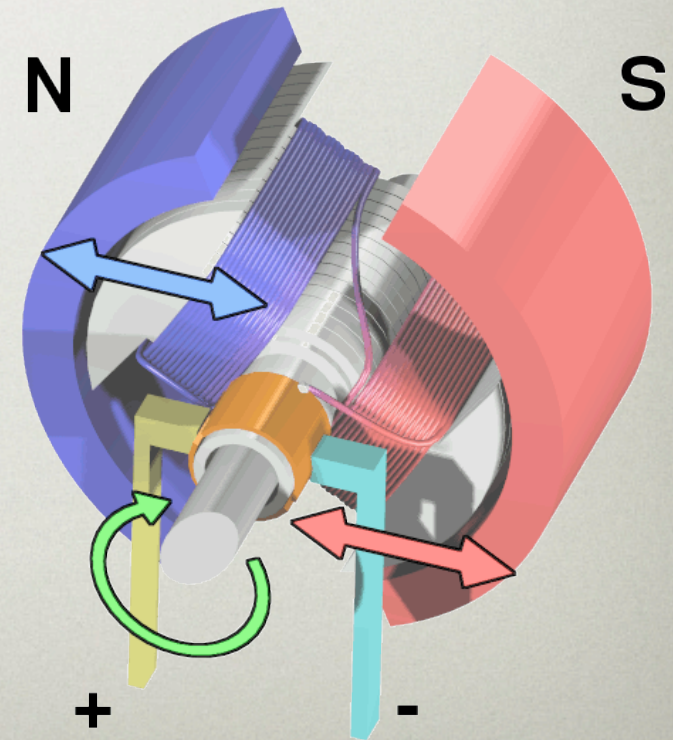


PHYSICS 106

DR. LECLAIR

OFFICIAL THINGS

- Dr. Patrick LeClair
 - pleclair@ua.edu please include 'ph106' in subject
 - offices: 228 Bevill, 110 Gallalee
 - lab: 180 Bevill
 - 857-891-4267 (cell)
- Office hours:
 - *MW 12-1pm in Gallalee*
 - *any day after 3pm in Bevill*
- *other times by appointment*



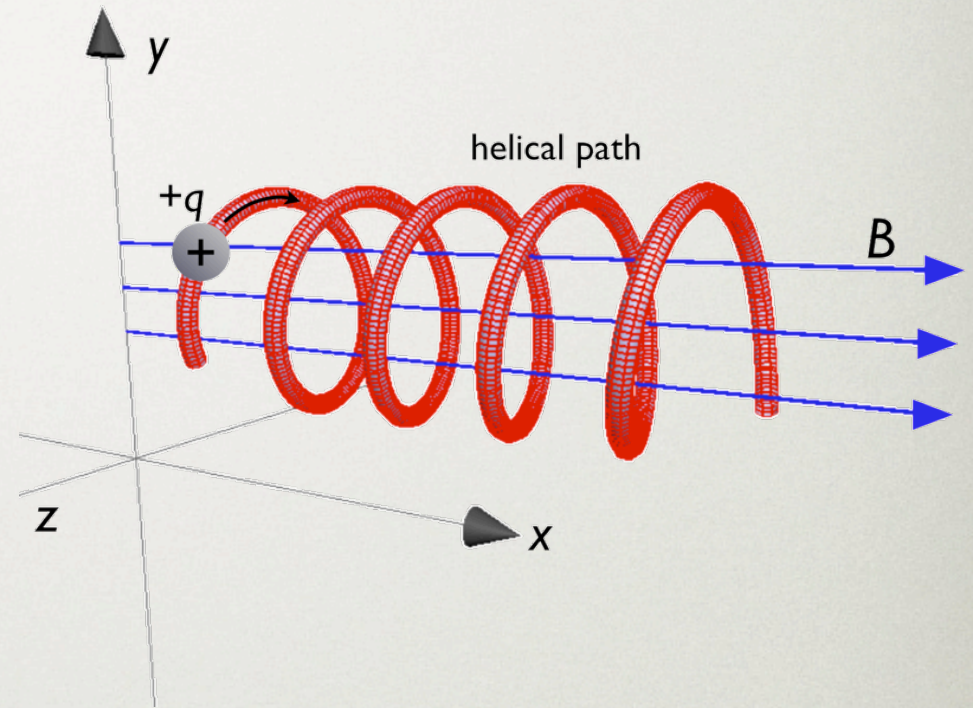
OFFICIAL THINGS

Lecture / Lab:

- 329 Gallalee
- MW 1-2:55pm

Recitation:

- F 2pm



OFFICIAL THINGS

- Graduate Assistants:

