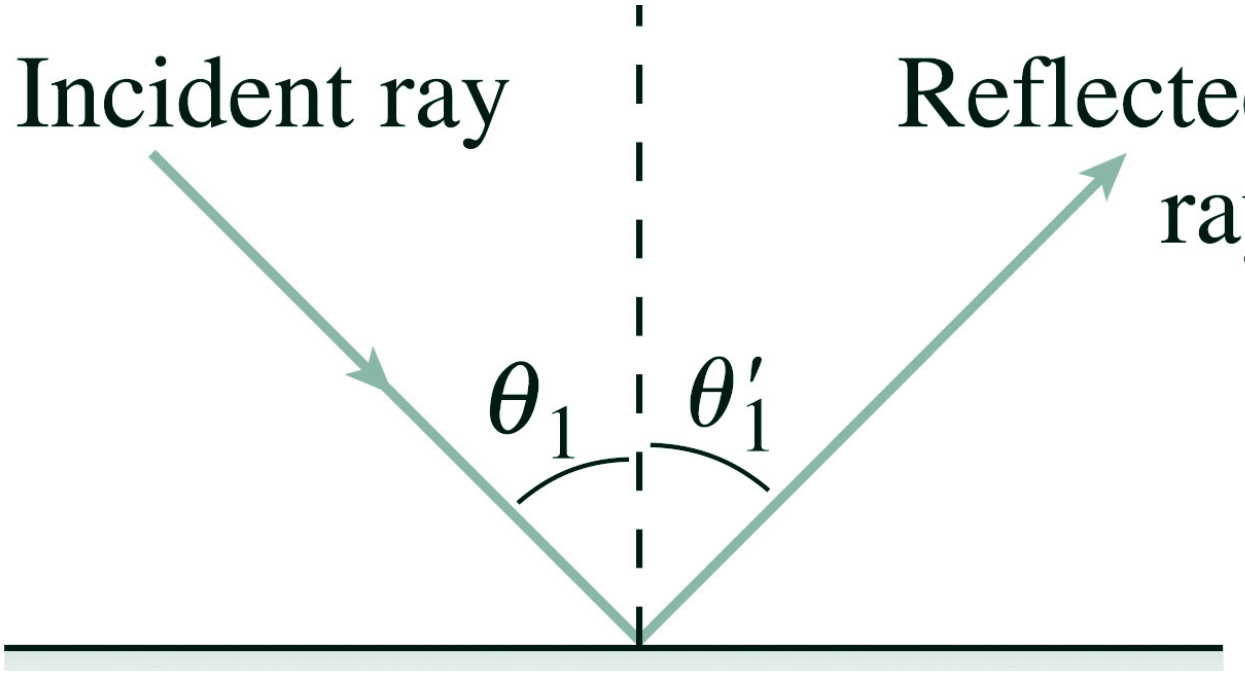
Chapter 30: Reflection and Refraction
Thursday November 17th

- **V. IMPORTANT: Final exam will be in HCB103/316**
  - **There will be assigned seating (TBA)**
- **Check your exam scores online**
- **Still 50 unregistered *i*Clickers, some with excellent scores!**

- Reflection and Refraction (Ch. 30)
  - Review: wave reflection from an interface
  - Review wave transmission through an interface (refraction)
  - Snell's law
  - Total Internal reflection
  - Brewster's angle
  - Dispersion

Reading: up to page 540 in the text book (Ch. 30)

