

## Physics 221

### Induction and radiation

*Materials:* nail, wire, battery, neodymium magnet, sand paper, tape.

#### Induction

Open the PhET ([phet.colorado.edu](http://phet.colorado.edu)) simulation *Faraday's Electromagnetic Lab*.

Play with the simulation for 5 minutes or so.

#### What is induction?

The phenomenon of lighting a light bulb with a magnet is called induction. Describe, in your own words, what induction means, include step by step instructions of how to accomplish it using terms such as *magnetic field, change, direction, electrons* and *current*.

#### Create your own electromagnet

Use a nail, batter and wire. (Note: The wire is coated so you'll need to sand off the coating before you can make good contact with the battery.)

A. Draw a diagram below showing how you did this.

B. Compare the strength of your electromagnet to a neodymium magnet.

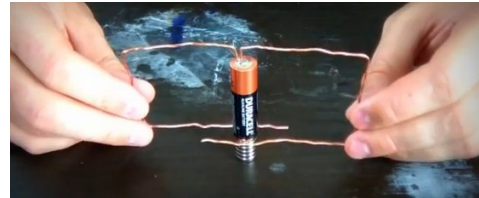
## Transformation between electricity and mechanical energy

*Materials:* conducting neodymium magnet or stack of neodymium magnets, C battery, screw, wire.

### Create a homopolar motor.

You are encourage to look online for ideas.

**Challenge :** If you choose to accept this challenge you will receive 10 points extra credit:  
Make a homopolar motor where the wire spins around.



### What is the story?

Compare and contrast the story of energy transformation between electricity and light on the *Generator* tab to the transformation of electricity to mechanical energy with the homopolar motor? Below is a list of possible key elements. Feel free to add any that were omitted from the list to construct the complete story.

- Light radiated from the bulb
- induced electric current
- kinetic energy of the water
- kinetic energy of the wire
- chemical energy of the battery
- changing magnetic field
- Motion of the bar magnet
- thermal energy of the filament
- changing direction of electric current

## **Infrared Radiation**

### **Play**

Use the infrared camera to look at the world.

Try making a handprint on the table.

After looking around with the camera, what was something that surprised you? What radiated less energy than you expected it to or more energy than you expected it to? Write your discovery both here and on the board.

### **Explain**

Try out the incandescent bulbs versus the florescent lights.

Which gives off more infrared energy? Why?