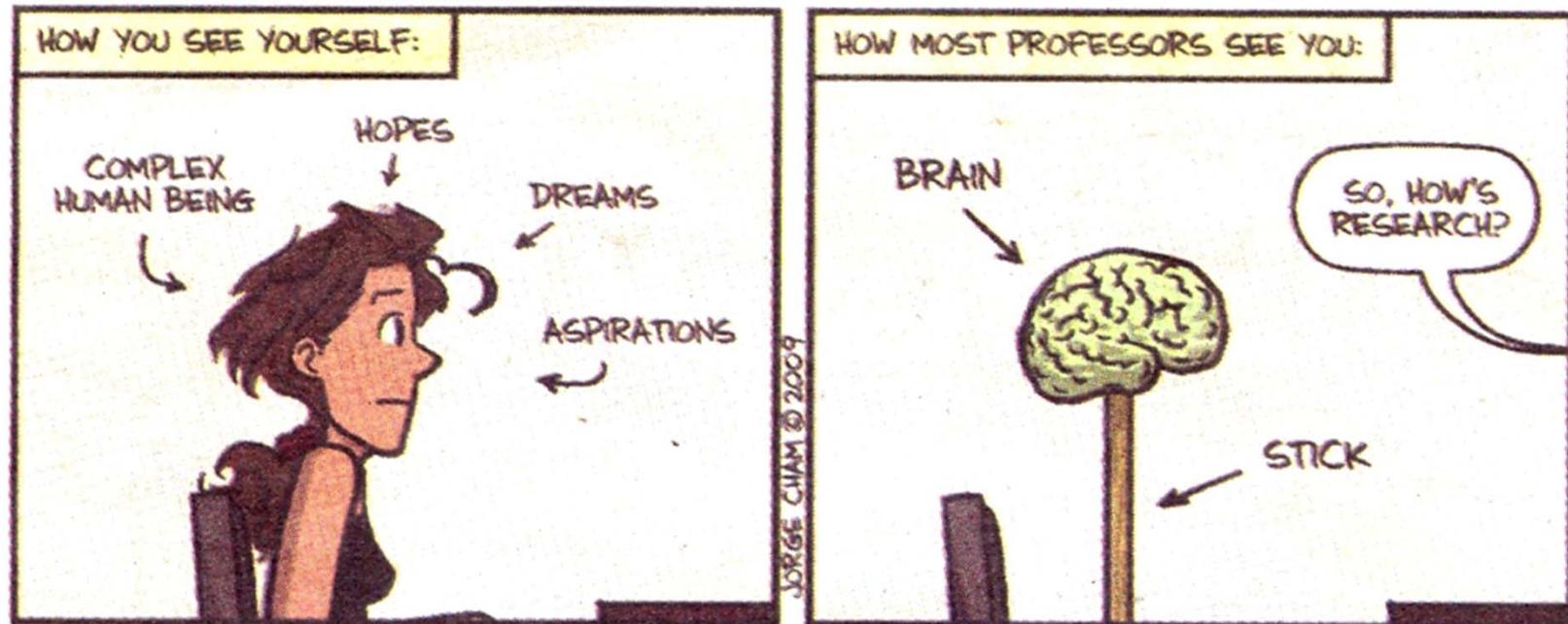


# Finding an advisor and grad school advice



# Finding an advisor

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- **What does an advisor do?**
  - Guides your PhD research
  - Generally funds your research
  - Is the main editor of your PhD thesis
  - Helps you make contact with others in the scientific community
- **How many advisors are there at UIUC?**

Approx. 70-80 professors supervise students for physics PhD (not just in Physics!! ~15% of Physics grad students do research in other departments!)
- **How many students are there here?**
  - Approx. 280 students are seeking physics PhD (but most advanced grad students already have advisors)

# Key decisions you'll need to make

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## 1. What area of research interests you?

To be happy and successful in a longish (~5-6 years) grad school career, you **MUST** be driven by an important physics problem!

**Astrophysics** - Physical processes of planets, stars, galaxies,...

**Atomic and Molecular Physics** - Physics of atomic or molecular systems

**Biophysics** - Physical processes of biological molecules

**Condensed Matter** - Physics of materials, solid phases of matter

**Nuclear/Medium Energy Physics** - Physics of atomic nucleus, muons, protons, neutrons, other particles

**Particle/High Energy Physics** - Study fundamental constituents of matter

**Physics Education Research** - Study how we learn science concepts

**Quantum Information** - Study/Exploitation of quantum 'weirdness'

# Key decisions you'll need to make

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To be happy and successful in a longish (~5-6 years) grad school career, you **also** MUST get some enjoyment from the more mundane day-to-day activities associated with your research, NOT just the “big picture” goal of your research...

