



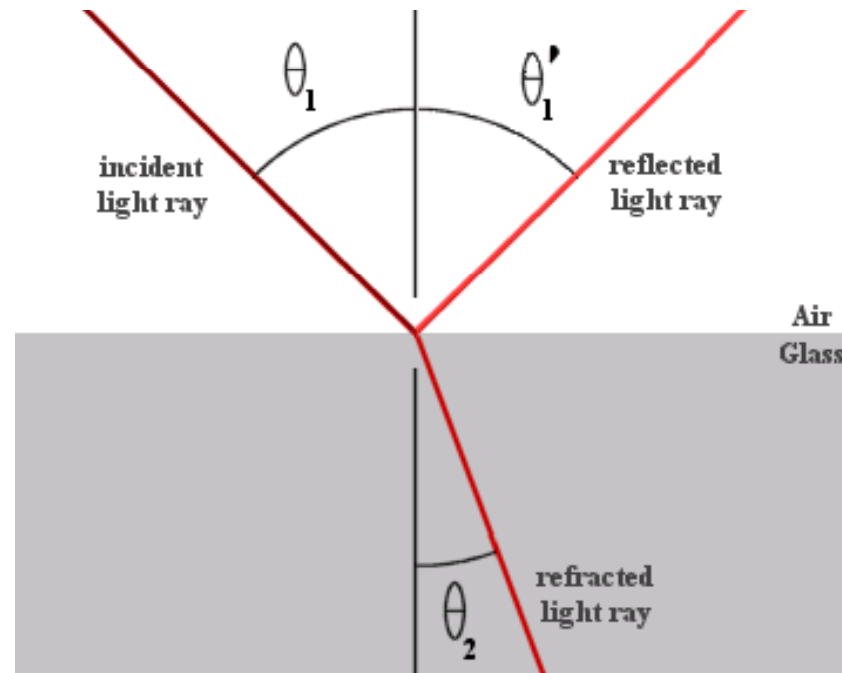
Reflection and Refraction

Tony Hyun Kim
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6.161: Lab 1

Topics to be discussed

- Geometric reflection and refraction, Snell's law
 - (*Experiment 1.6*)
- Polarization dependent *reflectivity*, R
 - (*Experiment 1.5*)
- Explanation of the angular dependence of R

