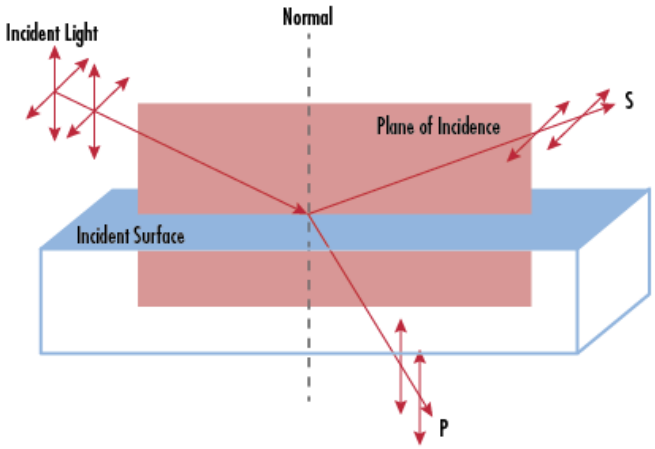
Lasers: Transmission, Reflection, and Polarization

Two of the fundamental interactions light can have with a material interface are transmission and reflection. The light either bounces off the surface or goes through it. For example, think of light reflecting off a mirror, or how you can see through a clear glass window. Both of those phenomena are affected by the polarization of the light. Polarization refers to the plane that the electric field of an electromagnetic wave oscillates in.

Assorted Notes and Facts for the lab:





Law of reflection: The angle at which the light strikes the surface, relative to the normal, is the angle at which the light is reflected.

$$\theta_i = \theta_r$$

Law of transmission: The angle at which light is transmitted into one medium from another is dependent on the angle that the light strikes the surface and the index of refraction of the two materials

$$n_1 \sin(\theta_i) = n_2 \sin(\theta_2)$$

The **Brewster angle** is the angle at which components of the light polarized parallel to the plane of incidence is completely transmitted into the medium.

$$\theta_B = \arctan\left(\frac{n_2}{n_1}\right)$$

Questions:

1) Why does the transmission angle of the two lasers differ even though they enter at the same angle into the same medium?

2) Why do you see your reflection on windows at night, but not during the day?

3) When you look at your phone screen with the polarizing filter does it look different? Why or why not?

4) How could you figure out what polarization a laser or other light source has if you lost your polarizer?