

Student activities included in The Magnetic Balance Lab include:

- a. Demonstration of the validity of Coulomb's law for magnets by measuring the force between two magnetic poles for a variety of pole separations and then plotting F vs. $1/d^2$;
- b. Using data taken in the first part and Coulomb's law for magnetic poles, computation of the magnetic pole strengths and confirmation of the values obtained by measurement of the pole strengths using a pair of Helmholtz coils.

See your lab manual for more details.



Our setup will look almost the same as this one. We will use the DC wall outlets to put a current through the Helmholtz coil instead of a separate stand alone power supply.

In the first part of the lab we must establish **h_o**. This is the position on the bottom of the slider holding Magnet A on to the meter stick. This is the reference point for all measurements of **d**, the distance between the magnetic poles. Here are the directions to find h_o.

1. Loosen the knob on the slider and remove Magnet A from the Meter stick.
2. Place Magnet A several feet away from Magnet B so it's magnetic field does not affect what you will be doing with Magnet B.
3. Using the two small knurled nuts, adjust Magnet B so that it is balanced on its fulcrum. (**Make sure Magnet B is seated properly on the jeweled bearing**)

4. Let Magnet B oscillate back and forth and note the number of divisions on either side the scale it swings away from the zero point. When it reaches the same number of divisions on either side of the zero point it is balanced.
5. Raise the small round platform under the left side of Magnet B by turning it until it just touches the bottom of the round ball at the left end of Magnet B.
6. Place Magnet A back on the meter stick so that the magnetic field of the right end of it pushes the left end of Magnet B downward. This means we have S-S or N-N poles. Remember like poles repulse and opposite poles attract.
7. Gently remove Magnet B from its fulcrum and place it aside, making sure not to change the adjustment of the knurled nuts.
8. Slide Magnet A down along the meter stick until the bottom of the ball on the right end just touches the top of the round platform.
9. Note the position of the bottom edge of the clip holding Magnet A on the meter stick. This position on the meter stick is **h₀**.
10. Replace Magnet B gently back onto the fulcrum.
11. Lower the round platform back down into the base.
12. You are now ready to take data.