Neha Pachauri

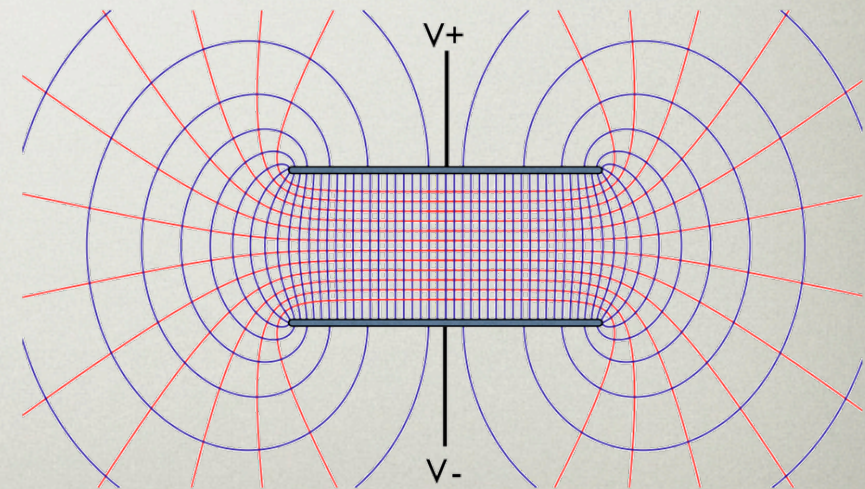
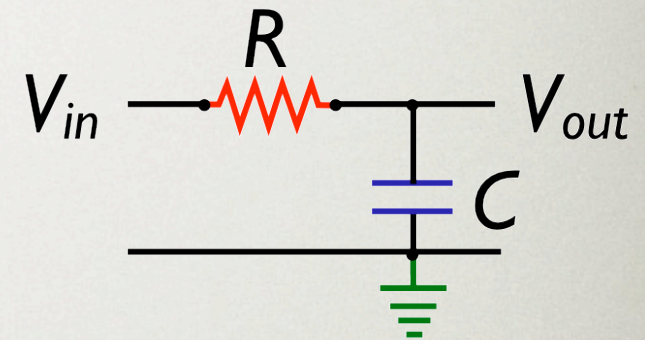
Gallalee 215

[npachauri\(at\) bama.ua.edu](mailto:npachauri@bama.ua.edu)

