

# ELECTRIC FIELD AND SIMPLE CHARGE DISTRIBUTIONS

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8/29/2010

Supplementary Material for  
PHY1308 (General Physics -  
Electricity and Magnetism)

# ANNOUNCEMENTS

- Homework 1:
  - Due next Monday by 9am (start of class)
  - NOTE! I have a better feel for the pace of the course now. Please hold off on doing problems SS-4 and SS-5.
    - They will not be graded. Instead, they'll be moved to the *second homework*.
- First official in-class Quiz
  - One week from today
  - Bring pens/pencils and calculator

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- PHY1308 math tip on YouTube
- Coulomb's Law: Problem Solving
- Michael Faraday
- Electric Field (of Dreams)
- Dipoles

# PHY1308 MATH TIP: CROSS-PRODUCT

- I've made a short YouTube video to demonstrate a math trick for computing the cross product:

$$\vec{a} \times \vec{b} = \vec{c}$$

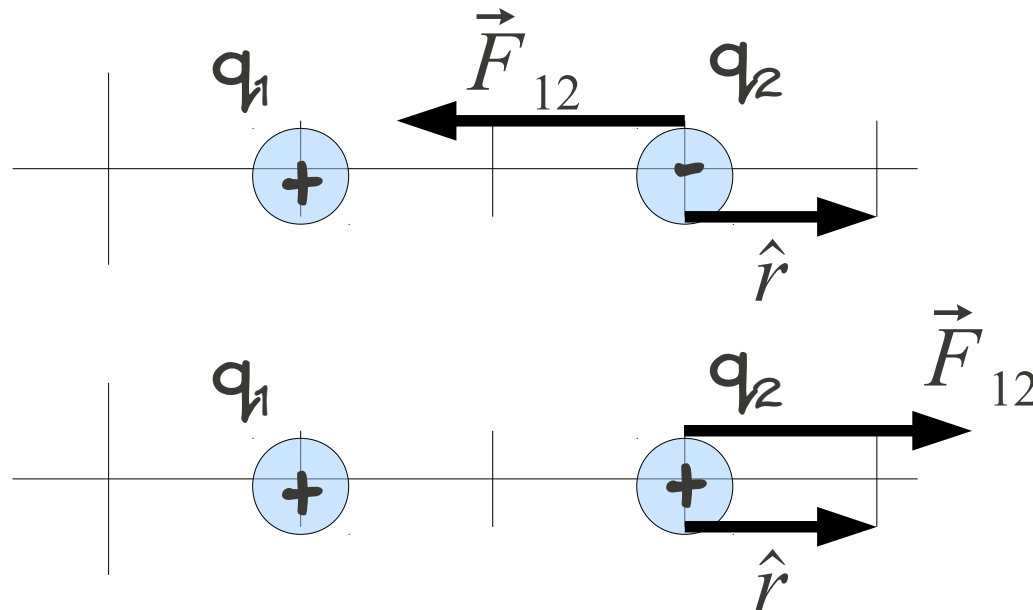
- Check it out (it's just 3:47):

<http://www.youtube.com/watch?v=Q8GVr1coHps>

# COULOMB'S LAW

$$\vec{F}_{12} = \frac{k \cdot q_1 \cdot q_2}{r^2} \hat{r}$$

Tells you the force that charge 1 (the "source charge") exerts on charge 2:



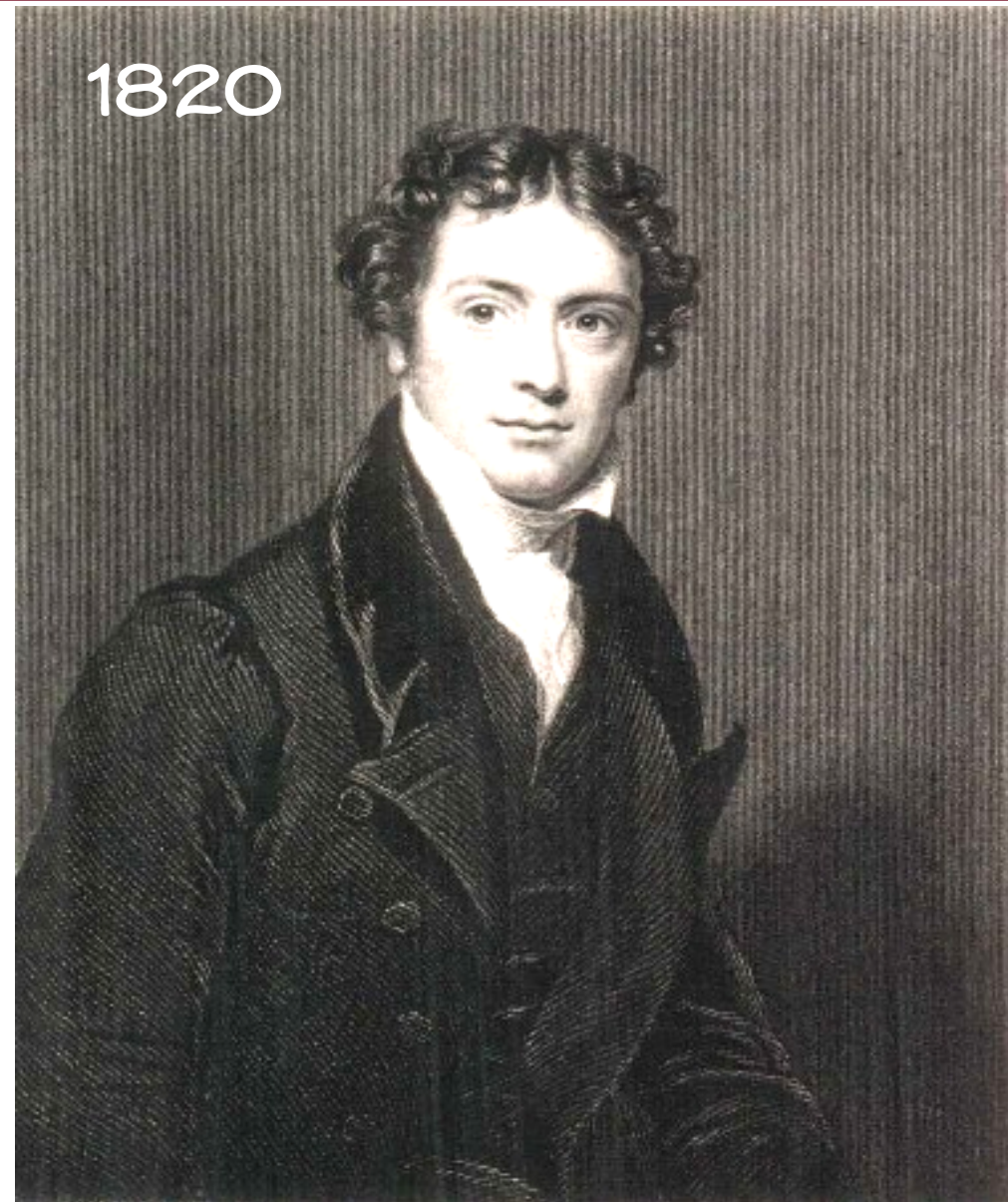
# MICHAEL FARADAY

1820

1792-1867

A brilliant chemist and physicist. Despite his origins in poverty, through persistence he was able to break into England's nobility-controlled scientific elite.

Introduced the concept of an "electric field".

