

# Secondary Considerations

Dr Jim Carrubba

University Laboratory High School

(just across Springfield from where you sit)

# (bio)

- Harvard AB
- Illinois MS, PhD
- have enjoyed teaching at University High, Urbana, starting in 1997
- gladly teach in Loomis during summers, when invited (thank you, Dept of Physics)

# Where I work ...





a quick introduction into the profession ...

a brief taxonomy, showing teachers in their  
natural habitat

# Types of Teachers I: Happy Teachers



# Types of Teachers II: Confident Teachers

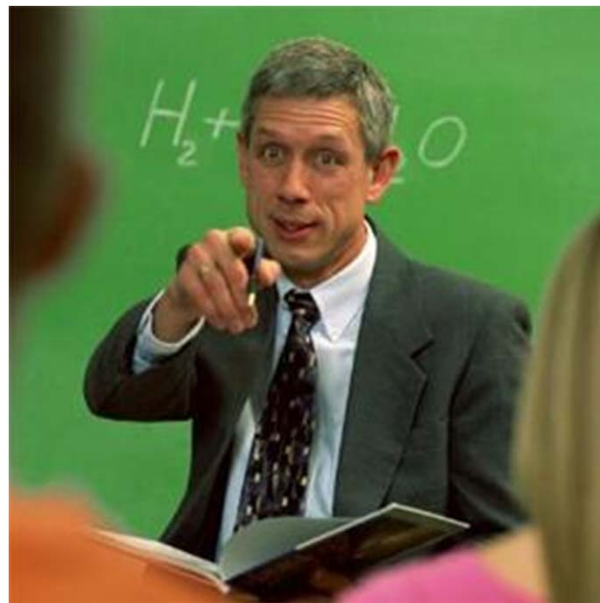


# Types of Teachers III: Angry Teachers

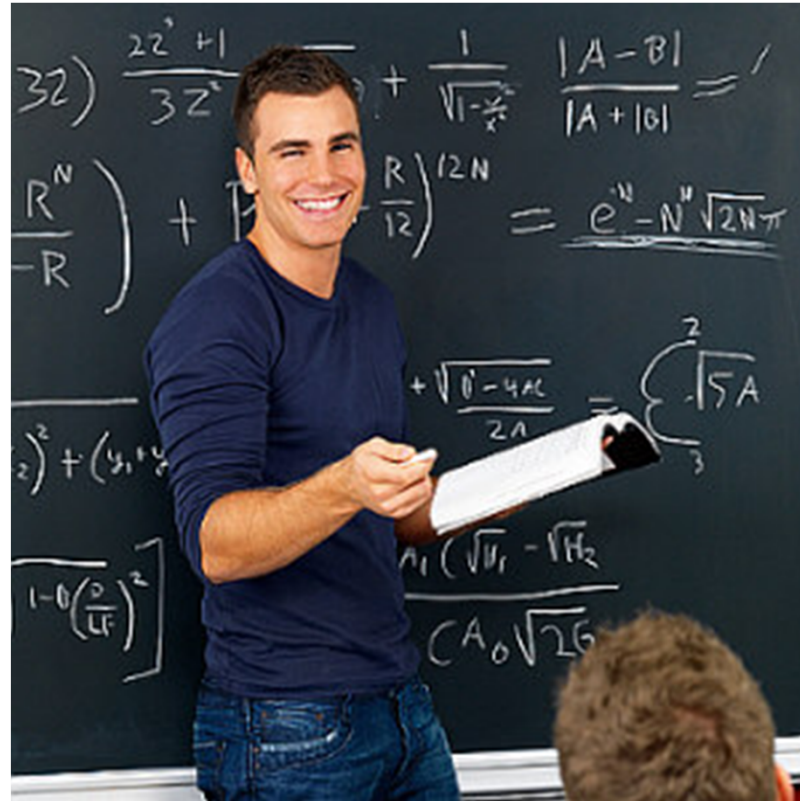




# Types of Teachers IV: Chemistry Teachers



# Types of Teachers V: Teachers who should be avoided



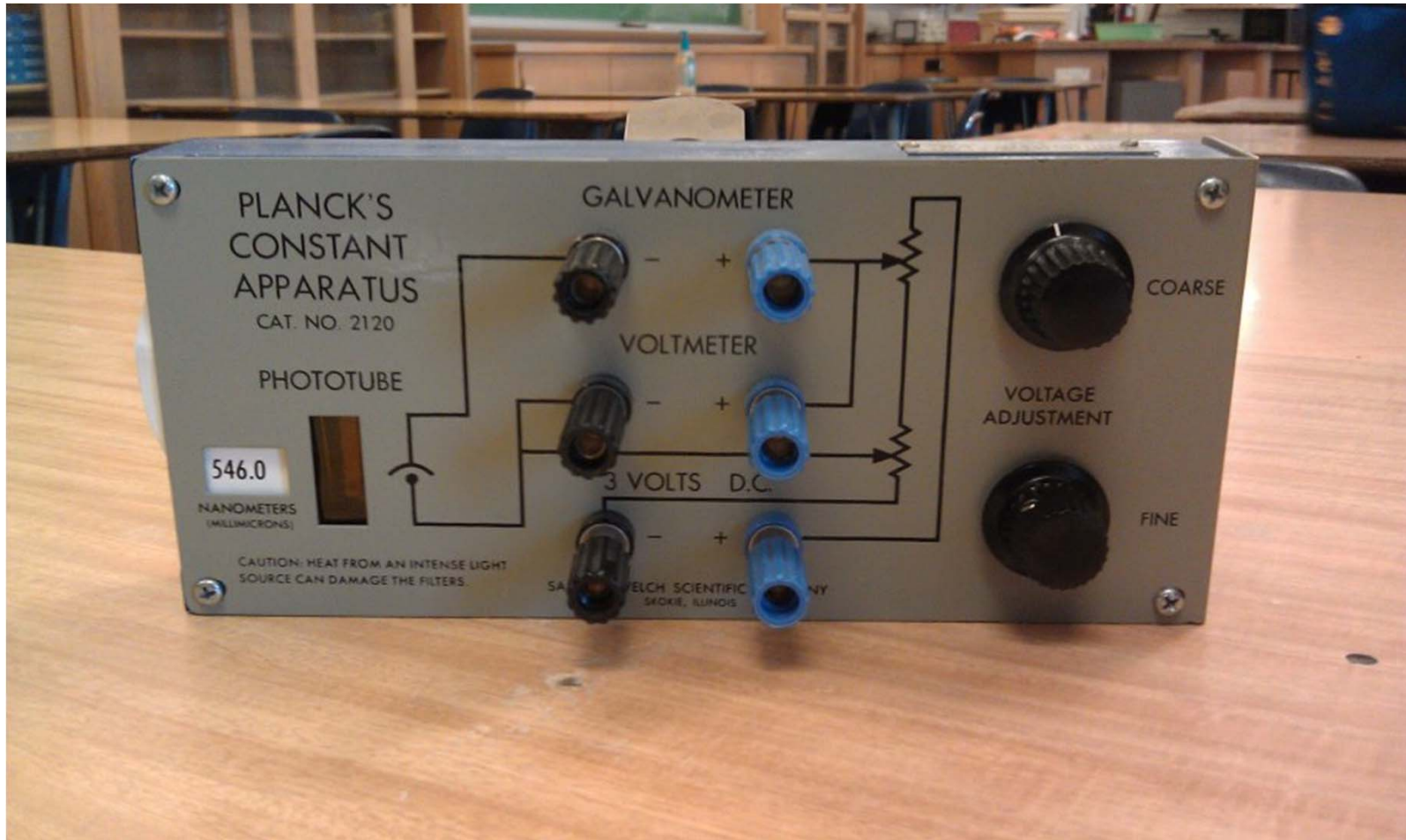
# Is this a “Waste of a PhD?”

