

Physics 140 Discovery Room #10

11.2 alternating current, magnetic induction, Lenz's law, transformers; 11.3 electric generators; 13.1 radio waves

Name _____

Date/Time _____

Faraday Cage and Radio

Turn on the radio and find a station you can hear. Then place the radio inside the Faraday cage.

1. What happens? Why?

Magnet through Copper, Aluminum, PVC Tubes

Drop a magnet through the copper tube. Drop a magnet through the plastic tube.

1. Does one take longer for the magnet to drop? Can you think of a reason why?
Hint: Think about Lenz's law. A changing magnetic field induces a current and that current produces a magnetic field that opposes the change.

Laser pointer and polarizers

BE SAFE: Do not point the laser pointer anywhere in the DR room except at a wall.

1. What happens if you aim the laser pointer through one polarizer? What happens when you rotate the polarizer? Why?

Handmade Generator

Crank the handle. Note that you are turning a magnet inside of a coil when you do this.

1. Why does cranking the handle light the light bulb?

2. Keep cranking the handle and have someone unscrew the light bulb. Is it easier or harder to turn the crank? Why?

Step up and step down transformer

Turn on the frequency generator and set it to 60Hz. Turn on both voltmeters and set them to AC (the V with the ~ on top of it). Vary the amplitude of the input voltage by turning the amplitude knob on the frequency generator. Note the values of V-IN and V-OUT.

1. How do these compare with what you expect given the number of turns on each coil (One coil has 220 turns and one has 110 turns, as marked)?

Now turn off the frequency generator and reverse the leads so that the opposite coil is attached to the frequency generator—on the transformer, switch the red with the red and the black with the black. Turn the frequency generator back on and set it to 60Hz again.

2. How do V-IN and V-OUT compare now? What have you changed? Why might this be a useful trick?

Using the margins of this sheet of paper, write down a question regarding a topic, concept, or example you do not understand from this week in PHYS140.