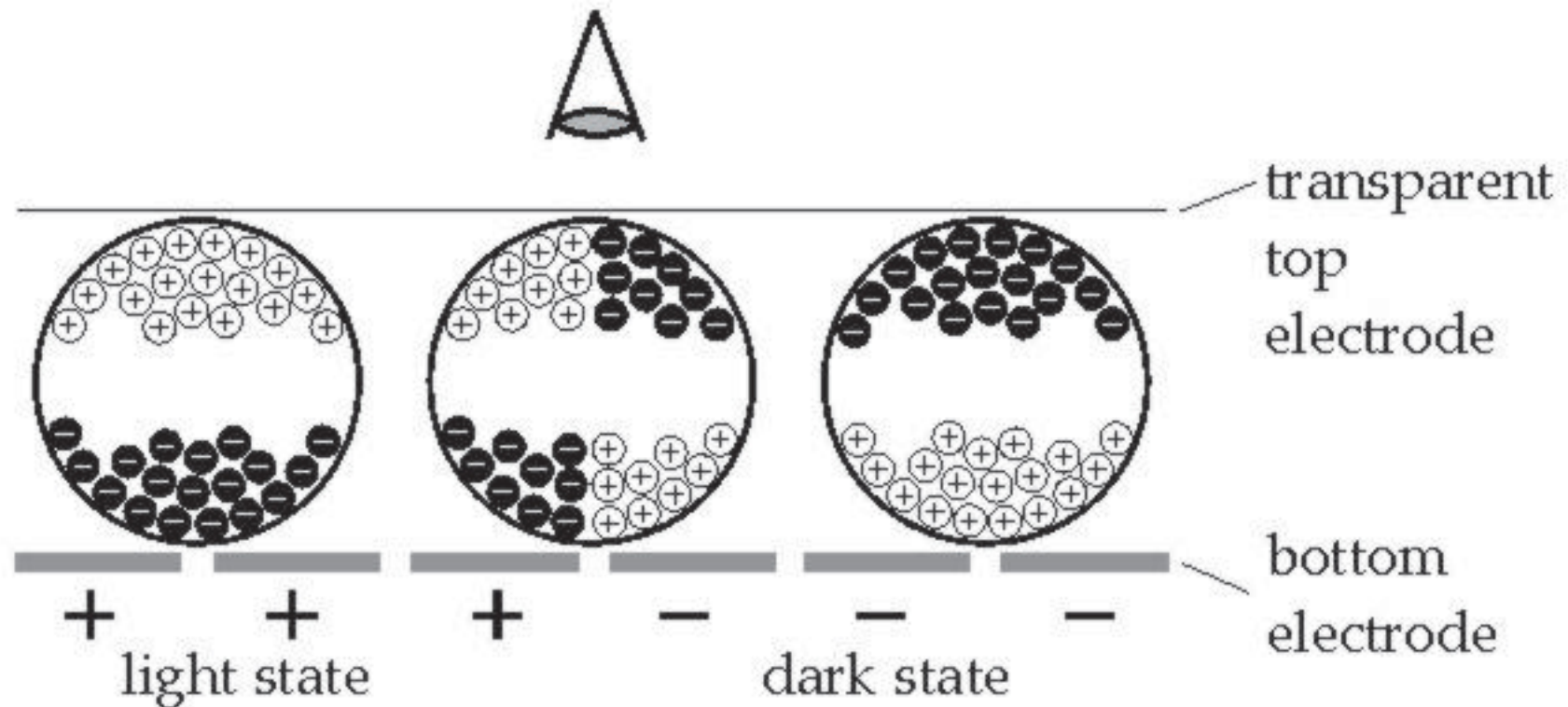


# ELECTRIC FIELD DEMO

- Feel the electric field
  - Van de Graaff Generator
- Visualize the electric field
- PhET simulation:

<http://phet.colorado.edu/en/simulation/efield>

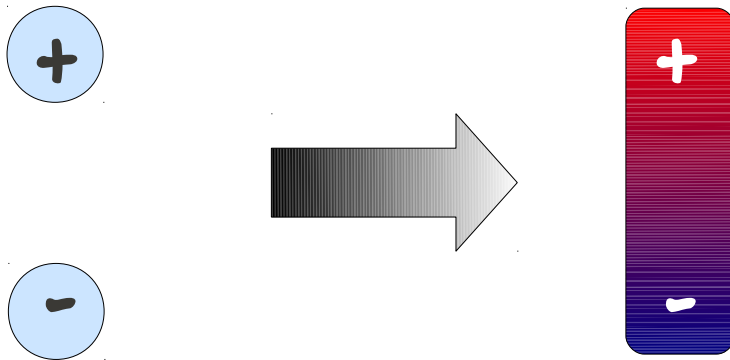
# E-INK (ELECTROPHORETIC INK)