- Physics Help Desk

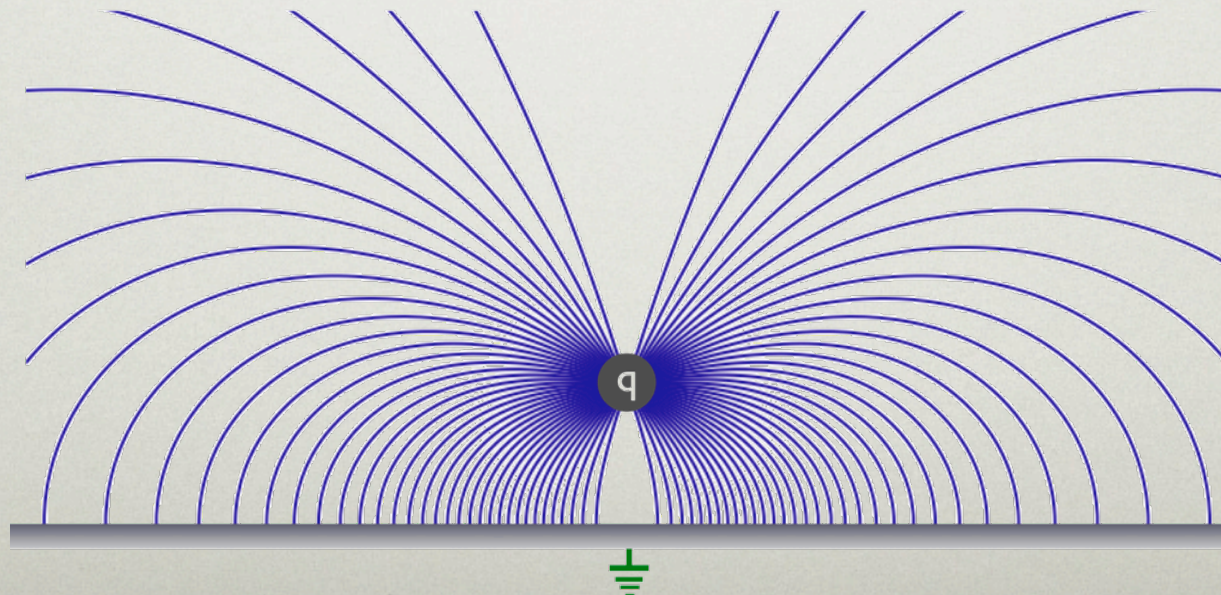
Hours TBA

low-pass



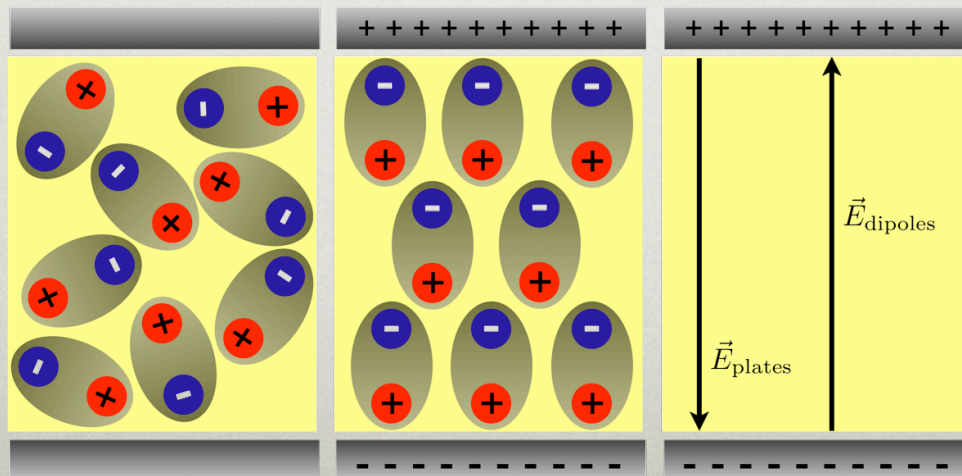
MISC. FORMAT ISSUES

- lecture and labs will try to stay linked
- learn a concept, then demonstrate it
- friday recitations: work problems + quiz
- working in groups is encouraged *for homework*



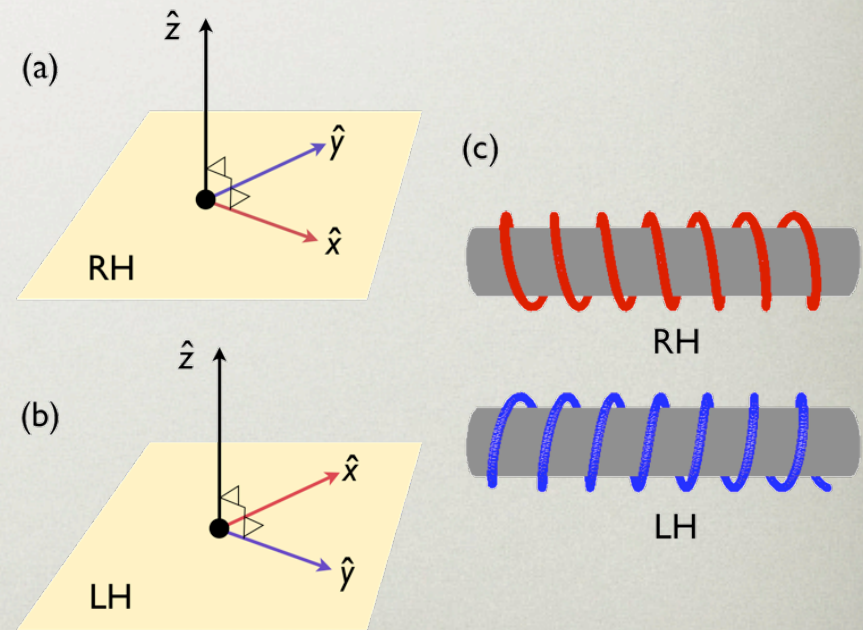
SOCIAL INTERACTION

- we need you in groups of 3-4 for labs
- groups are not assigned ...
 - ... so long as they remain functional relationships
 - even distribution of workload



WHAT WILL WE COVER?

- electric forces & fields
- electrical energy & capacitance
- current & resistance
- dc circuits
- magnetism
- electromagnetic induction
- ac circuits & EM waves
- reflection and refraction
- mirrors & lenses
- wave optics



GRADING AND SO FORTH

- labs / exercises
- quizzes, homework
weekly
in-class questions
- exams
1 multiple choice
1 problem-based
final is mixed

Table 1: Grading Breakdown

Component	Sections	%	
		section	total
<i>In-class work</i>	Labs & Exercises [†]	12.5	
	Quizzes [‡]	12.5	
			25
<i>Outside work</i>	Homework problems [‡]	20	
			20
<i>Hour Exams</i>	Exam I	15	
	Exam II	15	
			30
<i>Final Exam</i>			25

[†] The lowest two grades will be dropped.

[‡] The lowest single grade will be dropped.

HOMework

- out every friday - on the blog [pdf]
- due the following friday at class time
- hard copy or email (e.g., scanned) both OK
 - my Gallalee or Bevill mailbox
 - give to TA at lab time
- can collaborate
- have to show your work to get credit.
 - BUT turn in your own

QUIZZES

- every friday (at least)
- ~5-10 question multiple choice
- that week's work
- 10-15 min anticipated
- occasionally and randomly in lecture

LABS / EXERCISES

- something due every day
- if not a “real” lab:
in-class exercises or simulations
- drop 2 ...
- time critical ...
read carefully, work efficiently

STUFF YOU NEED

- textbook

Serway & Jewett. get a used one.