Review: Wave Reflection (Ch. 30)



$$\theta_1' = \theta_1$$

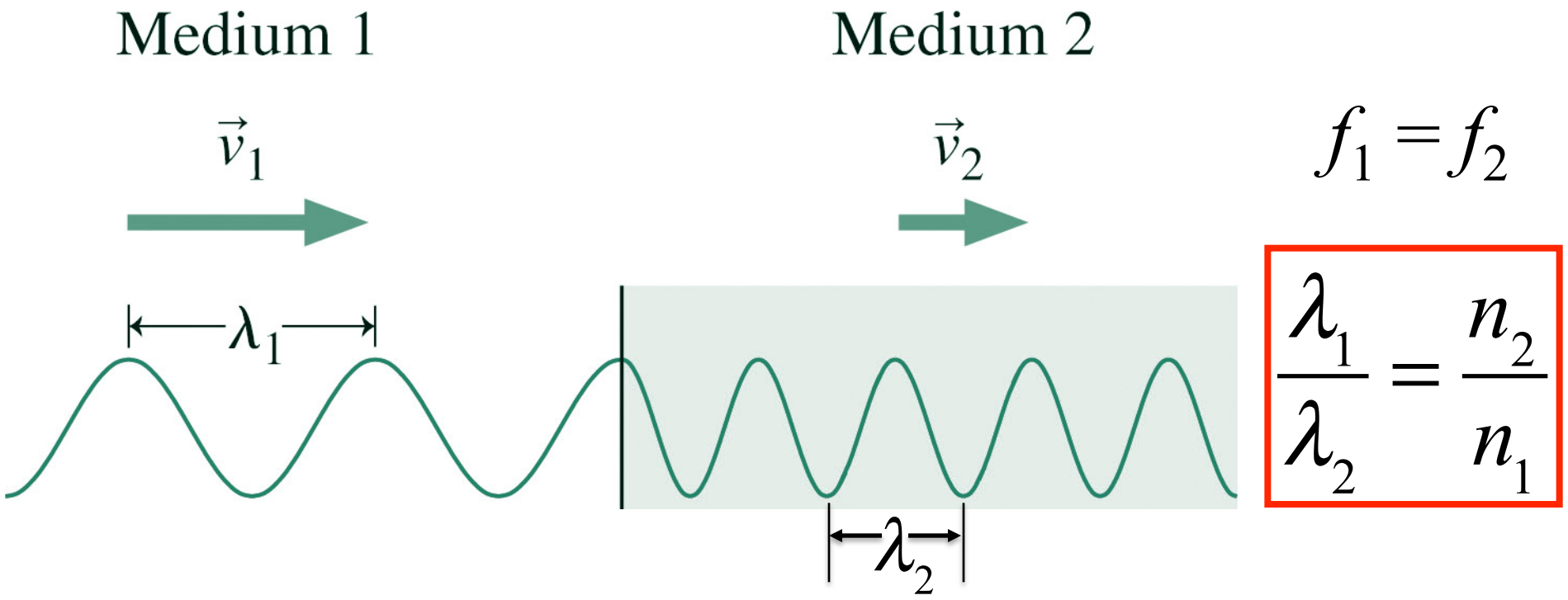
- There are a number of different ways to rationalize this, both in terms of the wave- and particle-like nature of light.
- The latter involves conservation of energy/momentum, i.e., just like a perfect elastic collision between a billiard board and the rail.