Do you want to be a theorist or an experimentalist?

**Theorists must enjoy:**

Analytical calculations

Mathematics

Developing models

Programming

**Experimentalists must enjoy:**

Equipment building and  
troubleshooting

Electronics

Data Acquisition and Analysis

Programming

# Key decisions you'll need to make

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Are you interested in elements of both experiment and theory?

“Computational” Physicists must enjoy:

Mathematics

Developing and testing models

Programming and troubleshooting code

# What Do Students Do at Illinois?

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- About 40% of students do theory, 60% do experiment
- Of the students who change (theory to experiment) or (experiment to theory), most started in theory and change to experiment\*

If you want to have elements of both theory and experiment in your research, generally speaking, it's probably a little easier to do theory as an experimentalist than to do experiments as a theorist (try computational physics if you like programming!).

\*Beware attempting to join a theory group if you applied here expressing interest in experiment. Most past students attempting this have struggled!

# Key decisions you'll need to make

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What *style* of research/advisor interests you?

- Large collaborative project vs. Small individual project  
(high energy/nuclear vs. condensed matter/biophysics)
- Pure subfield vs Interdisciplinary research
- “Hands on” advisor vs. “Hands off” advisor
- New project/lab vs Established project/lab

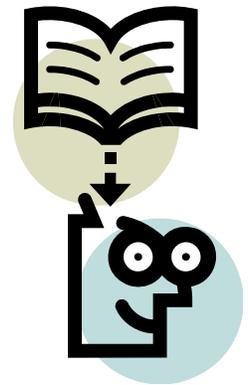
# How can you tell what research you like?

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- You just know
- Based upon classes you liked best or did well in
- From undergraduate research projects you liked or didn't like
- By seminars you see that inspired you (or didn't!)

Take advantage of this first semester/year to identify research areas that interest you:

- Attend seminars/colloquia:  
<https://physics.illinois.edu/calendar/seminar>
- Explore the research websites:  
<https://physics.illinois.edu/research/>
- Talk with faculty: <https://physics.illinois.edu/people/>
- Look for grad blog research postings:  
<https://physics.illinois.edu/academics/graduates/blog/>



# What advisors are looking for

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## Experimental advisors:

- Most experimental advisors would like, but don't require, laboratory experience...i.e., they will generally train you
- Those building a new lab – and those with more sophisticated experiments -- may want more experimental background in a new student
- In general, experimental advisors are less grade conscious and much less concerned with how you did on the qual
- They're less concerned with which courses you've taken, e.g., the Biophysicists/Condensed Matter/AMO experimentalists will accept you in their groups even if you have no Biology/Condensed Matter/AMO experience
- Will generally start you in the group with intro projects

# What advisors are looking for

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## Theory advisors:

- Theory advisors are generally more grade-conscious, more likely to ask about qual results
- May want you to have more advanced courses (e.g., **quantum field theory**, etc.) before taking you as a student
- Generally want a strong math background
- Will generally evaluate you with “starter” problems before accepting you into the group
- Keep in mind that many theory groups (particularly in condensed matter) have many students and may be difficult to break into, *particularly if you have little or no prior theoretical research experience*

# Some Tips

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- Don't be too "calculating" about your decision: **research can be hard sometimes, so find something that excites/inspires you!!**
- Don't forget about opportunities outside the physics department (**Materials Science, Chemistry, Electrical Engineering, etc.**)
- Explore a little...don't assume you're sure you know what you want to do: **keep an open mind as you're watching the different research presentations in Phys 596**
- Don't assume a faculty member isn't looking for students if he/she doesn't give a 596 talk!
- Your quality of life has a definite impact on the quality of research you can do, so find an advisor and group environment you are comfortable with

# More Tips

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- Be a little practical: To do experimental research, it helps to have some mechanical aptitude. To do theoretical research, it helps to be strong analytically.
- Physics 597, Independent Study is a course and you'll get a grade! Take it seriously!
- If you start out in a group and are not happy, it is expected that you may switch, and switching is common
- The level of commitment increases with time in the group and with the degree to which you are supported by your advisor's research grants
- If you want advice on how to negotiate a group change, contact me

# Goals and Time frames

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- **Goal:** start an independent study with an advisor (Physics 597)
- **Time frames:**
  - Check out faculty research websites, attend seminars, start talking to faculty to narrow research focus in Fall 2019
  - Hang around the lab/group by Fall 2019 or Spring 2020
  - Try to start formally with a group by no later than Summer 2020

# How to find an advisor

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- Identify potential advisors
  - Look over their research pages on <https://physics.illinois.edu/research/>
  - Go to their seminars
  - Send them an e-mail to ask if you can meet to talk about their research
  - Talk with grad students of potential advisors to find out about style of research and group environment

# Questions to ask a potential advisor

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- Is he/she taking students? If “no”, then when will they take on students?
- Are the advisor’s research projects collaborative (multiple students), or does every student have his/her own project?
- Will you be expected to build a new apparatus (or write new code, perform a new calculation, etc.), or will you jump into the middle of a well-developed project that follows up another student’s research?
- Is it likely you’ll be constantly funded during your time with the group, or will you be expected to TA periodically?