- course notes (optional)

PDF online (do not print it here)

- calculator

basic with trig/log

- notebook

SHOWING UP

- no make-up of in-class work or homework
“acceptable” + documented gets you a BYE
- missing an exam is seriously bad.
acceptable reason => makeup or weight final
- lowest 2 labs are dropped. I don't want to know.

DISTRACTIONS

- cell phones
 - keep it on a quiet mode.
 - take the call outside if it is urgent
- “no food / drink”

OTHER

Academic misconduct

- do your own work on quizzes & exams
- suspected violations referred to A & S
- teamwork encouraged on labs / homework

Accessibility / disability accommodations

- for a request - 348-4285 Disabilities services
- after initial arrangements, contact me

INTERNETS

- we have our own intertubes:
 - <http://faculty.mint.ua.edu/~pleclair/ph106/>
 - updated several times a week. often late
 - comments (anonymous even) allowed
 - rss feed
- google calendar (soon)
- Facebook group ... (soon)
 - can add RSS feed of blog to facebook
- check blog & calendar before class

LET'S GET AT IT

The pace will have to be brutal.

Today & Monday

- Electrostatics (Ch. 23)

Friday:

- course intro, first homework

Reception for Undergraduate Physics Majors

What:

- * gathering to meet your fellow majors and the faculty
- * free pizza ...
- * learn more about our program
- * undergraduate research opportunities

Where: Gallalee roof

When: Thursday, 28 August 2007, 7-9pm

Who: all undergraduate physics majors
anyone interested in physics

Phy-EE double major

- Electrical and Computer Engineering majors need only 4 additional hours to complete a second major in Physics.
- This combination of fundamental and applied physics can be highly advantageous when the graduate enters the job market.

electrostatics

or, electric forces when nothing is moving.

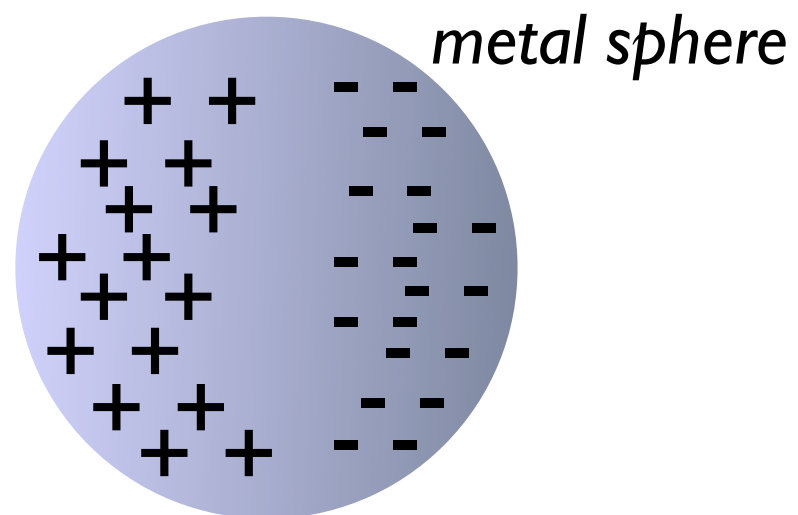
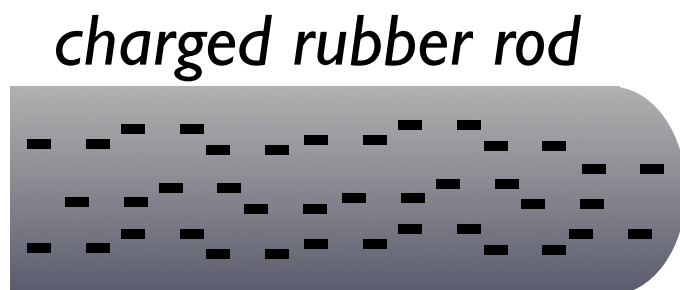
Summarizing the properties of charge:

- 1. Charge is quantized in units of $|e| = 1.6 \times 10^{-19} \text{ C}$
- 2. Electrons carry one unit of negative charge, $-e$
- 3. Protons carry one unit positive charge, $+e$
- 4. Objects become charged by gaining or losing electrons, not protons
- 5. Electric charge is always conserved