Review: Refractive index

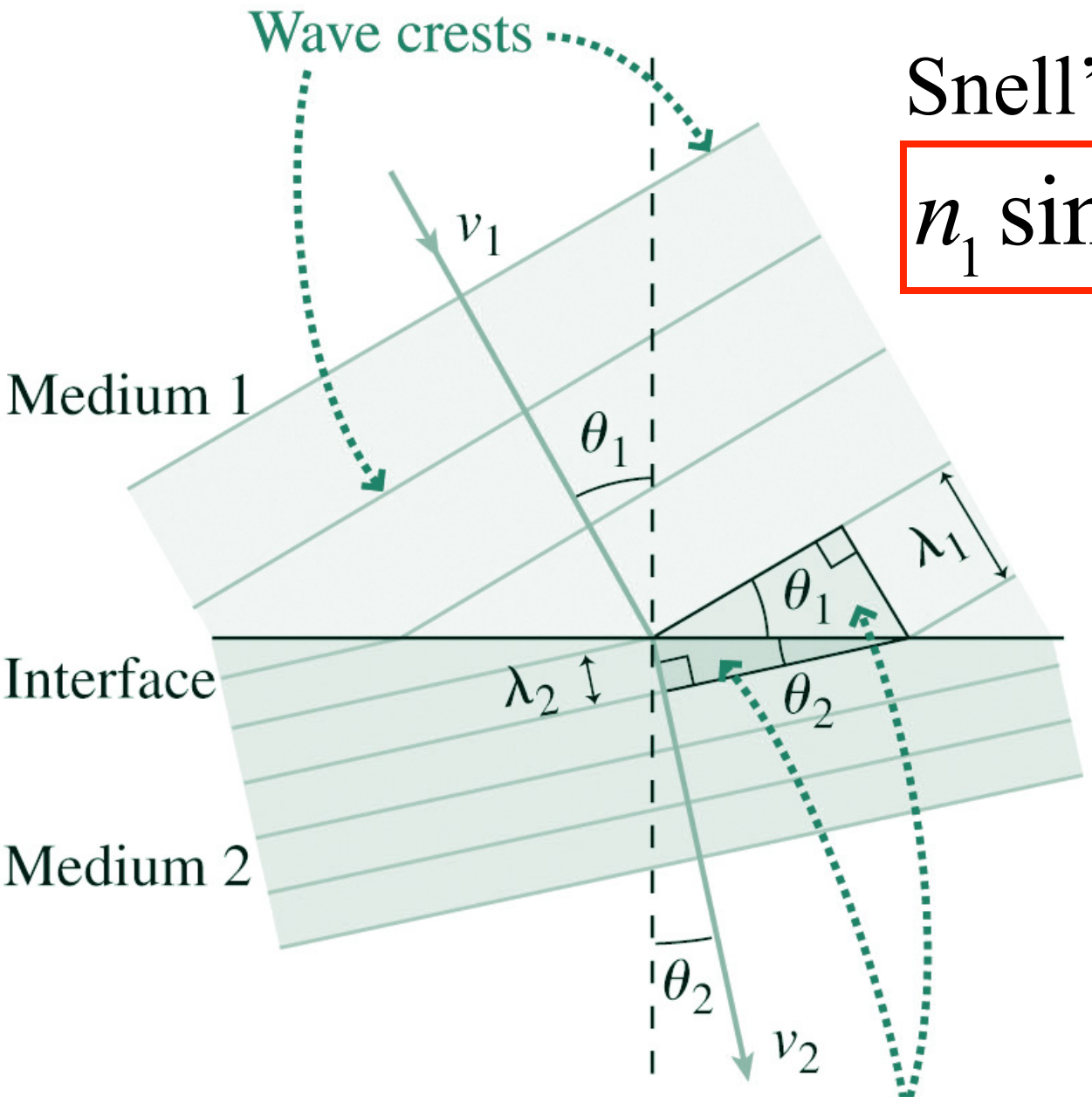
When a wave travels into a medium other than vacuum, the constants ε_o and μ_o are modified by their permeabilities κ_e and κ_m, thus the speed of the electromagnetic wave is given by:

$$v = c\sqrt{\frac{1}{\kappa_e \kappa_m}} = \frac{c}{n}$$

where $n = (\kappa_e \kappa_m)^{1/2}$ is called the refractive index of the material.



