Physics 161, spring 2015

HW # 7
Due Wednesday 18 March by the end of the day.

We spent last week going slowly through chapter five, learning about the properties of an electric field from a moving set of charges, or, equivalently, learning about the properties of the E-field created by a set of stationary charges in the case that we are moving with respect to them. The principles of special relativity (Lorentz contraction, time dilation) demonstrate that a charge in motion parallel to a current carrying wire will experience an electrostatic force *perpendicular* to the wire; this is usually attributed to the existence of a magnetic field caused by the current in the wire.

Special relativity is subtle all by itself, and applying it to electricity demands intense attention to detail. Your homework this week (all from PM's Chapter 5) requires you to go carefully through all the steps yourself and consider variations of the chapter's presentation.

1. PM 5.2. Maximum horizontal force

2. PM 5.5. E from a line of moving charges

3. PM 5.8. Finding the magnetic field

4. PM 5. 9. "Twice" the velocity

5. PM 5.12. Tilted Sheet

6. PM 5.15. Gauss's law for a moving charge

7. PM 5.22. Electron in a "classical" oscilloscope

8. PM 5.27. Charges in a wire

> 5.26