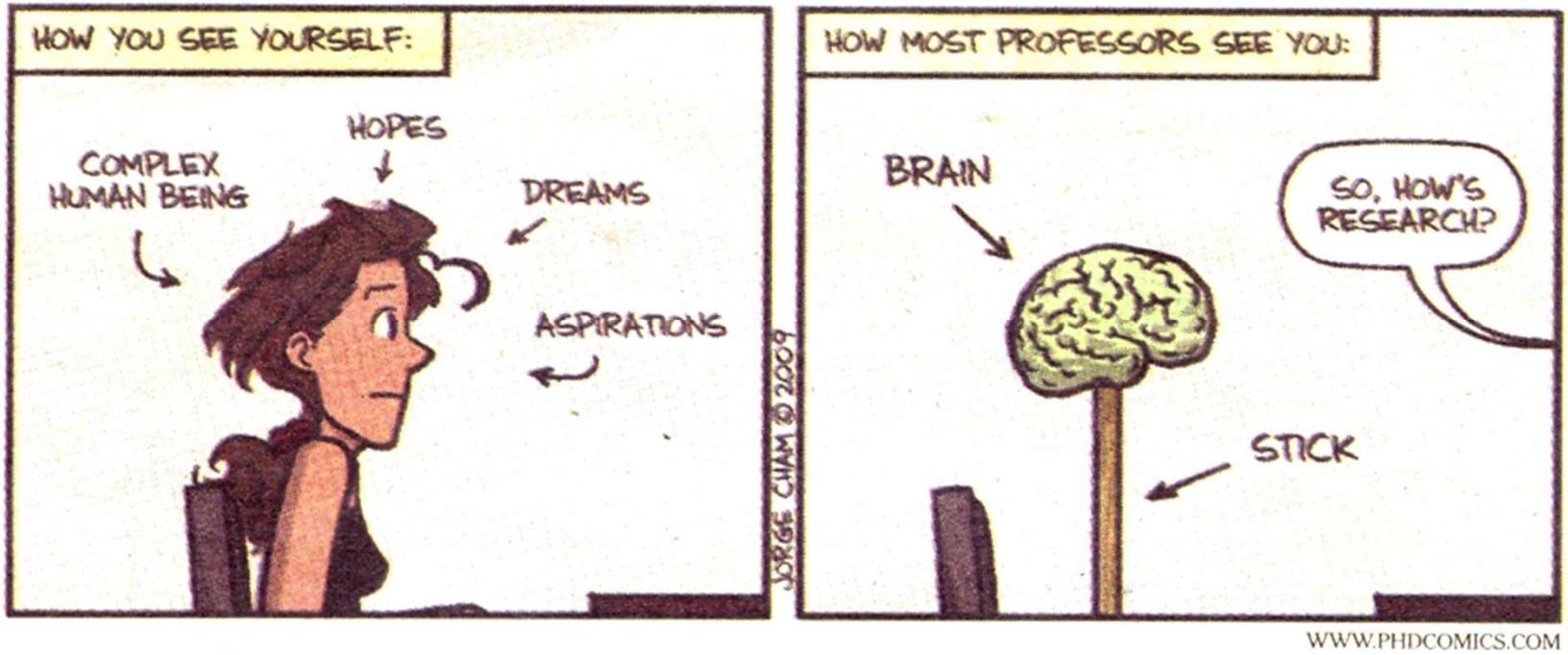
Finding an Advisor and Grad School Advice



Finding an Advisor

- 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 physics 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 here?
  - Approx. 370 students are pursuing a physics PhD (but most advanced grad students already have advisors)

Key Choices You'll Have

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/Relativity/Cosmology - Physical processes of the universe

Atomic and Molecular Physics - Physics of atomic or molecular systems

Biophysics - Physical processes of biological systems

Condensed Matter - Physics of materials, correlated and topological phases

Nuclear/Medium Energy Physics - Physics of atomic nucleus, muons, protons, neutrons, quark-gluon plasma, etc.

Particle/High Energy Physics - Studies of fundamental constituents of matter

Physics Education Research - Studies of how we learn science concepts

Quantum Information - Studies and exploitation of quantum 'weirdness'

Key Choices You'll Have

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…

To be or not to be a theorist/experimentalist?

Daily activities you must enjoy, at least most of the time:

Theorists:	Experimentalists:
Analytical calculations	Equipment building and troubleshooting
Mathematics	Electronics
Developing models	Data Acquisition and Analysis
Programming	Programming

Key Choices You'll Have

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?