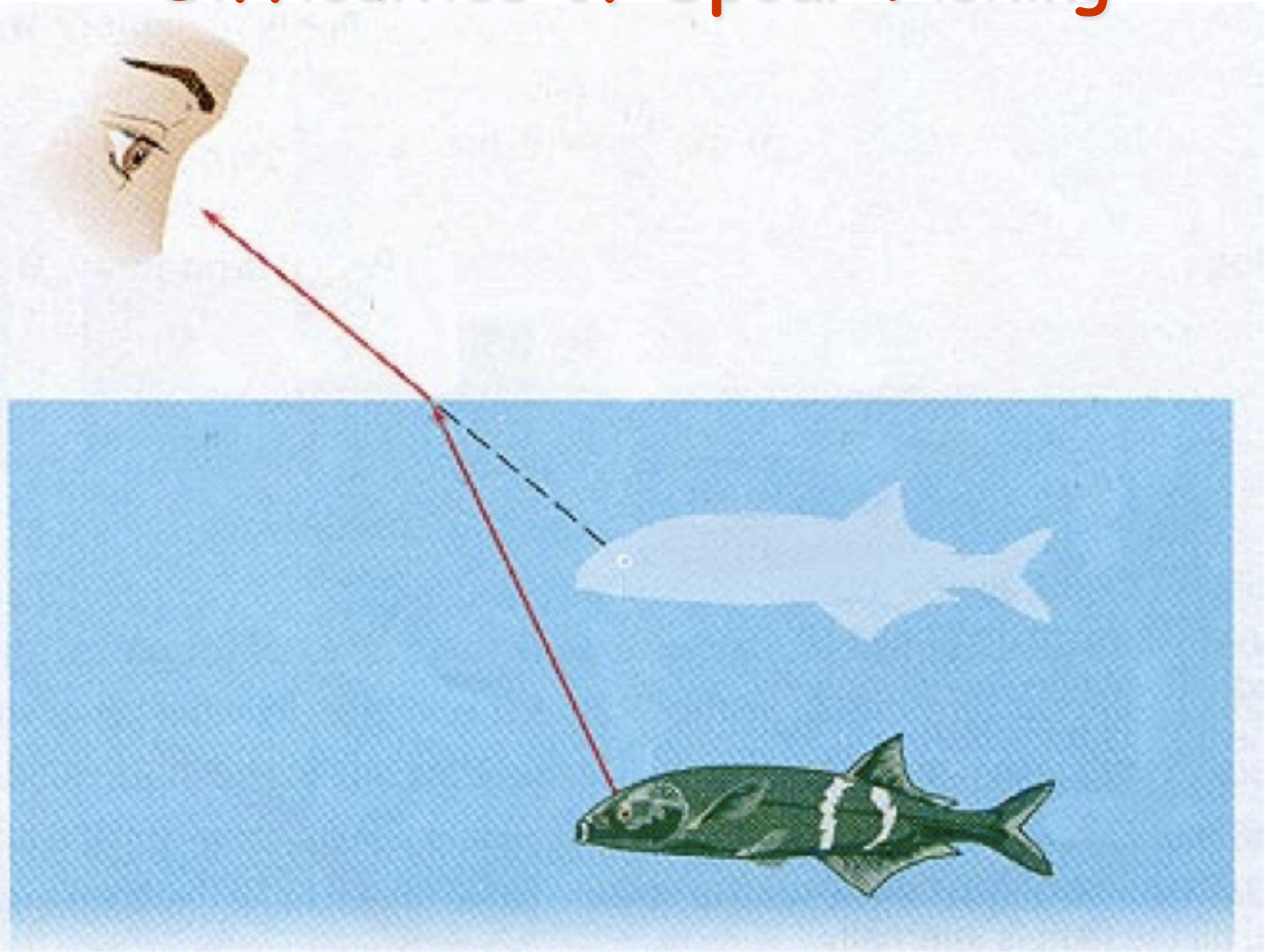
Refraction and Snell's law