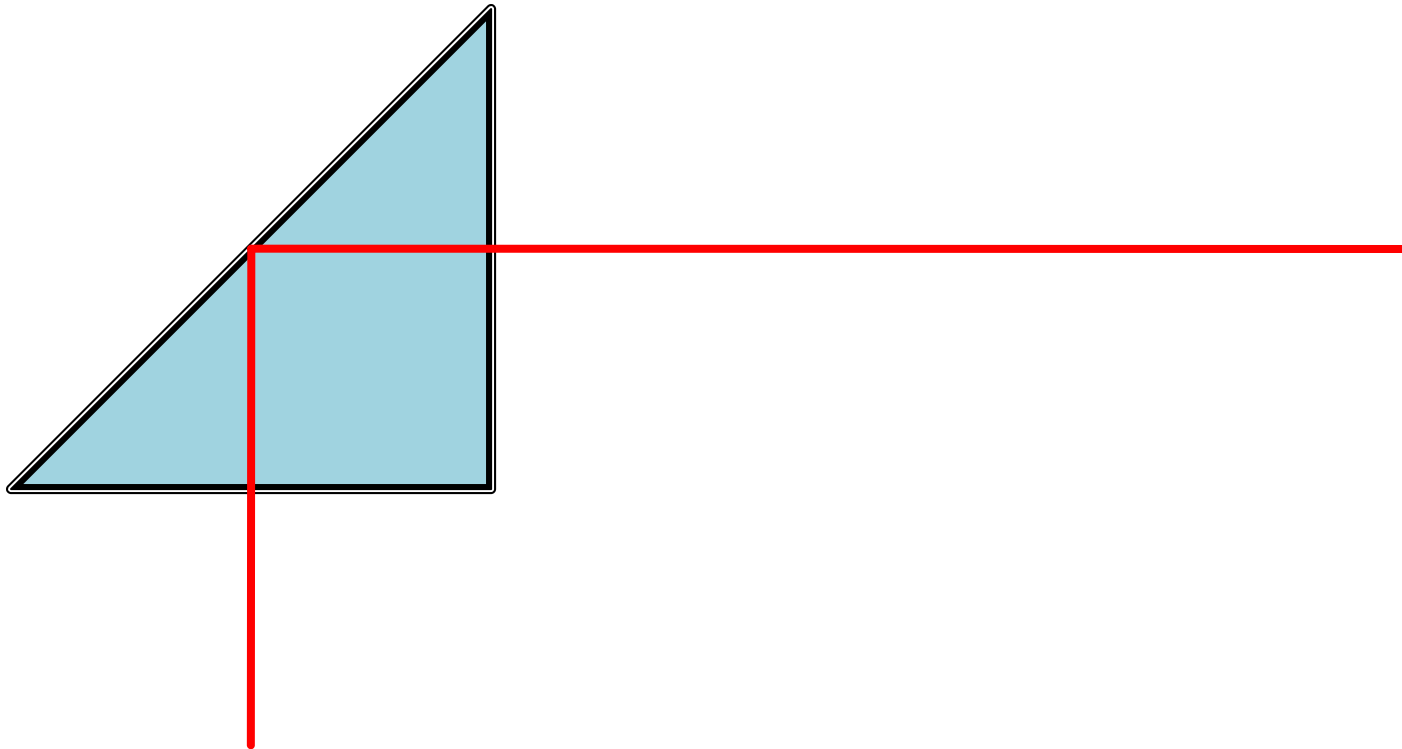
Reflection and refraction at a boundary



- Incident angle = Reflected angle: $\theta_1 = \theta_1'$
- Refracted angle obeys Snell's law: $\sin \theta_1 = n \sin \theta_2$

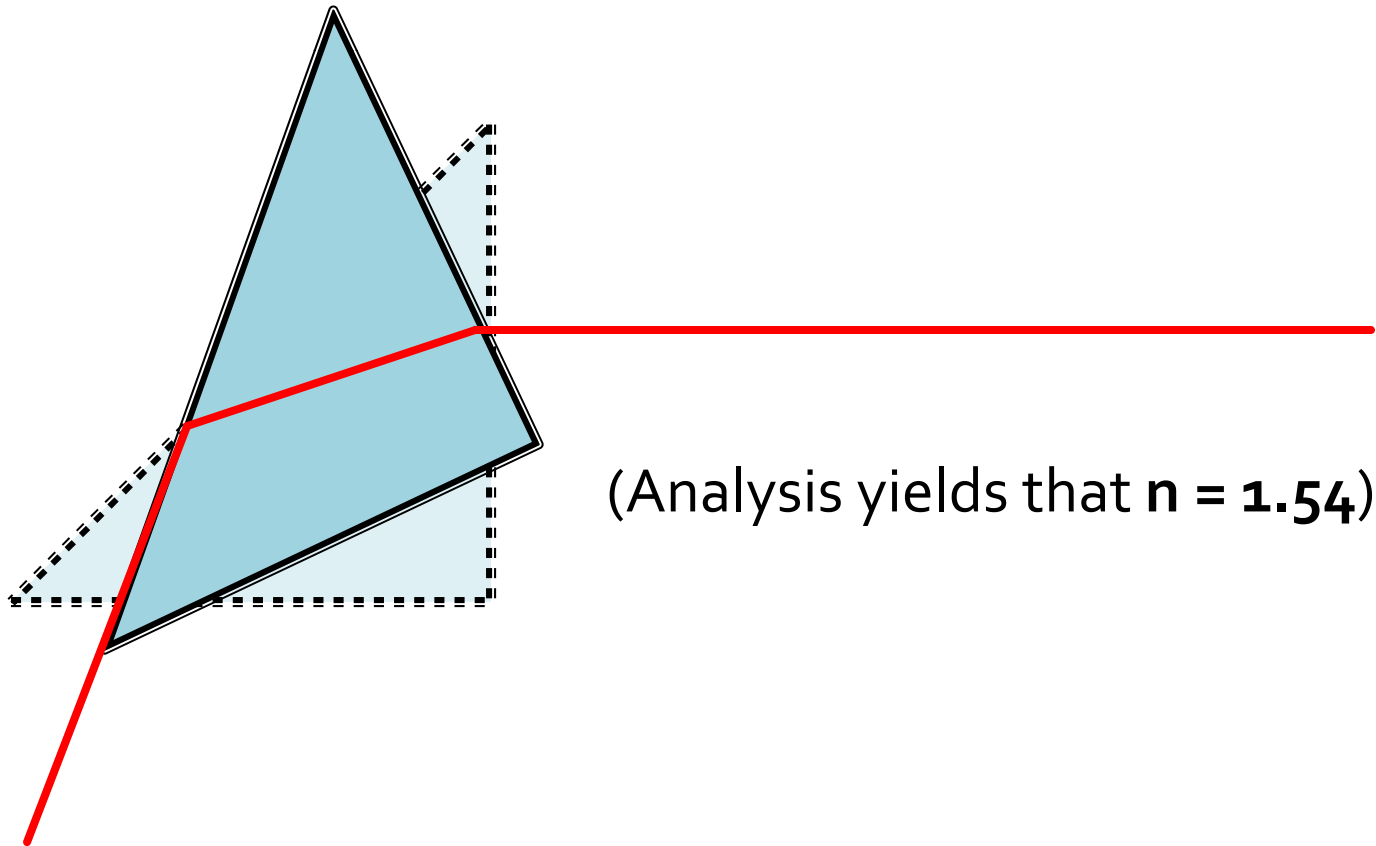
Analysis of prism (Expt. 1.6)