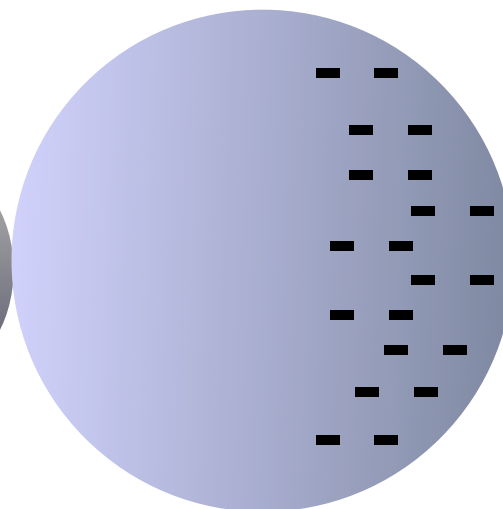
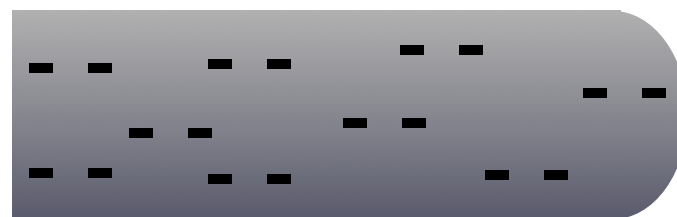
Table 3.1: *Properties of electrons, protons, and neutrons*

Particle	Charge [C]	[e]	Mass [kg]
electron (e^-)	-1.60×10^{-19}	-1	9.11×10^{-31}
proton (p^+)	$+1.60 \times 10^{-19}$	+1	1.67×10^{-27}
neutron (n^0)	0	0	1.67×10^{-27}

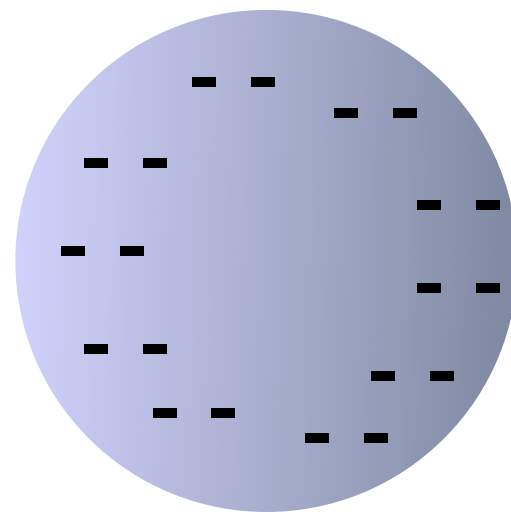
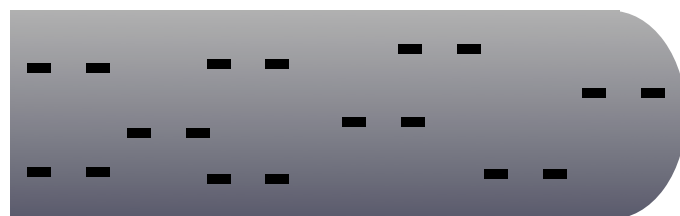
a) before