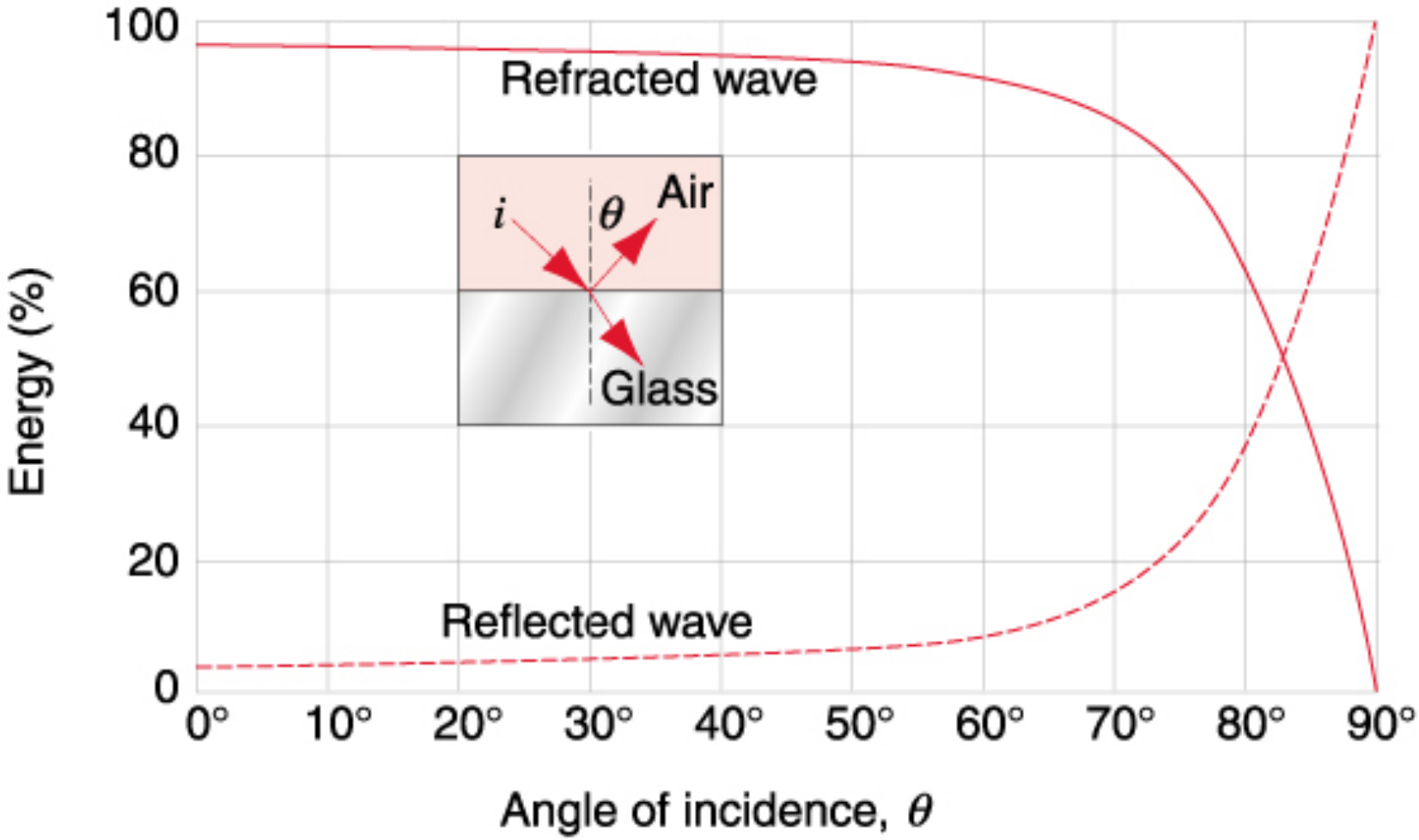
Snell's law:

$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

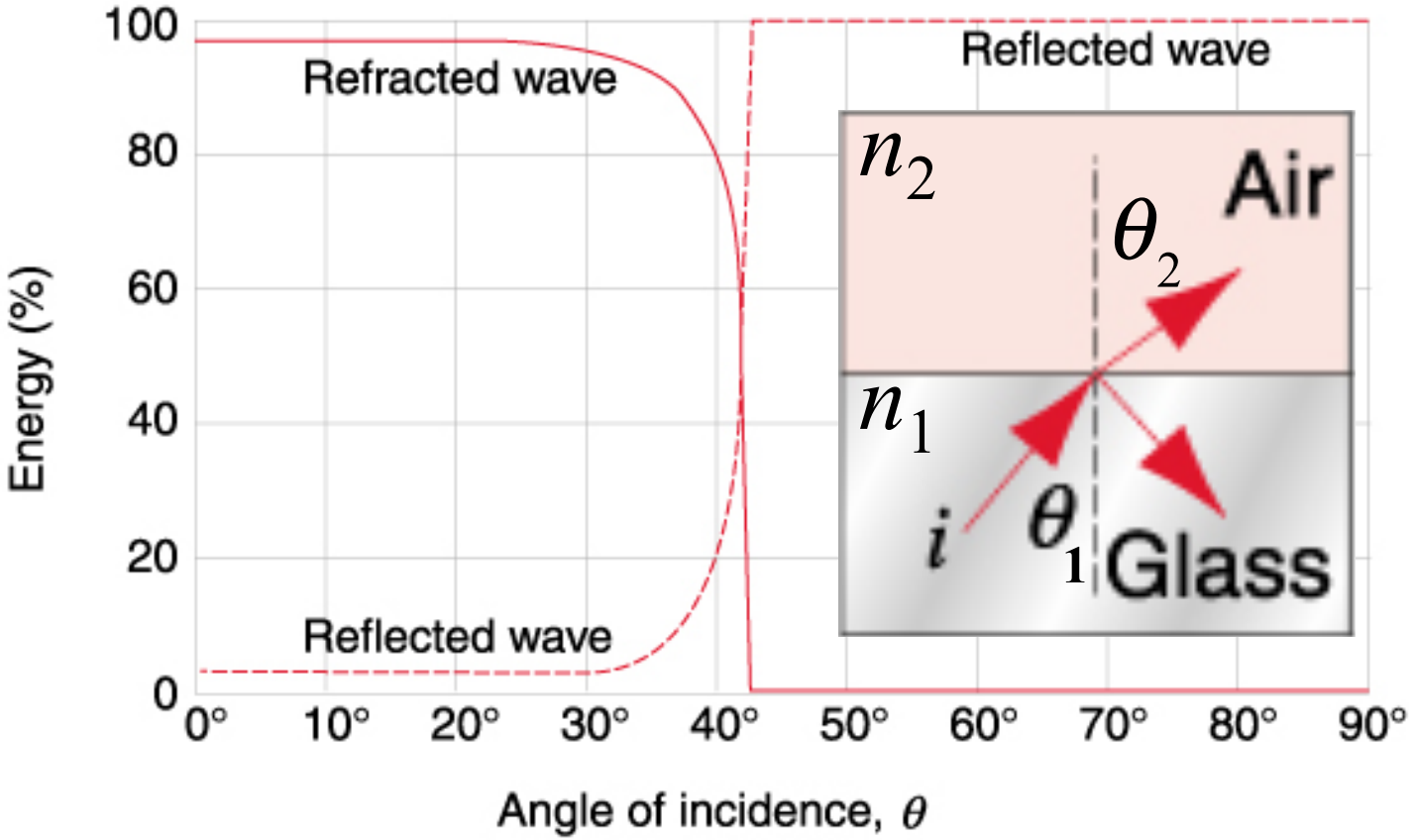
Difficulties of Spear Fishing



Refraction and total internal reflection

