Lab E-4: Magnetic Force on a Charged Particle

Although we're measuring the mass of an electron in this lab, we're also going to measure the Earth's magnetic field.

Before coming to Lab:

1. Review the lab ahead of time, considering the notes I provide below. We're generally going to follow the lab procedure, so the more you understand about it ahead of time, the better.

2. You only have to do the specific pre-lab things I mention below. Make these a part of your write-up – they don't have to be separate. Check with your partners to see if you came up with the same results. You'll be using this information for your lab, so I will come around and see if it's ok as you get started.

Pre-Lab

1. Read the OBJECTIVES and PREPARATION sections and actually do the three things after they say: “Before coming to lab, you should:”. In other words, actually write them down and provide a simple sketch or something that shows you “understand the meaning of all the quantities involved”.

2. We will not be getting the 3D direction of the Earth's magnetic field from the compasses mentioned in the manual, so you need to look this up. Here's an on line calculator to use:

   http://www.ngdc.noaa.gov/seg/geomag/jsp/IGRFWMM.jsp?defaultModel=WMM

   1. Enter the Chamberlin zip code (53706)
   2. Enter Madison's altitude (300 meters)
   3. Enter the date of your lab in both the start and end dates, then calculate the result.

   4. Record the inclination, declination and the total field strength and enter them in your write up. If you read the lab, you might see why we need these things. Although we don't need it for the lab and you don't need to put it in your write up, the calculator also gives you the amount that the field changes per year. It's kind of interesting how fast it changes.

Yes, we will be calculating uncertainty. You'll be taking 10 or so measurements doing calculations that involve multiplication and division, averaging results, subtracting the averages so pleeeeeeeeeeease review the appendix pages B-2 through 3 and B-5 through 7.

We'll go over the lab briefly after the quiz over last week's lab, which will last 15 minutes.