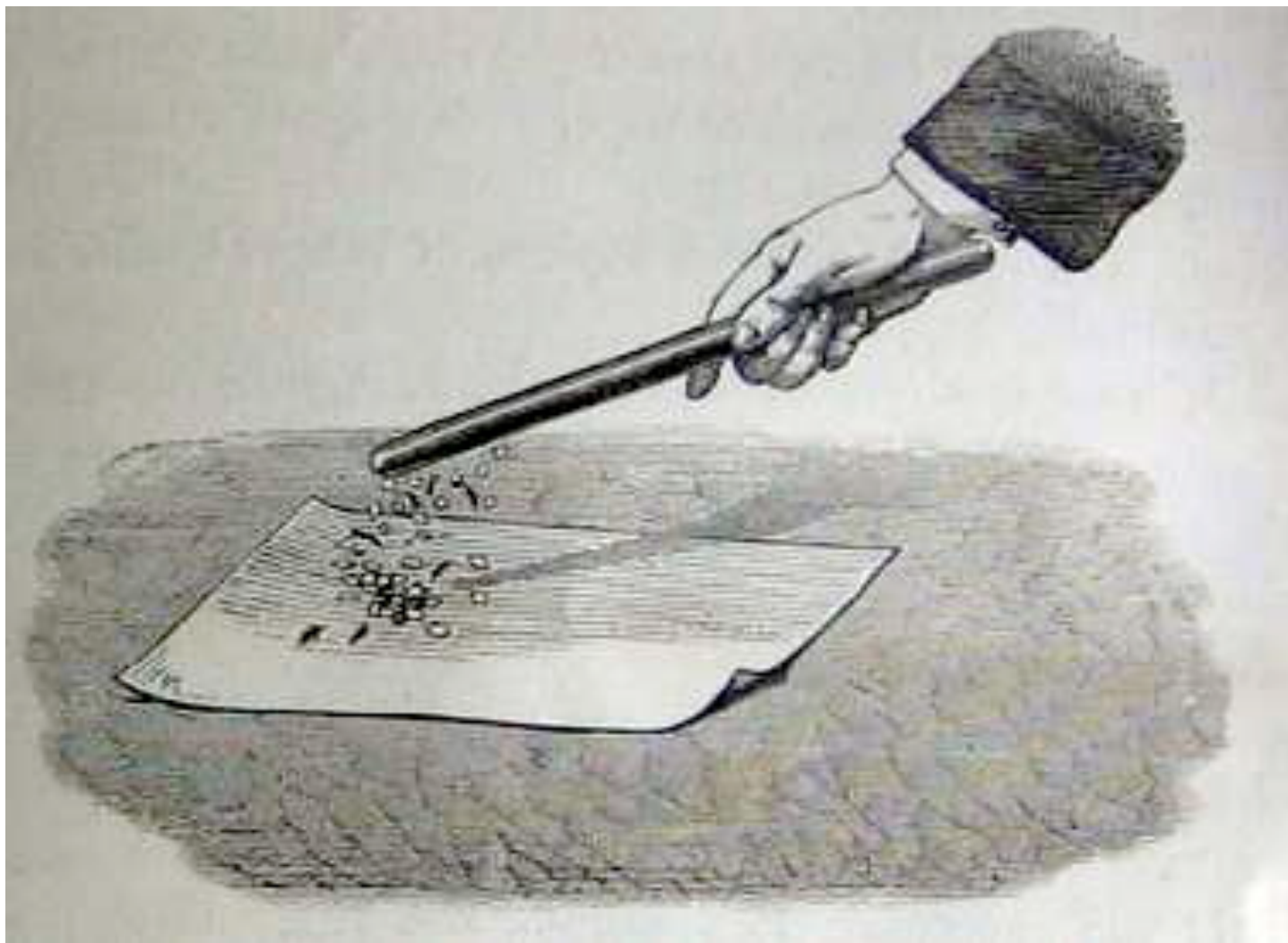


b) contact



c) after

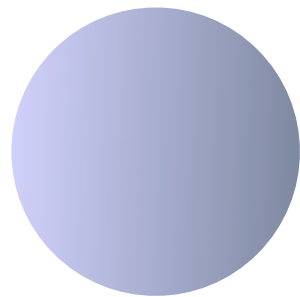




“Little pieces of tissue paper (or light grains of sawdust) are attracted by a glass rod rubbed with a silk handkerchief (or by a piece of sealing wax or a rubber comb rubbed with flannel).”

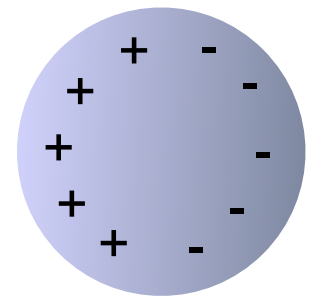
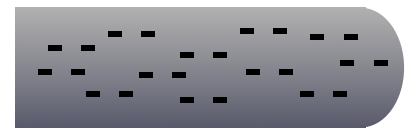
- from a random 1902 science book

*neutral
metal sphere*

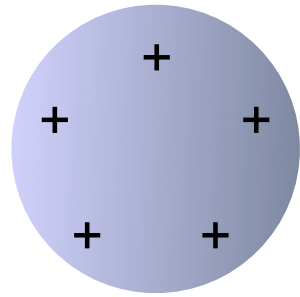
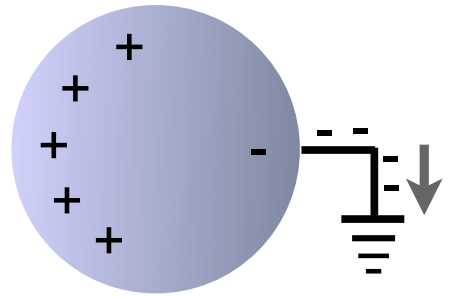
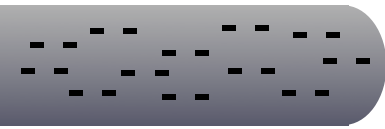
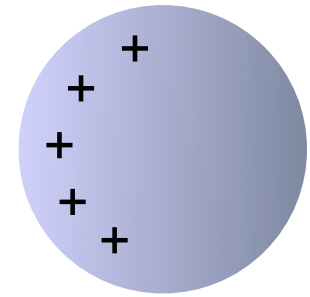
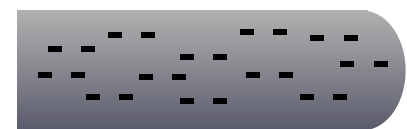


b)

*charged
rubber rod*



d)