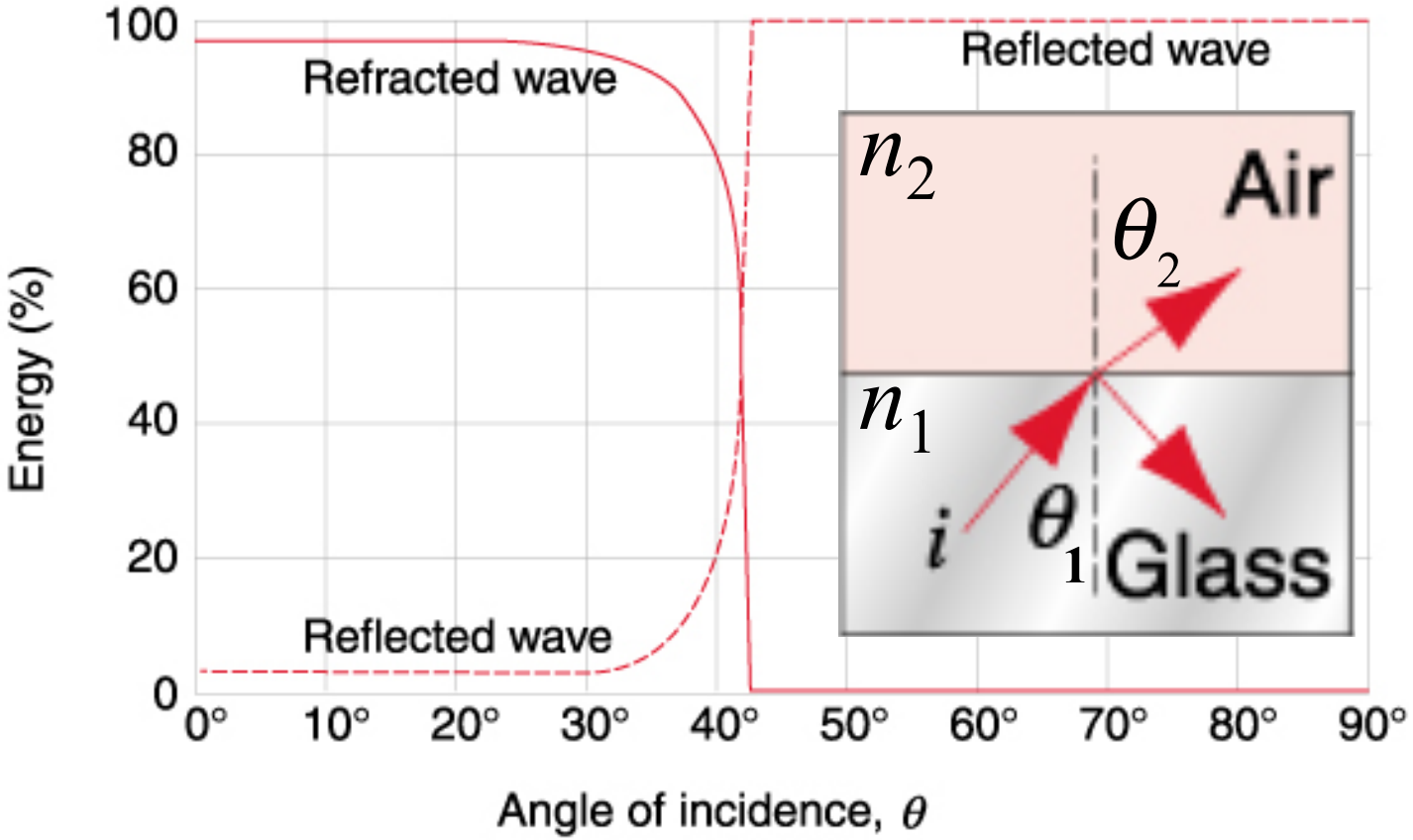


Refraction and total internal reflection



$$\sin\theta_2 = \frac{n_1}{n_2}\sin\theta_1 > 1 \text{ for } \theta_1 > \theta_c$$