- Roughly 45% of students do theory, 55% do experiment
- Of the students who change (theory to experiment) or (experiment to theory), most started in theory and change to experiment

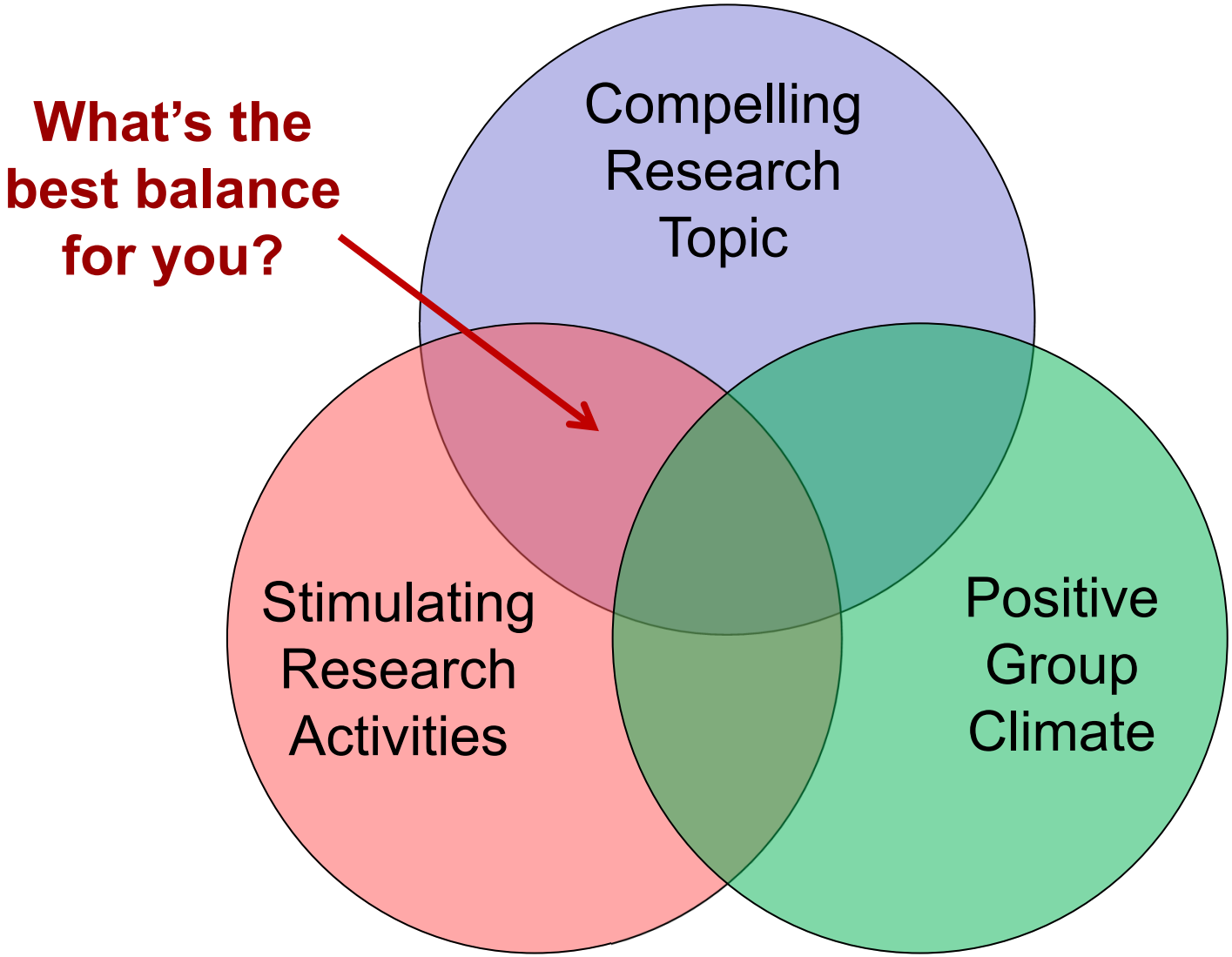
If you want to have elements of both theory and experiment in your research, generally speaking, it's probably a little easier to do theory as an experimentalist than to do experiments as a theorist (try computational physics if you like programming!).

