

Physics 202, Lecture 15

Today's Topics

- Faraday's Law (Ch 29)
 - Change of Magnetic Flux and Emf (ϵ)
 - Lenz's Law
 - Faraday's Law of Induction

Sources of **E** and **B** Fields: An overview

- Sources for the electric field:
 - Electric charges (Coulomb's Law, static)
 - subjects of past several weeks
 - Change of **B** field (Faraday's Law, varying in time)
 - **Today**

- Sources for the magnetic field:
 - Electric current (Biot-Savart Law/Ampere's Law, static)
 - Chapter 28
 - Change of **E** field (Ampere-Maxwell Law, varying)
 - Chapter 28

- All these features are summarized in Maxwell's Equations.
 - Lecture 21 (Chapter 31)

Review: Electromotive Force (emf, ϵ)

- Electromotive “force”, emf, is a measure of the voltage that can be provided by a source.
 - For a given device, if a charge Q passes through that device, and gains an energy U , the net emf for that device is the energy gained per unit charge, or U/Q .
 - emf is not a force, it has a unit of volts
 - sources of emf:
 - chemical process (battery)
 - change of magnetic flux
 - semiconductors.....
- e.g. battery:
 - notice that emf has a direction
 - emf may exist even if no current.

$$\epsilon = 1.5V$$