- Can calculate the index of refraction, n :



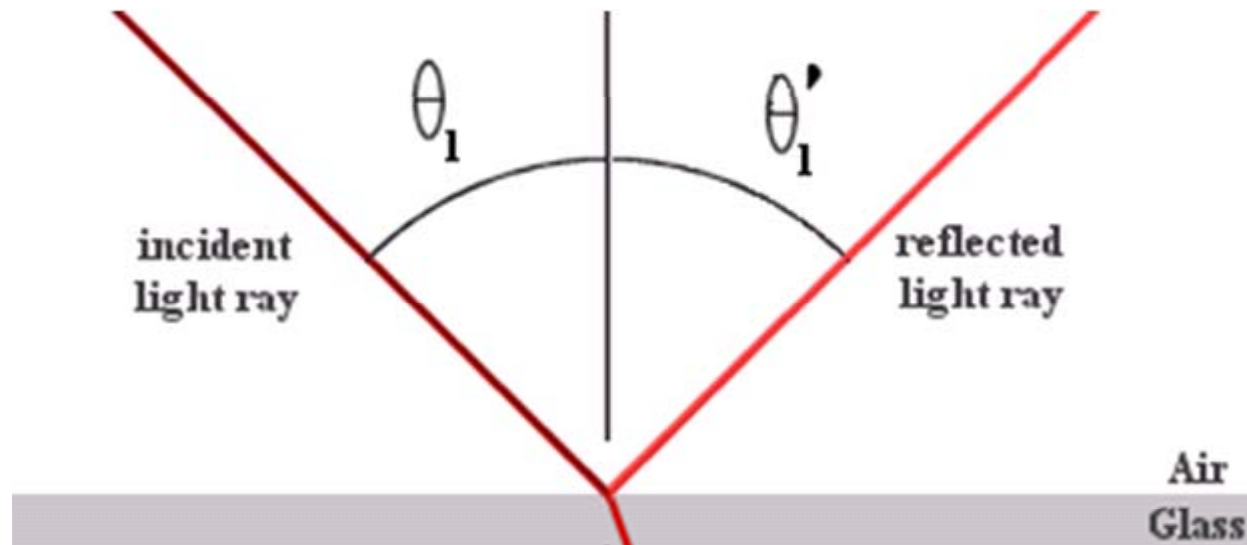
Analysis of prism (Expt. 1.6)