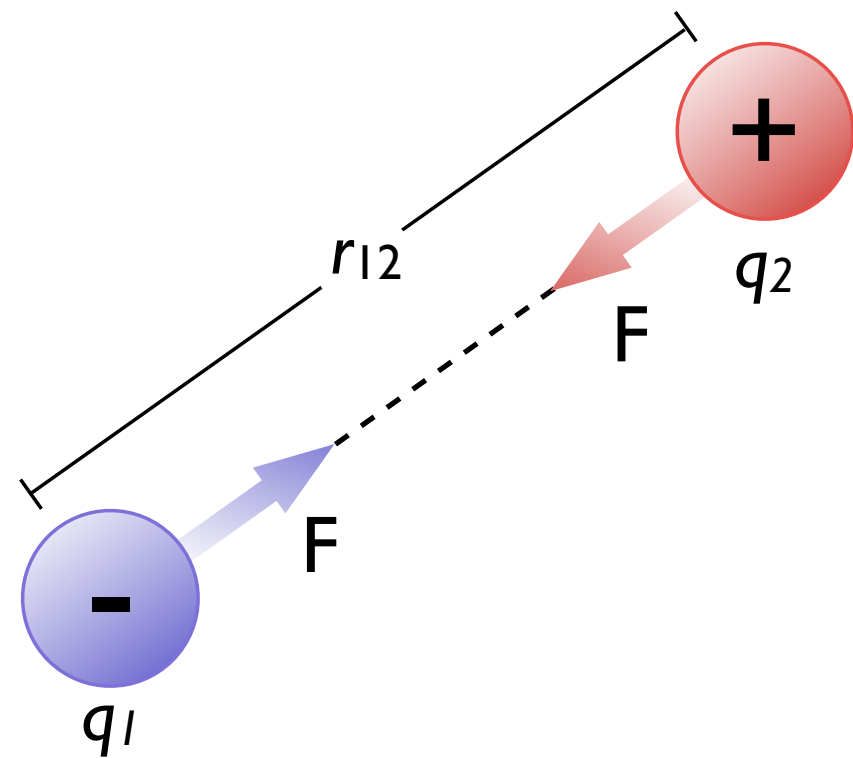
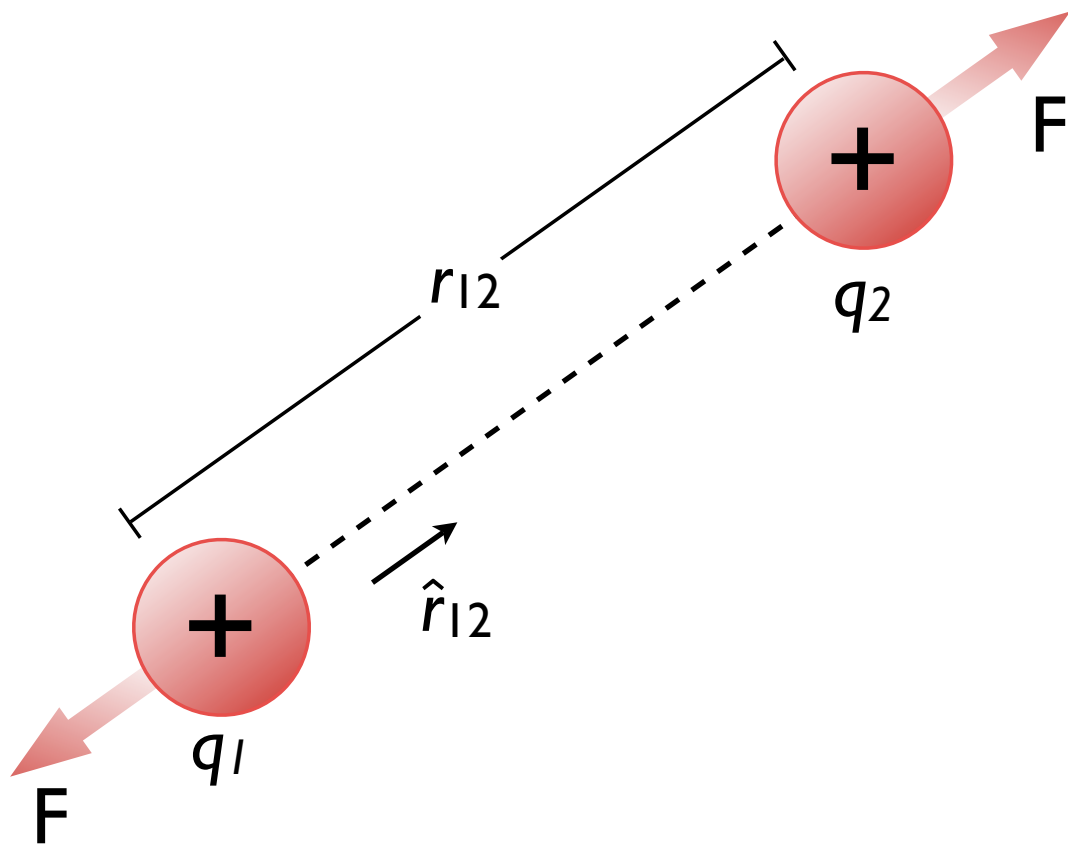
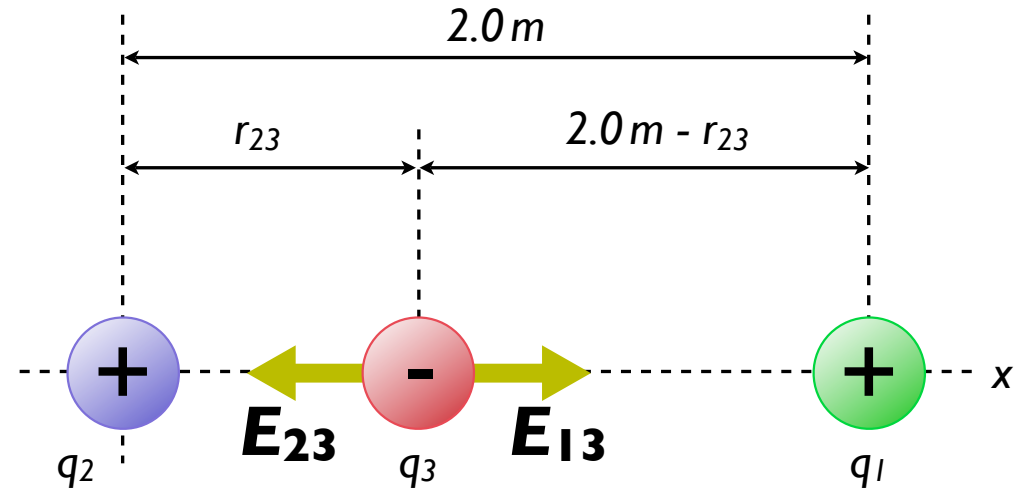


