

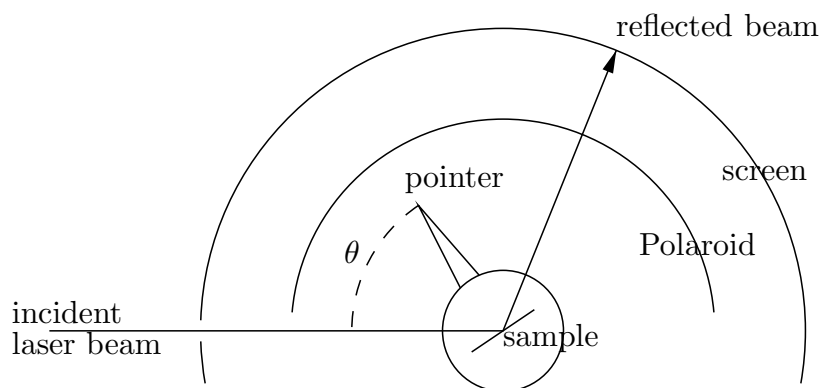
Lab #10

Brewster's Angle

In this lab, you will measure the Brewster angle for two different materials. From these measurements, you will then calculate the index of refraction for each material.

As shown in the figure below, a laser beam is directed towards the flat surface of a sample. The sample is mounted on a platform which can be rotated. The pointer attached to the platform points in a direction perpendicular to the surface of the sample. The incident angle θ of the beam can be read from a scale on the apparatus.

The reflected beam passes through a sheet of Polaroid and hits a white screen. The transmission axis of the Polaroid is horizontal. When the angle of the incident beam is equal to the Brewster angle, the reflected beam is polarized vertically and thus will not pass through the Polaroid. At this angle, the illuminated spot on the screen will disappear. (Actually, since the sample and the Polaroid are not ideal, the spot will not disappear completely, but will have a minimum intensity.)



There are two samples. One is ordinary glass, and the other is zirconium oxide (ZrO_2). First insert the glass into the sample holder. Rotate the sample platform and find the orientation where the reflected beam has a minimum intensity. Be sure that the Polaroid sheet is in place so that the reflected beam passes through it. Read the incident angle from the scale and record it below. This is the Brewster's angle θ_p . Determine the index of refraction from $n = \tan \theta_p$ and record it below. Repeat this for the ZrO_2 sample.

Warning: Do not touch the sample surfaces. Finger prints on the samples will affect your measurements. Wipe off any finger prints with the tissues provided.

Glass sample: $\theta_p =$ _____ $n =$ _____

ZrO_2 sample: $\theta_p =$ _____ $n =$ _____

When you are finished, remove the Polaroid sheet and notice how intense the reflected beam is. Then place a small circular Polaroid sheet in the path of the reflected beam and observe how its intensity changes as you rotate the sheet.