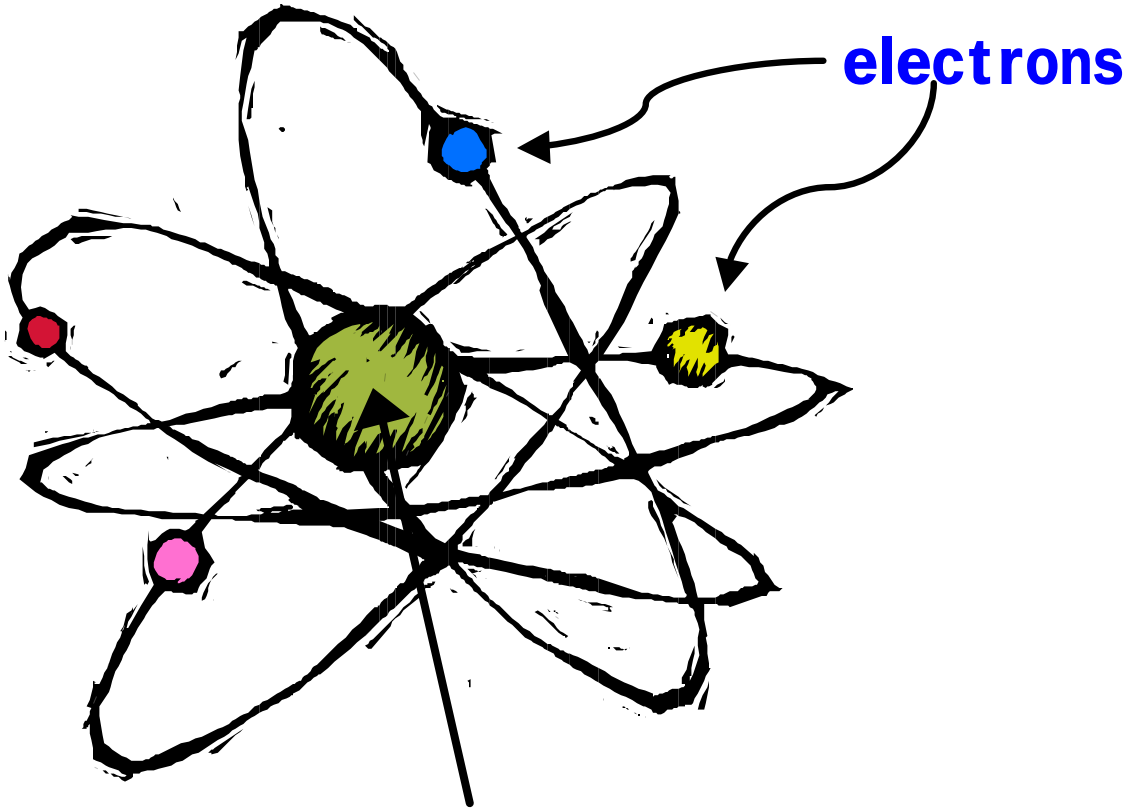
Electricity and Magnetism

What is electricity?

The Atom



Charge

- electrons have minus charge
- protons have plus charge


Opposites attract

Like charges repel

Repel: **push back**

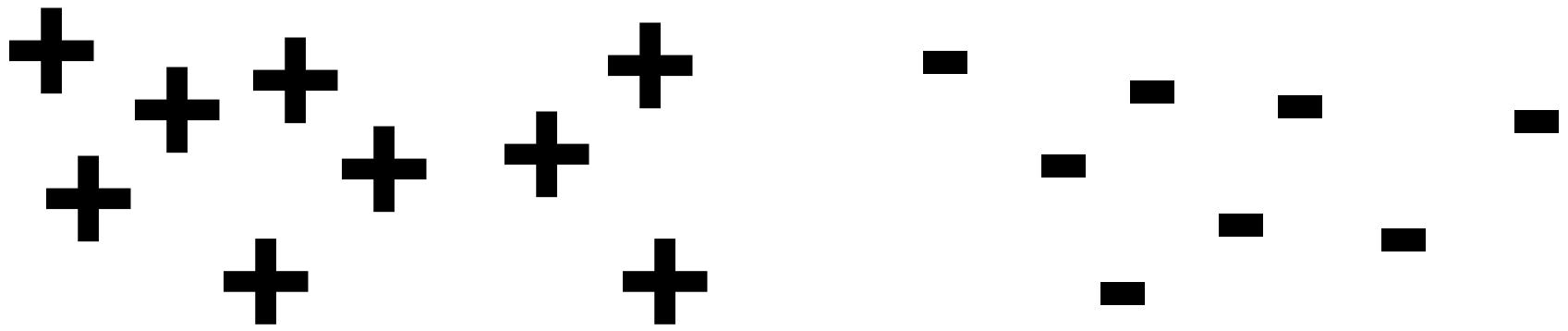
What is Electricity???

