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Phys 2426

2016-08-25

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Schedule TBA

Syllabus info - Bb

Why study E & M?

- Our society is electronic.
  - Information / communication
  - Energy
- Part of Light & Optics
- E & M holds matter together & apart.

Electrostatics

Matter is made of atoms.

Atoms have a nucleus of

- protons
- neutrons

• cloud of

- electrons

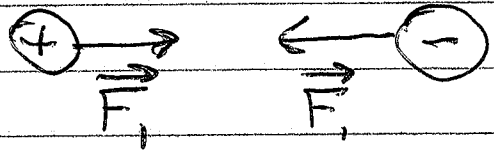
These particles have charge ( $q$ ).

Charge is measured in coulombs (C).

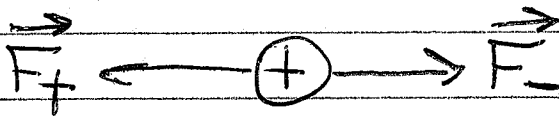
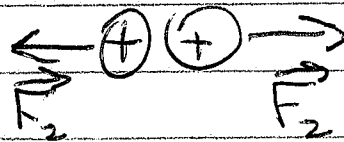
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Opposites Attract.



Like Charges Repel.



Our charge

Equal & Opposite

@ same place

Net zero.

Neutral Object

Most objects have  $Q = 0$ .

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How small are the particles?

	Mass	Charge
Proton	$1.67 \times 10^{-27} \text{ kg}$	$+e = +1.6 \times 10^{-19} \text{ C}$
Neutron	$1.67 \times 10^{-27} \text{ kg}$	0
Electron	$9.11 \times 10^{-31} \text{ kg}$	$-e = -1.6 \times 10^{-19} \text{ C}$

Neutral stuff:  $N_p = N_e$

Typical stuff:  $N_p = N_n$

Ex: 1.0 kg Object

	Mass
Protons	0.5 kg
Neutrons	0.5 kg
Electrons	$\sim 0$

$$M = N m \quad N_p = \frac{0.5 \text{ kg}}{1.67 \times 10^{-27} \text{ kg}} = 3 \times 10^{26}$$

$$Q = N q \quad Q_e = (3 \times 10^{26})(-1.6 \times 10^{-19} \text{ C}) \\ = -480000000 \text{ C}$$

$$M_e = (3 \times 10^{26})(9.11 \times 10^{-31}) \\ = 0.0003 \text{ kg}$$