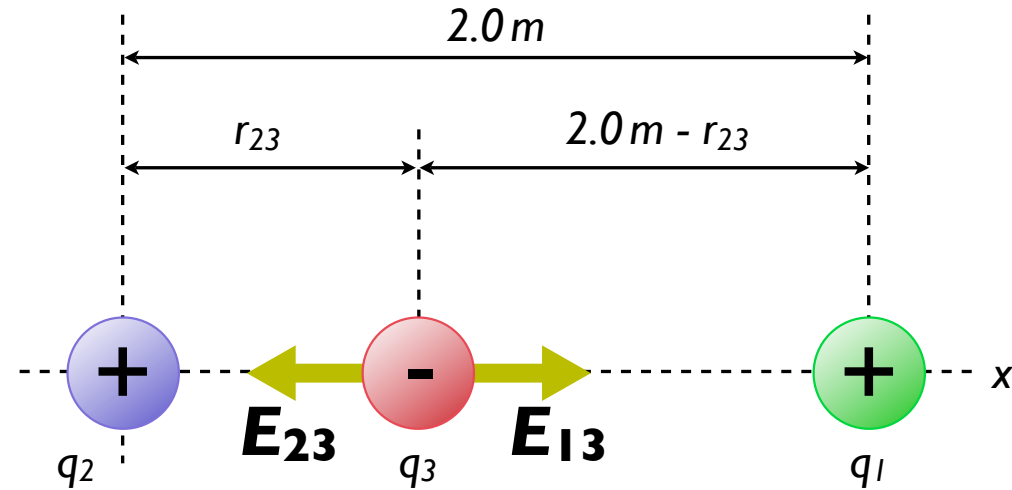
Table 3.2: *Approximate electric field values, in [N/C]*

Source	$ \vec{E} $	Source	$ \vec{E} $
Fluorescent lighting tube	10	Atmosphere (fair weather)	10^2
Balloon rubbed on hair	10^3	Atmosphere (under thundercloud)	10^4
Photocopier	10^5	Spark in air	10^6
Across a transistor gate dielectric	10^9	Near electron in hydrogen atom	10^{11}

2. Three point charges lie along the x axis, as shown at left. A positive charge $q_1 = 15\ \mu\text{C}$ is at $x = 2\text{ m}$, and a positive charge of $q_2 = 6\ \mu\text{C}$ is at the origin. Where must a *negative* charge q_3 be placed on the x -axis **between the two positive charges** such that the resulting electric force on it is zero?



2. Three point charges lie along the x axis, as shown at left. A positive charge $q_1 = 15 \mu\text{C}$ is at $x = 2 \text{ m}$, and a positive charge of $q_2 = 6 \mu\text{C}$ is at the origin. Where must a *negative* charge q_3 be placed on the x -axis **between the two positive charges** such that the resulting electric force on it is zero?



$\sim 0.77 \text{ m}$ from q_2

or

$\sim 1.23 \text{ m}$ from q_1