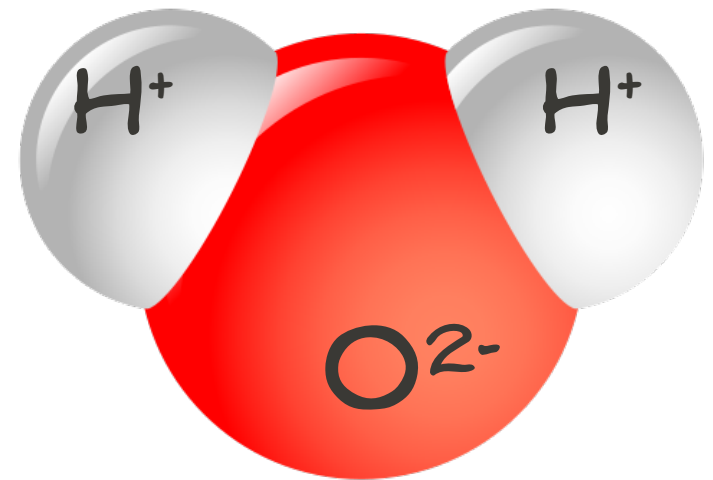
Examples: SONY and Amazon book readers.



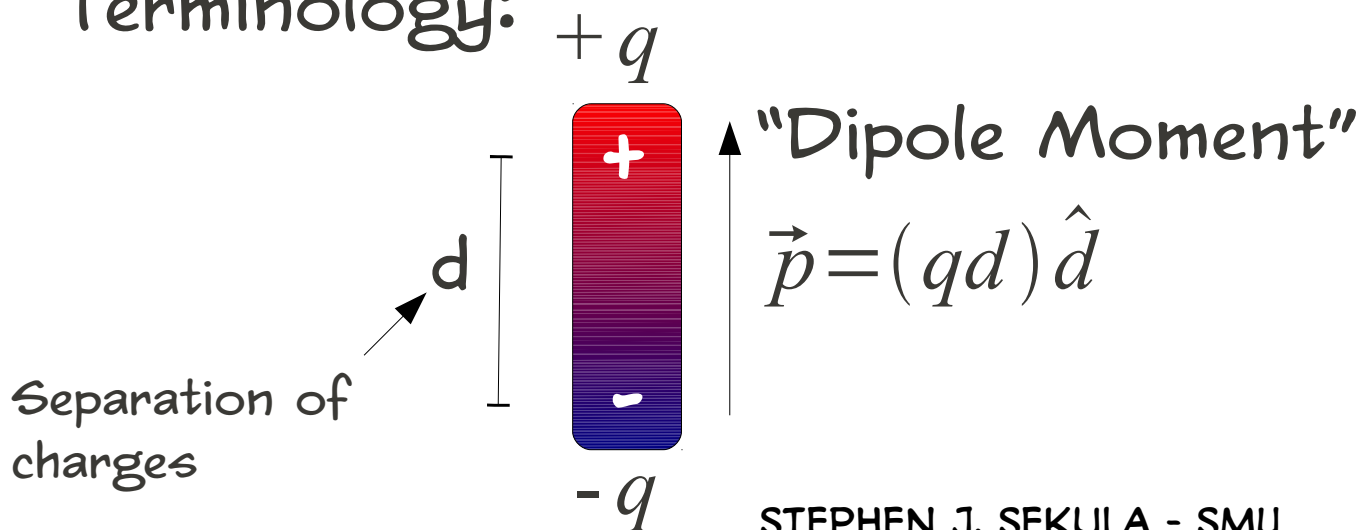
# DIPOLE



Cartoon of a  
water molecule



Terminology:



# QUALITATIVE: DIPOLES IN ELECTRIC FIELDS

- Visualize and Predict
  - in the simulator, make two charges, one with +2 and one with -2 charge. Change the electric field and see how the dipole responds.

<http://phet.colorado.edu/en/simulation/efield>

- If water is a dipole, what will it do in the electric field of a negatively charged object?



<http://www.youtube.com/watch?v=1EVQmhBoWy8>