1. How committed are you to your research?
2. What would you bring to a secondary classroom
  - a) as an experimenter?
  - b) as a computational physicist?
  - c) as a theorist?

# What this speaker brings:

1. Extreme unwillingness to spend money.

expensive ...

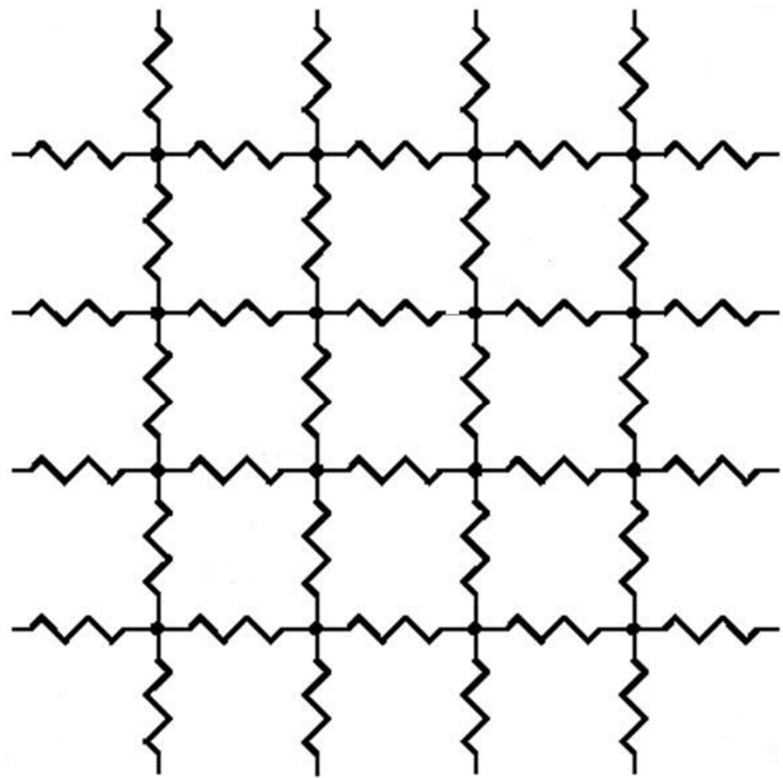


... versus cheap



# What this speaker brings:

1. Extreme unwillingness to spend money.
2. A love of arcane side projects.





THERE'S A CERTAIN TYPE OF  
BRAIN THAT'S EASILY DISABLED.



IF YOU SHOW IT AN  
INTERESTING PROBLEM,  
IT INVOLUNTARILY DROPS  
EVERYTHING ELSE  
TO WORK ON IT.



THIS HAS LED ME TO INVENT A  
NEW SPORT: NERD SNIPING.

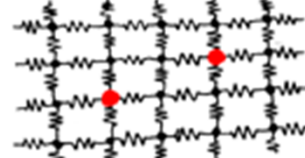
SEE THAT PHYSICIST  
CROSSING THE ROAD?



HEY!



On this infinite grid of  
ideal one-ohm resistors,



what's the equivalent  
resistance between the  
two marked nodes?

IT'S... HMM. INTERESTING.  
MAYBE IF YOU START WITH ...  
NO. WAIT. HMM... YOU COULD—



I WILL HAVE NO  
PART IN THIS.