- Tilt prism \rightarrow output beam grazes hypotenuse



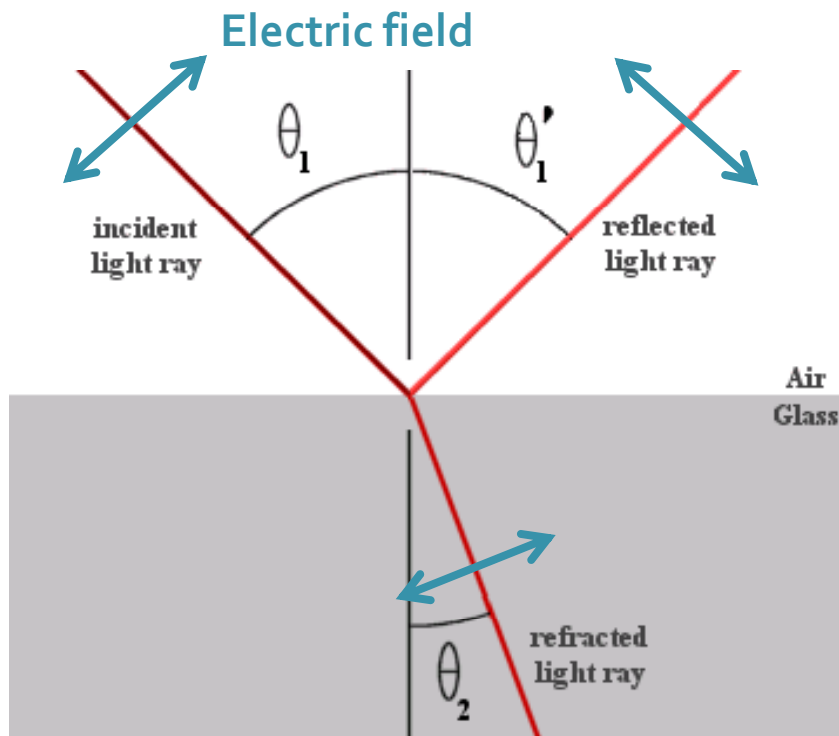
More detailed analysis of reflection

- The reflected angle is simple:

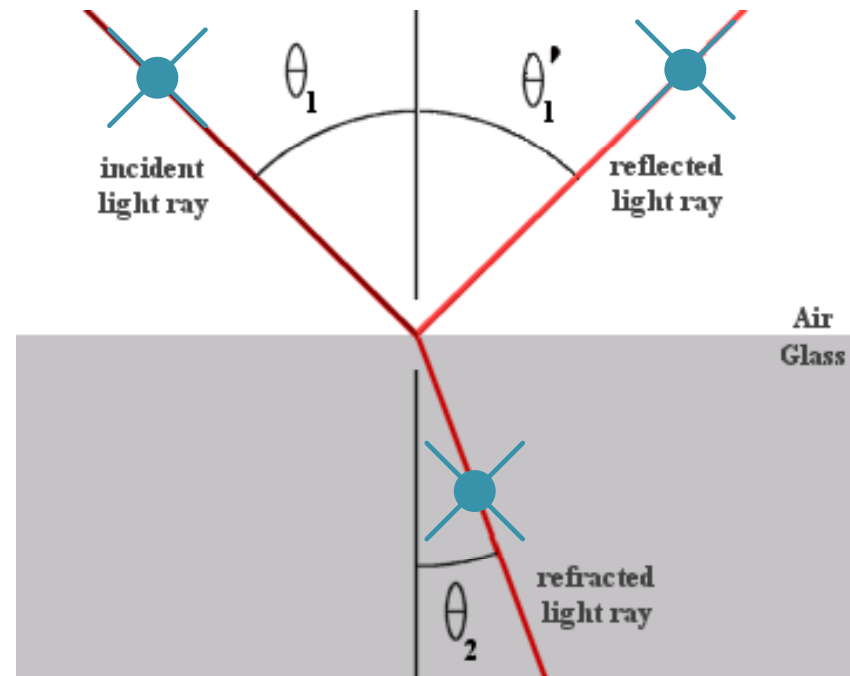


- However, intensity of reflected beam is complicated!