Key Choices You'll Have

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

Finding the Optimal Group Environment

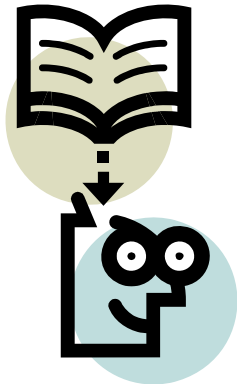


How to Decide What research You Like

- Based on discussions you have with potential advisors or the on the research described on their webpages
- Based upon classes you liked best or did well in
- From undergraduate research projects you liked/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/seminars
- Explore the research websites: https://physics.illinois.edu/research/
- Talk with faculty: https://physics.illinois.edu/people/directory/faculty
- Look for grad blog research postings: https://physics.illinois.edu/academics/graduates/blog/



What Advisors Look For

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 (Consider Phys 403)
- 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 Look For

Theory advisors:

- Theory advisors are generally more grade-conscious, more likely to ask about qual results (we don't give out 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 some theory groups aren't looking for many students and may be difficult to break into *if you have little or no prior theoretical research experience*

Tips for Identifying a Group

- 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 they're not giving 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 for Identifying a Group

- 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 and/or computationally.
- 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

- Goal: start an independent study with an advisor (Physics 597)
- Rough timeline for research involvement:
  - Check out faculty research websites, attend seminars, start talking to faculty to narrow research focus in Fall 2026
  - Attend group meetings by Fall 2026 or Spring 2027
  - Try to start formally with a group by *no later* than Summer 2027
- Manage your research expectations your first year!
  - You're taking classes and probably teaching your first year! You probably won't get much research done, and that's normal!
  - Try to relax if you feel you're not getting much research done this year!

Finding an Advisor

- Identify potential advisors
  - Look over their research pages on https://physics.illinois.edu/research/
  - Go to their seminars
  - Attend their Phys 596 presentations
  - 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
  - Look for postings on the grad blog
  - Take their course

Questions to Ask a Potential Advisor

- Are they accepting research students? If “no”, then when will they start accepting students?

- Are the advisor’s research projects collaborative (multiple students), or does every student have their own project?

- If you work in their group, how much flexibility will you have to select research projects?

- 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?

Approaching Potential Advisors

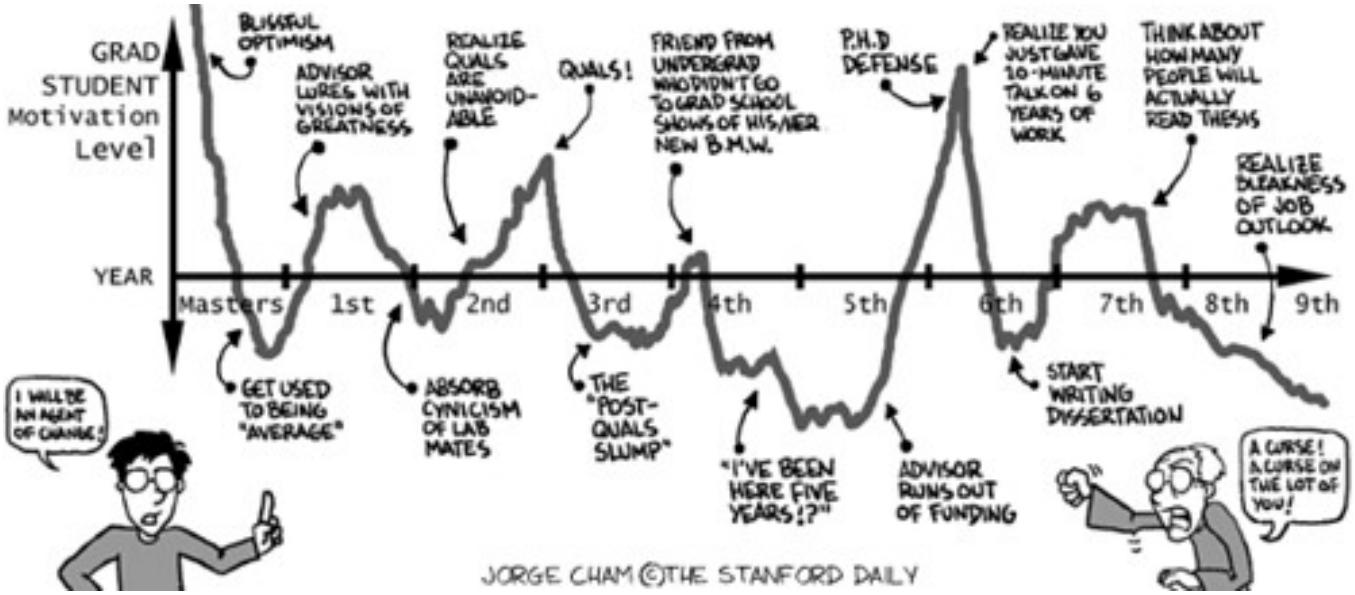
- Once you've identified one or more advisors you may be interested in, get your foot in the door
  - Ask about attending group meetings
  - Ask about getting involved with small projects, even if you're not funded
  - Start as early as you feel comfortable (this semester is fine, if you know what you want, but it's also fine if you start in research by next semester or summer!)
  - 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!

