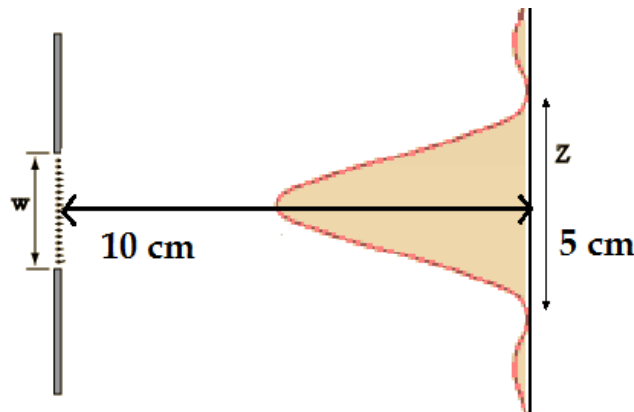


ME 498 Homework #2 Due 9/13

- 1) What is Brewster's angle? Derive the equation for Brewster's angle starting with Snell's law. Calculate Brewster's angle for air/quartz, air/sapphire, and air/plexiglass interfaces at 500 nm.
- 2) Instead of using \mathbf{E} and \mathbf{B} vector fields, the EM field is often represented by the scalar and vector potentials ϕ and \mathbf{A} . How are these defined? What is a gauge? What are the characteristics of the Coulomb gauge? Write the equation for the vector potential of a plane EM wave of frequency ω .
- 3) Under what conditions do we use h vs. \hbar when calculating energy or momentum?
- 4) A narrow slit is illuminated by a red Helium Neon laser. On a surface 10 cm away, the distance between the first two minima is 5 cm. What is the width of the slit?



- 5) Consider an LED flashlight powered by a single lithium AA battery. The 20 gram flashlight is turned on while motionless in outer space. When the battery runs out, roughly how fast will the flashlight be moving relative to its initial state?