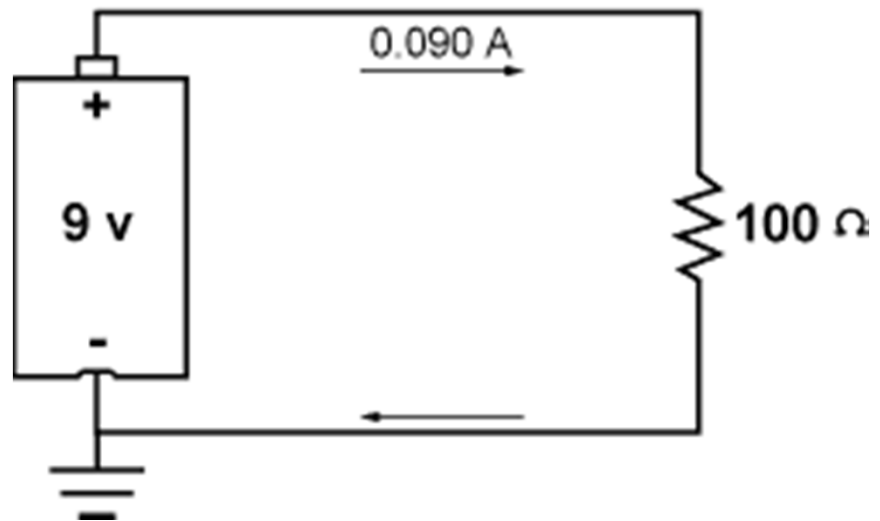
C'MON, MAKE A  
SIGN. IT'S FUN!

PHYSICISTS ARE TWO POINTS,  
MATHEMATICIANS THREE.



# What this speaker brings:

1. Extreme unwillingness to spend money.
2. A love of arcane side projects.
3. An interest in how language, physics, and philosophy intersect.



## a student responds:

Student: “Um, OK, so ... like ... if it doesn't matter whether it's plusses moving one way or minuses moving the other ... um ... then, like, could there be all these charges moving in all different directions at the same time ... and ... like ... you wouldn't know about it? Yeah, like, I don't know, that's dumb.”

# Can we quantify satisfaction as a teacher?

Define an “instructor frustration index”:

$$\text{i.f.i.} = \frac{\text{(how long it takes you to teach something)}}{\text{(how long your students remember it)}}$$

# Secondary Considerations

- the certification process
- rigid scheduling
- dealing with young people
- not-lucrative remuneration
- repeatedly teaching low-level classes
- not always teaching Physics
- it's not a classic "career"
- hard to learn new Physics

# The Primary Consideration

There is one critical fact about  
American education which  
prospective secondary science  
teachers must consider.

# The Primary Consideration:

The lack ...  
or loss ...  
of instructor autonomy.



# The Primary Consideration:

The lack/loss of instructor autonomy could include

- standardized tests
- imposed curricula
- prescribed methods/teaching materials
- and other bad things which I will reveal in an ironic way that may cause profound soul-searching

Where on earth could such a thing  
happen???



There are understandable reasons for all this ...

- the ~~need~~ desire for uniformity
- in some cases, it comes in response to research
- some (but not all!) school administrators are easily frightened
- it is “widely understood” that American high schools are terrible; “replicating success” is the only remedy we can imagine

Physics 108 8:00 am to 10:00 am section, circa  
late 1980's

- 8:00 to 8:20: discuss homework, solicit questions, do not repeat lecture
- 8:55 to 9:00: take a break
- 9:30 to 9:50: quiz

Physics 108 8:00 am to 10:00 am section, circa  
late 1980's

- 8:00 to 8:20: discuss homework, solicit questions, do not repeat lecture
- 8:20 to 8:55: ..... ???
- 8:55 to 9:00: take a break
- 9:00 to 9:30: ..... ???
- 9:30 to 9:50: quiz

these chairs are confused



# If you become a high school science teacher ...

- “don’t teach the subject, teach the kids”
- be prepared to fight parents, administrators, colleagues, and society as a whole for your autonomy
- find allies in nearby Departments of Physics
- a PhD in Physics gives you a lot of credibility

If you do not become a high school  
science teacher ...

- ask yourself what type of classroom is best for your own children



if you are interested in learning more

- [carrubba@illinois.edu](mailto:carrubba@illinois.edu)
- visit and observe
- formal/informal student teaching is actually part of our official mission