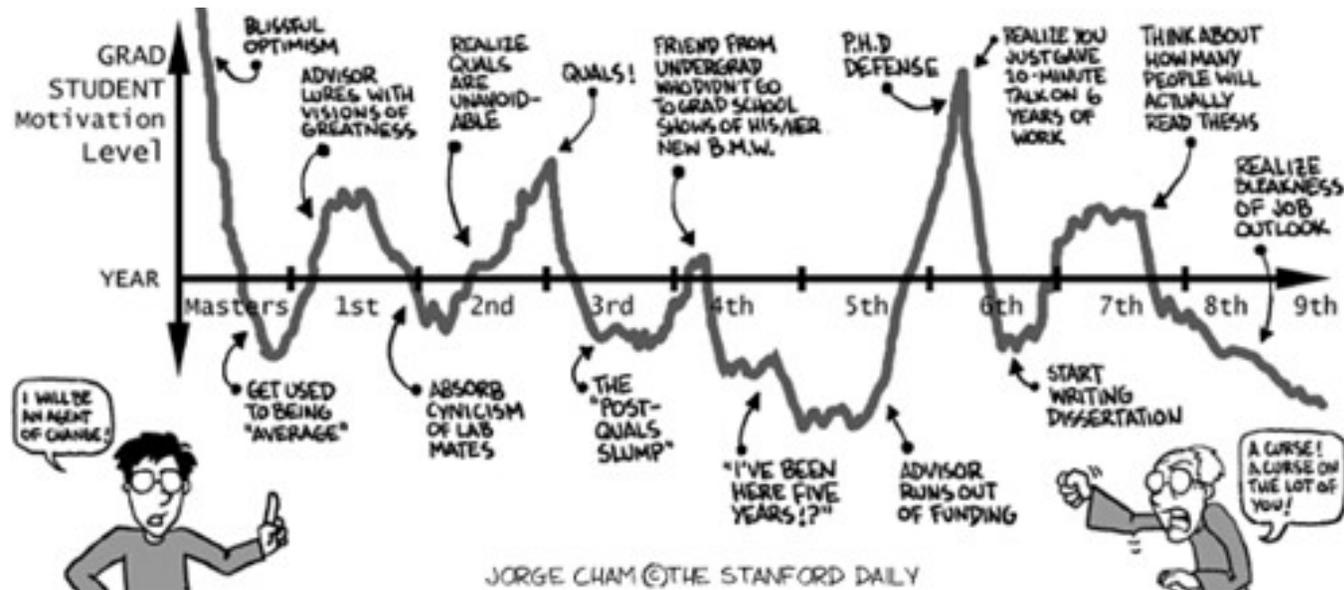
# How to find an advisor

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- Once you've identified an advisor you're interested in, get your foot in the door
  - Ask about attending group meetings
  - Ask about getting involved with small projects, even if you're not funded
  - Start early (this semester, if possible, or next semester at the latest!)
  - There is no commitment (on either side) for you to stay with a group!

Research opportunities generally don't come to you...you need to be proactive and track down opportunities. Start early and get over any shyness talking to faculty...they don't bite!

# Tips For Thriving in Graduate School



- Get used to the uneven pace of research: progress happens sporadically in grad school
- Don't compare yourself to others: getting your PhD is a marathon, not a sprint, and there's not a limit on the number of PhDs we give out
- Learn to pick up knowledge outside of classes: courses can be an inefficient way to learn while doing research

# Tips For Surviving Graduate School

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- Everyone has self-doubts and experiences frustration, so this is not unusual and you're not alone! Your confidence and ability to manage frustration will improve with time and effort.
- This is your PhD, so take charge of the process and take responsibility for knowing/following the requirements
- Be receptive to academic and research feedback from others.
- But don't be afraid to express your own views on the directions your research project should take!

# Tips For Surviving Graduate School

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- Take time off from research/studies! Socialize and enjoy your hobbies, etc.! You'll come back to research and studies with renewed energy and a fresh perspective.
- Take care of your physical and mental health: eat well, exercise, get sleep, and take advantage of campus/community [mental health resources](#) if needed.
- Communicate your feelings and concerns with your advisors, classmates, me, counselors, etc. We're here to help!