Approaching Potential Advisors (cont.)

- If you're considering several potential advisors, be cautious about unintentionally committing yourself
  - You may not want to accept an RA appointment if offered, as this is a significant level of commitment
  - Be up front with potential advisors that you're exploring your interest in their research but are not yet willing to commit because you're also considering other groups
  - Doing a Phys 597 with an advisor suggests a somewhat higher level of commitment. And again, it's a graded class, so ask about the advisor's expectations
  - If you just want to explore your research interest without committing, ask to attend group meetings and talk with current students. It's fine to explore during your first year!

Tips For Thriving in Graduate School



Also: "Grad Student Mood"

- Get used to the uneven pace of research: progress happens sporadically in grad school ⇒ Manage your expectations and mood!

- Don't compare yourself to others: getting your PhD is a marathon, not a sprint, and there are many acceptable paths to the PhD

- Learn to pick up knowledge outside of classes: courses can be an inefficient way to learn while doing research

Tips For Thriving in Graduate School

- 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

- Your days and weeks will probably be much less "scheduled" than you were used to as an undergrad (particularly as a fellowship student)…find ways to manage your time usefully while budgeting time to take breaks, hang out with friends, and pursue hobbies!

- Don't be afraid to express your own views on the directions your research project should take!

Tips For Thriving in Graduate School

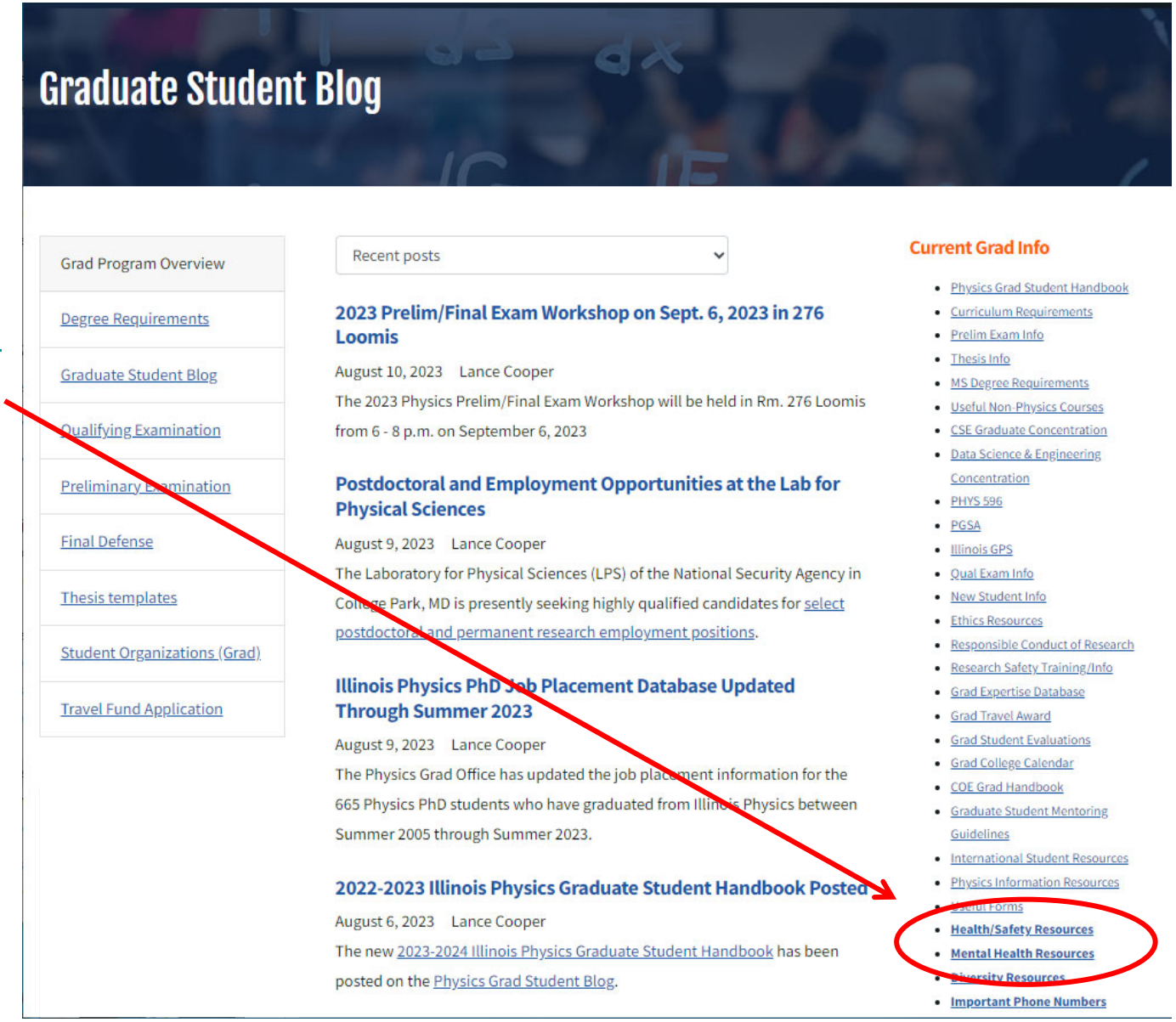
- Don’t be afraid to ask for help from me, classmates, and your advisors!