Refraction and total internal reflection

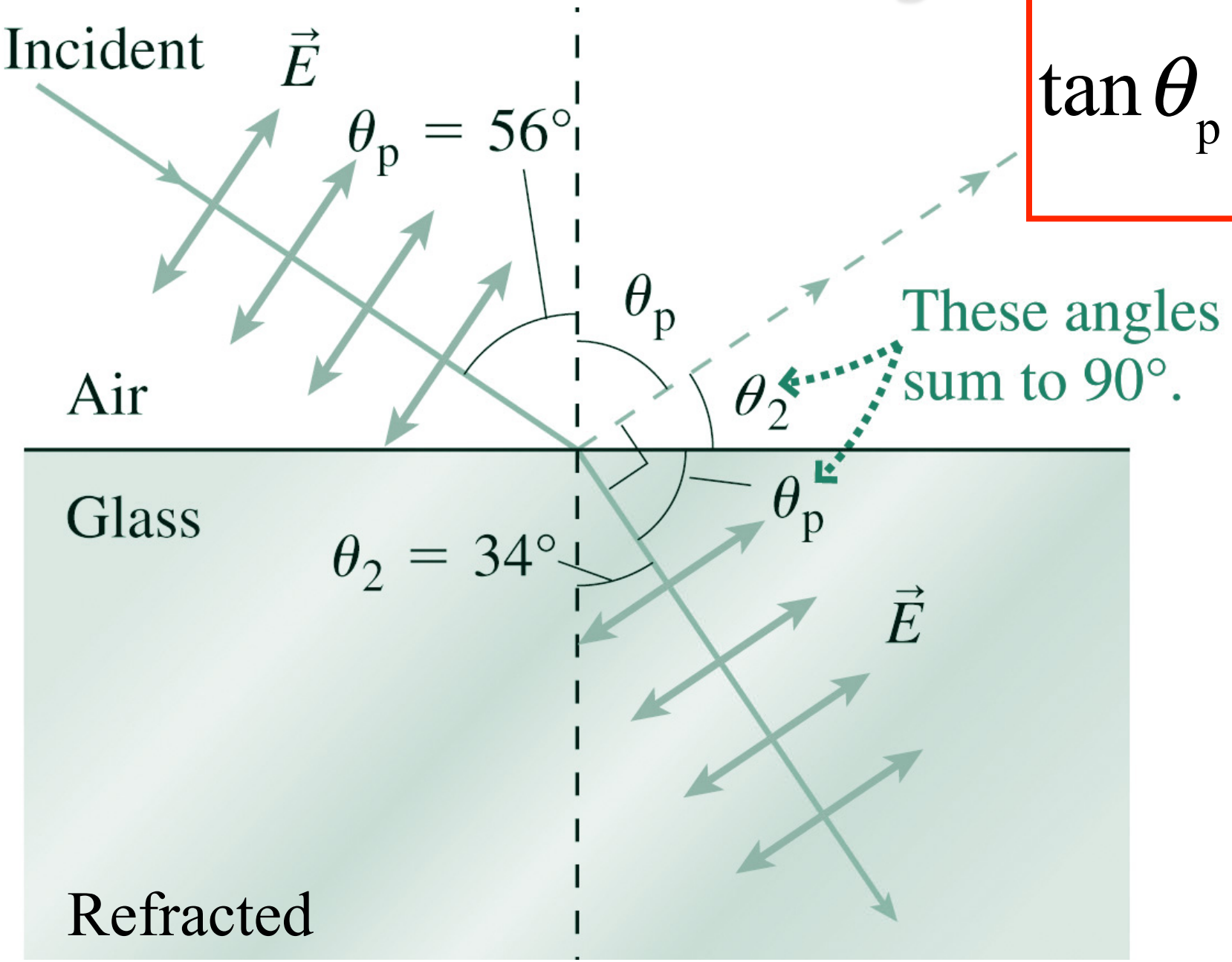


$$\sin\theta_c = \frac{n_2}{n_1}$$

Critical angle for total internal reflection

Brewster's angle

$$\tan\theta_p = \frac{n_2}{n_1}$$



Refraction and dispersionc