When charges from atoms

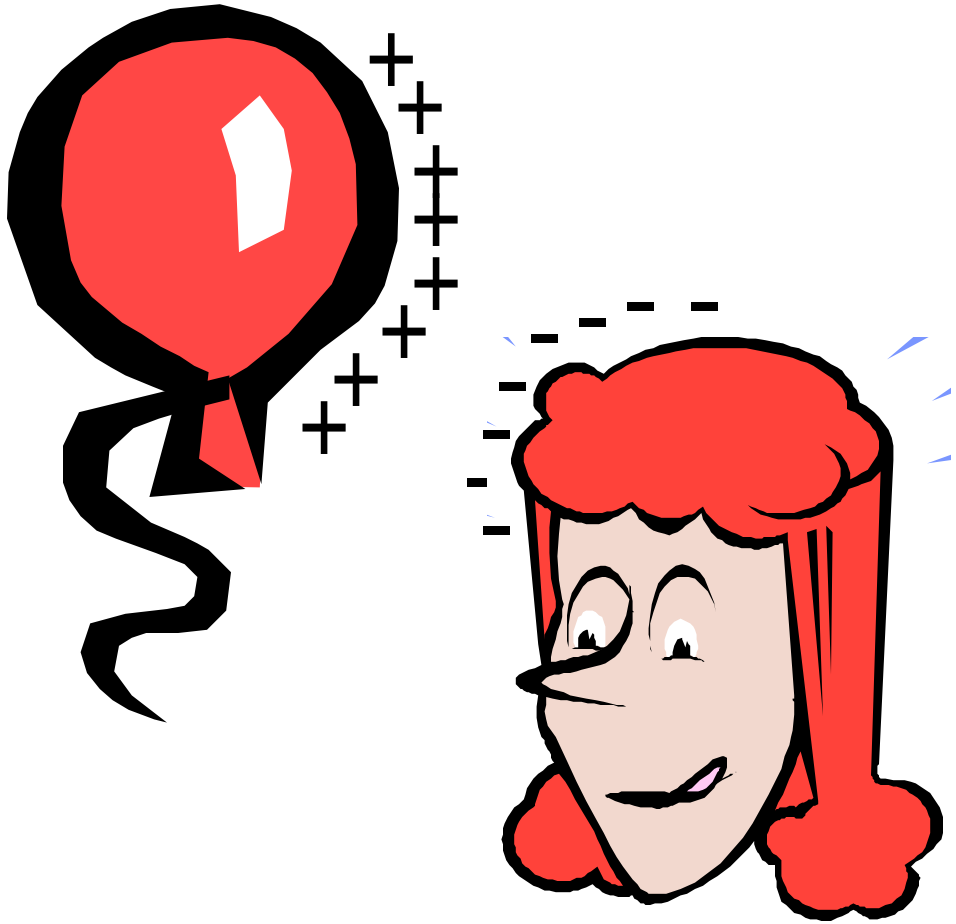
1. collect together
2. move

Static Electricity

Charges collect or buildup on something



Static: not moving



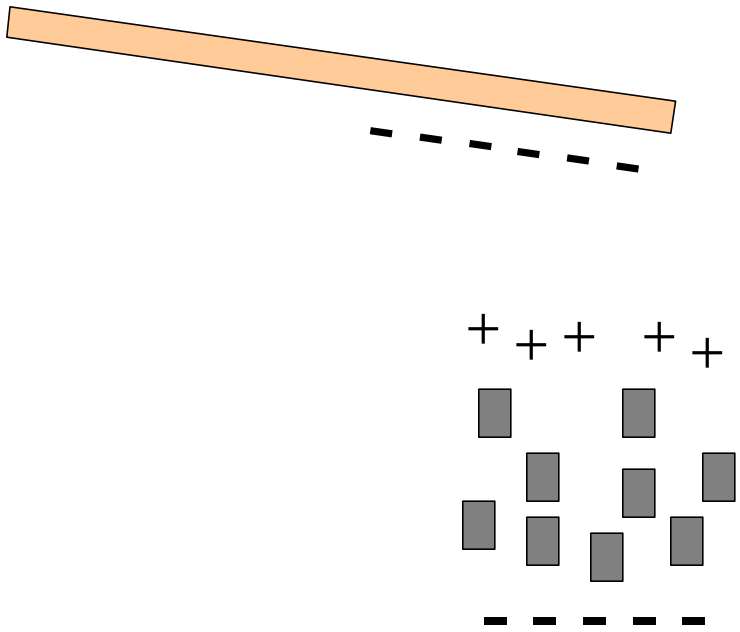
Triboelectric Series

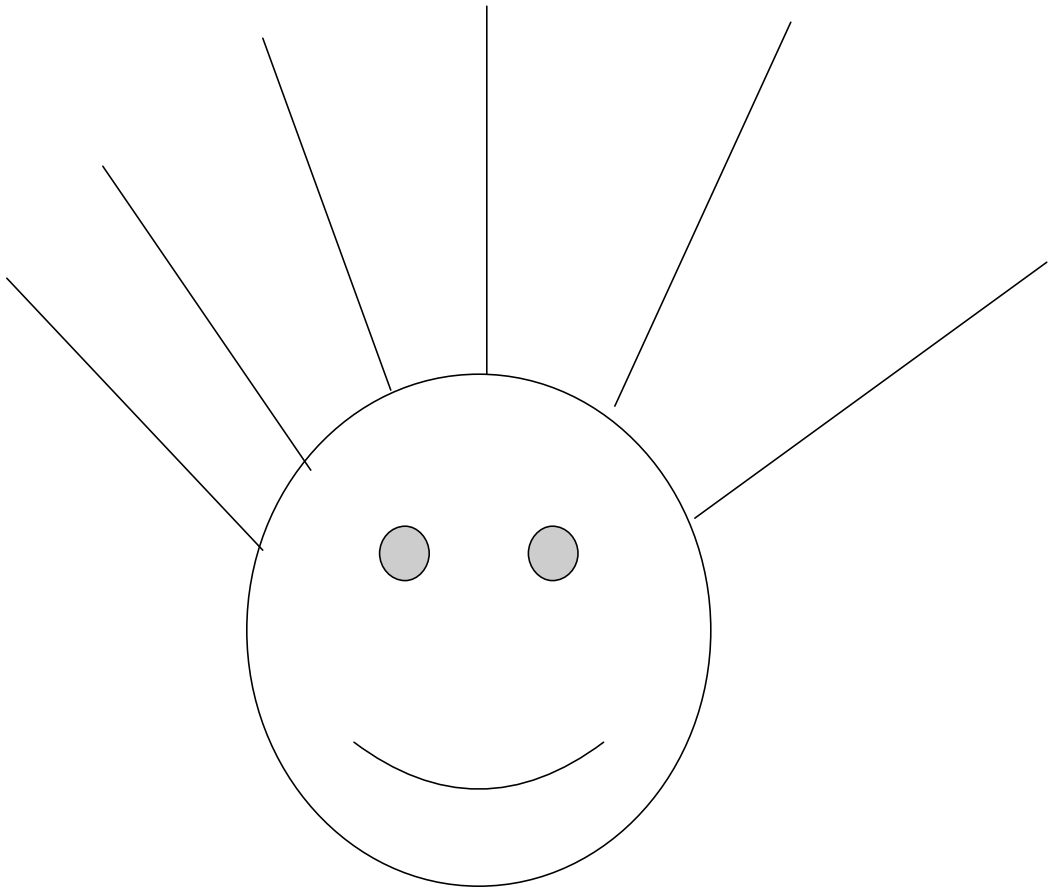
- Triboelectricity is the physics of charge generated through friction.
- In the table below, rubbing any material in the list with any material below it will cause the upper material to become positively charged.
- For example rubbing polyester on nylon will produce a negative charge on the polyester and a positive charge on the nylon.
- The farther apart the materials are in the list, the greater the charge will be.