- 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.

Mental Health and Wellness Resources

List of Health/Safety and Mental Health Resources on Grad Blog: https://physics.illinois.edu/academics/graduates/mental-health



Tips For Thriving in Graduate School

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- 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, counselors, and/or me! We're here to help!

- Familiarize yourself with departmental mentoring guidelines, and the associated responsibilities of your advisor, the department and YOU! (see next page)

Departmental Mentoring Guidelines

https://ws.engr.illinois.edu/sitemanager/getfile.asp?id=3102

ILLINOIS GRADUATE COLLEGE

Recommended Guidelines for Graduate Student Mentoring

FACULTY	GRADUATE STUDENTS	GRADUATE PROGRAMS
POSITIVE & SUPPORTIVE ENVIRONMENT	**POSITIVE & SUPPORTIVE ENVIRONMENT**	**POSITIVE & SUPPORTIVE ENVIRONMENT**
• Foster the overall wellbeing of students • Provide students a safe, supportive environment • Interact ethically and professionally with other members of the university community • Be responsive and receptive to students' requests for academic feedback and professional advice	• Interact ethically and professionally with other members of the university community • Seek guidance when feedback is needed • Communicate about needs and concerns regarding academic and professional progress	• Foster the wellbeing of students • Provide students a safe, supportive environment • Interact ethically and professionally with other members of the university community • Connect students with appropriate university offices and resources • Help resolve student problems and conflicts
ACADEMIC SUCCESS	**ACADEMIC SUCCESS**	**ACADEMIC SUCCESS**
• Guide students in developing academic and research skills • Convey clear expectations for academic and research progress • Provide timely, constructive feedback and periodic evaluations • Evaluate students' performance fairly and objectively • Promote students' timely academic and research progress • Advise students on requirements for academic integrity, responsible conduct of research and other relevant policies	• Be receptive to academic and research direction and feedback from advisers • Take responsibility for knowing and fulfilling degree requirements • Take responsibility for knowing and executing ethical, professional norms • Understand and follow department, Graduate College and university policies, including academic integrity, student conduct and responsible conduct of research	• Provide information about degree requirements, academic policies and expectations • Share information about fellowships, awards and other academic opportunities • Monitor student academic progress, providing at least yearly evaluations and communicating these with students
CAREER DEVELOPMENT	**CAREER DEVELOPMENT**	**CAREER DEVELOPMENT**
• Foster the professional development of students to prepare for a wide range of future employment options • Assist students in achieving their career goals • Encourage engagement in professional communities and meetings to foster potential career opportunities • Advise students regarding the ethics of their profession	• Identify professional development needs and pursue appropriate opportunities • Take initiative for career exploration and the job search	• Promote student engagement in professional development programs • Foster the professional development of students to prepare for a wide range of future employment options • Direct students to resources that can help them pursue and succeed in their careers of choice