Phys 276 Presentation outline

Michael Faraday

- Background on Faraday
  - Born in 1791 in England
  - chemist and physicist
  - no formal education
  - worked for a bookbinder at 14 and read all the Science books he could
  - attended lectures on chemistry by Sir Humphry Davy
    - took detialed notes and was offered a job by Sir Humphry Davy
  - did a lot of work as a chemist
    discovered organic compounds like benzene
  - in the 1820s he started shifting focus to physics

Physics at the time
- 1820 Hans Christian Orsted discovered how electric currents through a wire produce a magnetic field around the wire
- Faraday showed that a magnet also exerts a force on a current carrying wire
- Ampère showed that the magnetic force was circular
- Faraday understood how this circular force could be used to create an electric motor

Faraday's contributions to Physics
- 1831 Faraday attempted to understand what produced induced currents
  - his experiment involved a coil of wire
  - he saw that moving a magnent in and out of a coil of wire induced a current in the coil
  - Induced EMF = rate of change of magnetic flux

- Experiment with Iron filings around a magnet
- changes in a magnetic field around 1 coil produces a current in the second coil
- Saw the connection between field lines and force
  - Electric and Magnetic field lines
  - suggested that light consisted of vibrations of these field lines

- found that a magnet also exerts a force on a current carrying wire

- Invented dynamo
- Field theory: he thought that space is not nothing, but a medium capable of supporting electric and magnetic forces

Maxwell admitted the ideas for the theory of Electric and magnetic fields came from Faraday.
Maxwell did the math. Faraday had the ideas

- Einstein Quote abt Faraday
- Faradey effect: electromagnetic polarization

What is an Inductor?

- electrical component which opposes sudden changes in current
- can help maintain a steady current
  - store energy (in EM field) during sudden current surge

- Used for filtering high frequency noise in circuits
- store energy when converting between AC and DC

- Inductors used for tuned circuits that can recieve radio frequency signals

- Inductors don't like change
  - when current increases they try to stop it
  - when current decreases they try to stop it (Back EMF)