Reflectivity depends on polarization of light

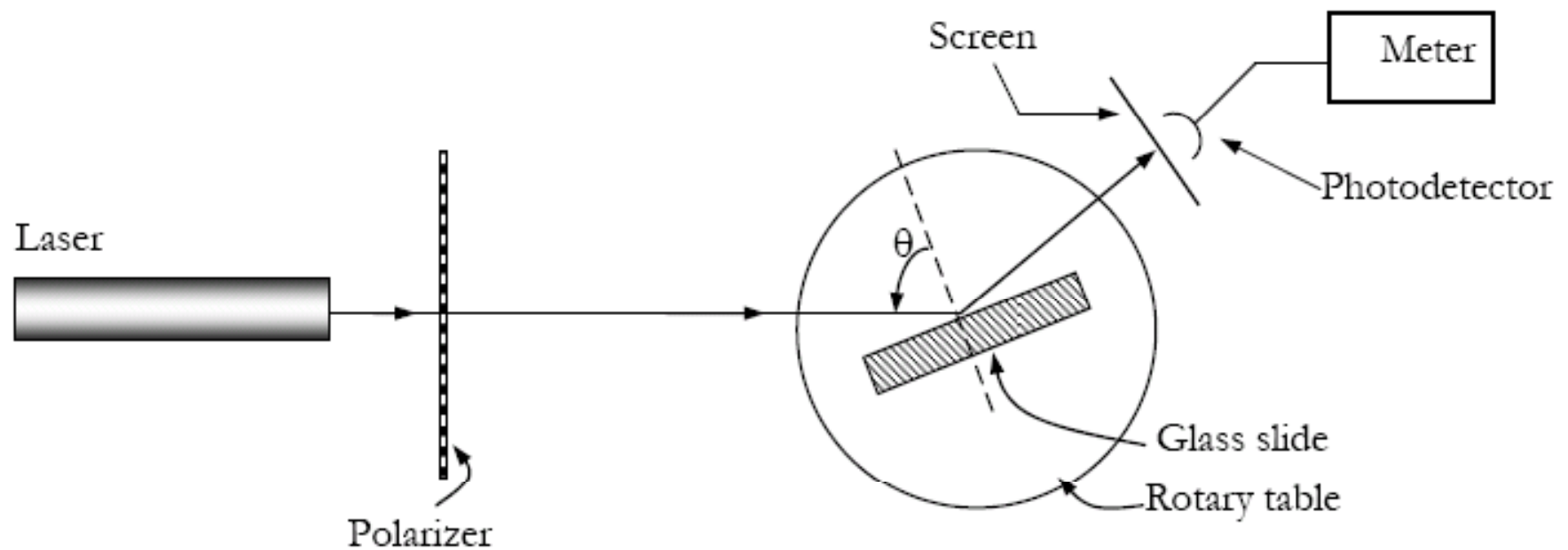


“Transverse magnetic”
 (“Horizontal”)



