Lab 36-1: **Magnetism - Part 2**

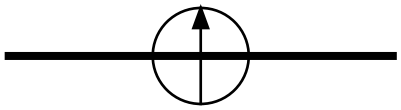
Purpose: To investigate basic electro-magnetic effects.

Materials: 1 bar magnet 1 compasses 1 solenoid 1 long wire 2 short wires

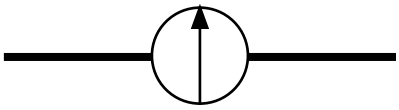
Part 5: The source of the magnetic field.

1. Using a long wire, connect a wire to the power supply (DC) and lay the wire on a compass so that the compass needle is perpendicular to the wire. Slowly turn up the current. Describe what happens to the compass needle as the current increases. Put the compass on the wire and repeat.

wire on compass

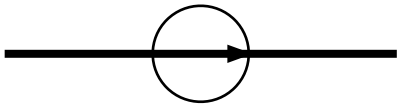


compass on wire

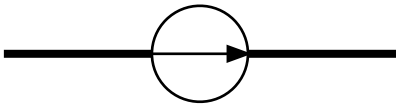


2. Repeat above, but start off with the compass needle parallel to the wire in both cases.

wire on compass



compass on wire

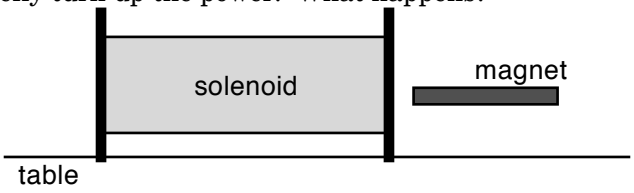


3. (*This is probably set up at the front table*.) Now holding the wire so that is vertical, turn up the current and move the compass around all around the wire in a plane. For each of the situations, sketch the magnetic field around the wire. (NOTE: by definition, current flows from the positive terminal to the negative terminal.)
   a. Current coming OUT of the paper b. Current going INTO the paper

Part 6: Solenoids.

4. Now hook the solenoid up to the power supply (DC side.) Hold some paper clips to the side of the solenoid. Does anything happen? How about if you hold them up to the openings?

5. Hold the bar magnet on the piece of wood and bring it near the opening on the solenoid. Briefly turn up the power. What happens?



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6. Try it again, but flip the pole of the magnet. What happens?

7. Flip the connections in the solenoid so the current goes in the opposite direction. Repeat above. What happens?

8. Place the solenoid on its side and turn the power on. Place a compass around the solenoid and record the compass direction all around the solenoid. How does the magnetic field of the solenoid compare to a bar magnet? Sketch it below.

9. So what is a solenoid?

Notes

1. What creates a magnetic field?

2. What kinds of fields surround a stationary electron? What about a moving electron?

3. In an atom, what moving charges create a magnetic field?

4. What electron motions contribute to an atom's magnetic field?

5. What is a *magnetic domain*?

6. Every atom has lots of electrons moving around a nucleus, so why are most things <u>not</u> magnetic?