Triboelectric Series

- Human hands (usually too moist, though) Very positive
- Rabbit Fur
- Glass
- Human hair
- Nylon
- Wool
- Fur
- Lead
- Silk
- Aluminum
- Paper
- Cotton
- Steel Neutral
- Wood
- Amber
- Hard rubber
- Nickel, Copper
- Brass, Silver
- Gold, Platinum
- Polyester
- Styrene (Styrofoam)
- Saran Wrap
- Polyurethane
- Polyethylene (like Scotch Tape)
- Polypropylene
- Vinyl (PVC)
- Silicon
- Teflon Very negative

PVC Pipe and Aluminum Foil Pieces





Electric Current

Charges move through a material, usually a metal

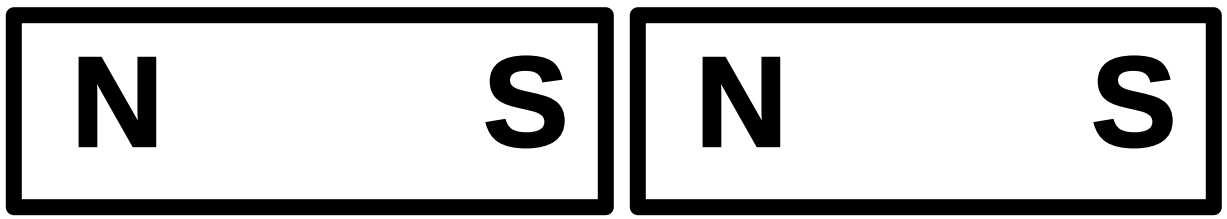
Magnets…

- attract or repel certain materials (not all materials!)

Magnets…

- Have a north and a south pole

Opposites attract



Likes repel

BOTH sides of magnet attract things

What happens if you split a magnet in two?

BOTH magnets will have a north and south pole!

Magnets work through things

Magnets push and pull things in a certain pattern

Scientists call this pattern a magnetic field

The Earth itself is a big magnet!

That's how a compass works!

Electricity and Magnetism are related!

You can make electric current with a changing magnetic field!

You can make a magnet with an electric current!

Safety

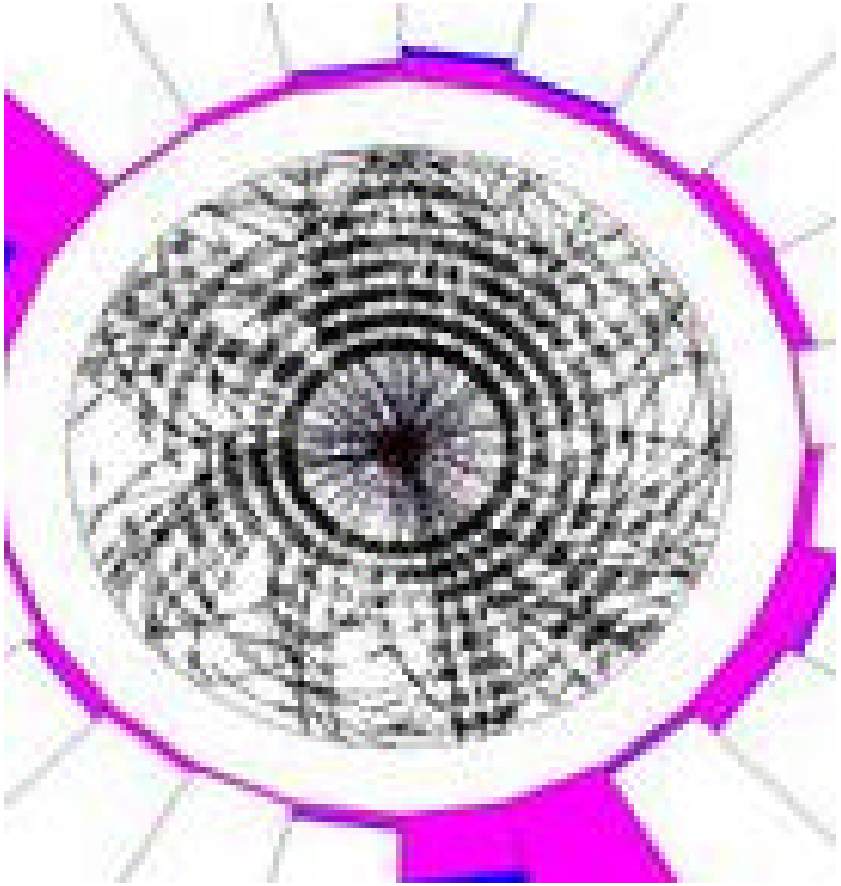
- Today we have been dealing with small electric currents and magnets!