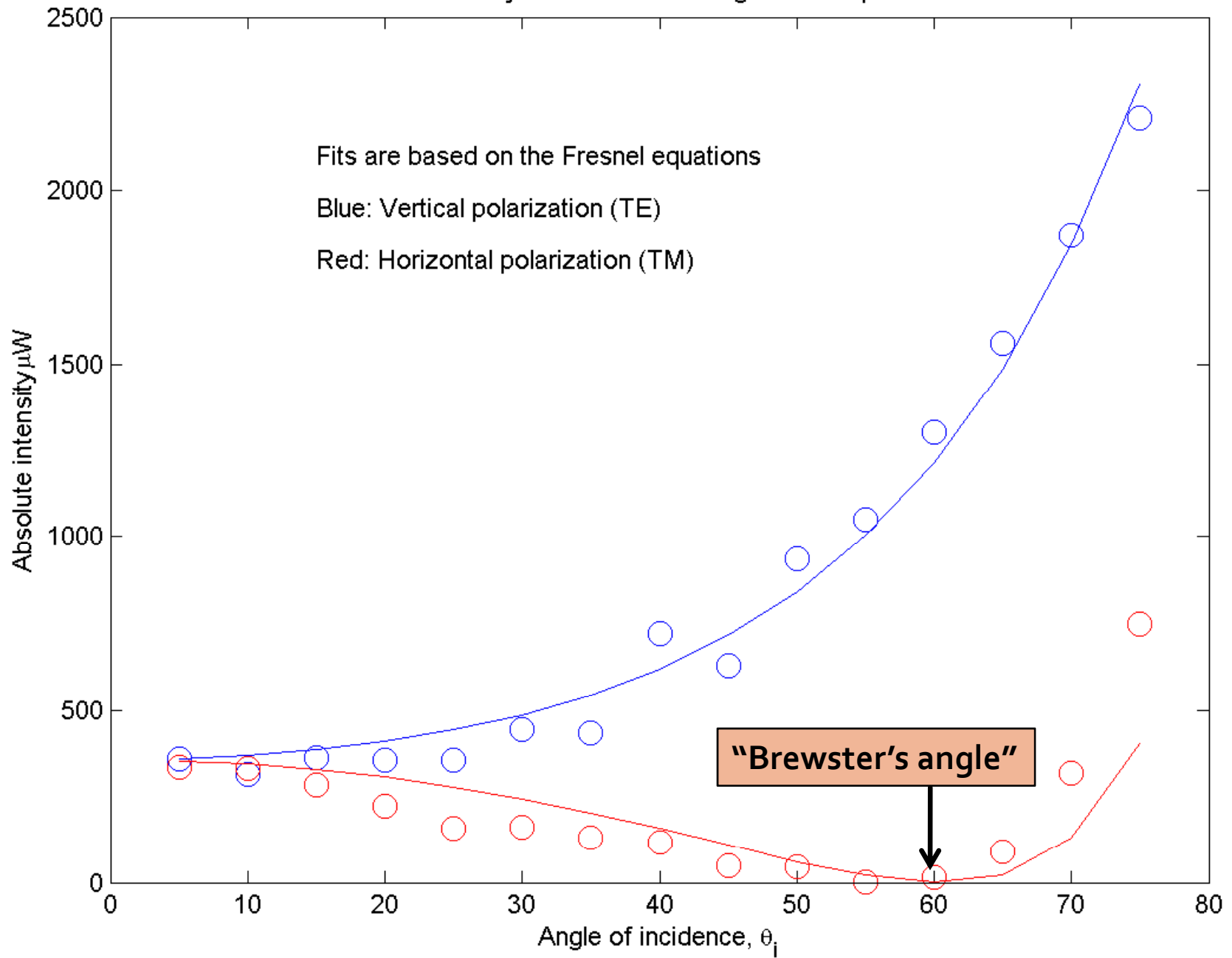
“Transverse electric”
 (“Vertical”)

Experimental setup



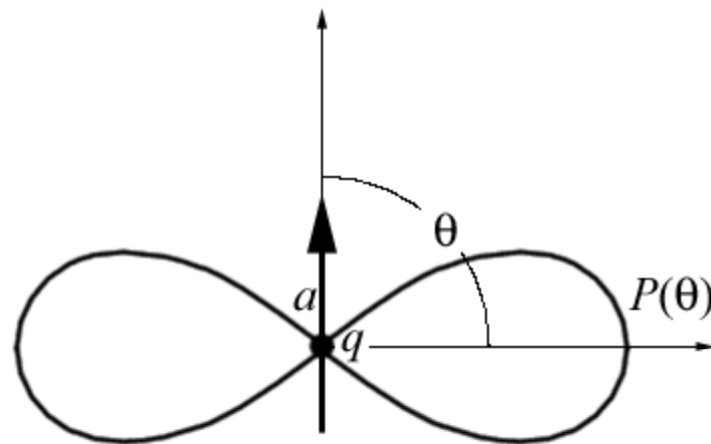
Experimental setup to demonstrate Brewster's angle.

Reflected intensity as a function of angle of both polarizations



Explanation of the angular dependence

- The full treatment involves Maxwell's equations applied to an interface.
- Dipole oscillations can give qualitative intuition for Brewster's angle.



Brewster's angle