BIG ELECTRIC CURRENTS ARE DANGEROUS!!!

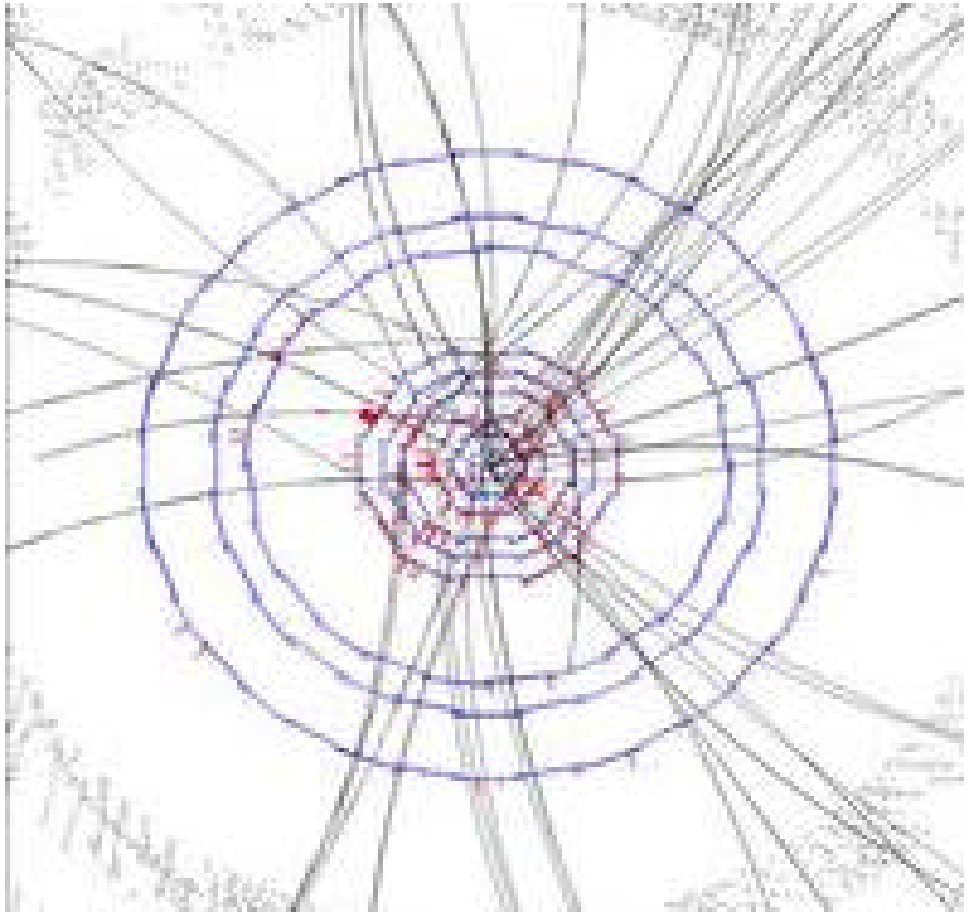
At Fermilab…

- We move protons around in a circle

Charged particles moving in a magnetic field



Charged particles moving in a magnetic field



Fermilab Web Site

www.fnal.gov