

Is grad school right for me? If so, how do I get there?

Prof. Marjorie Olmstead

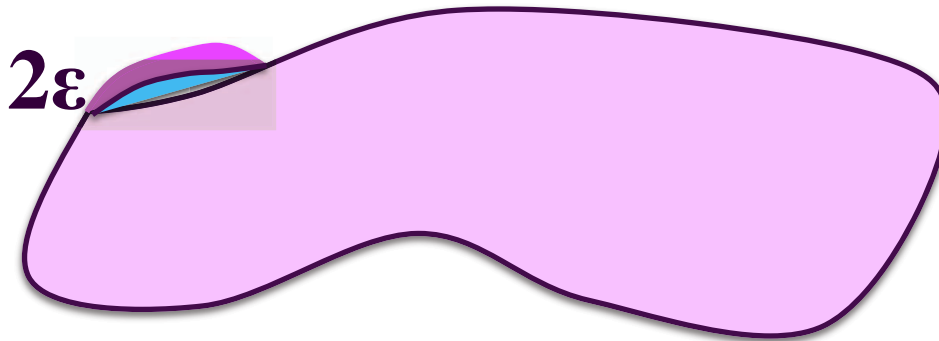
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What is a PhD?

- Take some piece of knowledge about the universe from $(\text{frontier} - \varepsilon)$ to $(\text{frontier} + \varepsilon)$



- Start out knowing nothing about a topic, and four years later you are the world expert
- “License to think” – allows you to write grants, direct research projects, teach @ college/univ

Why Go to Grad School?



- Deeper understanding of a subject
- Better/different job prospects
- Participate in the excitement of the intellectual frontier
- DON'T
 - Assume automatic faculty position
 - Drift into graduate school

Get a PhD and Become ...

- A researcher
- A communicator
- A visionary
- A problem solver
- A politician
- The smartest homemaker on the block
-

Where to Go? What Field?

➤ What Subject for your Advanced Degree?

○ Medicine

○ Law

○ Chemistry

○ Engineering

(Electrical, Materials, Chemical, ...)

○ Physics

○ Astronomy

2012 MCAT

| Major | Phys Sci | Bio Sci | Verbal | # |
|-----------|----------|---------|--------|--------|
| BioMedEng | 11.1 | 10.6 | 9.6 | 1147 |
| Physics | 11.1 | 10.4 | 9.8 | 228 |
| Biology | 9.0 | 9.7 | 8.7 | 13,605 |
| OVERALL | 9.5 | 9.9 | 9.0 | 44,464 |

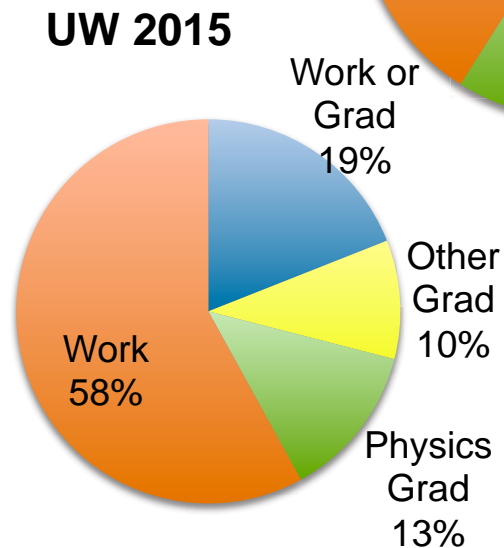
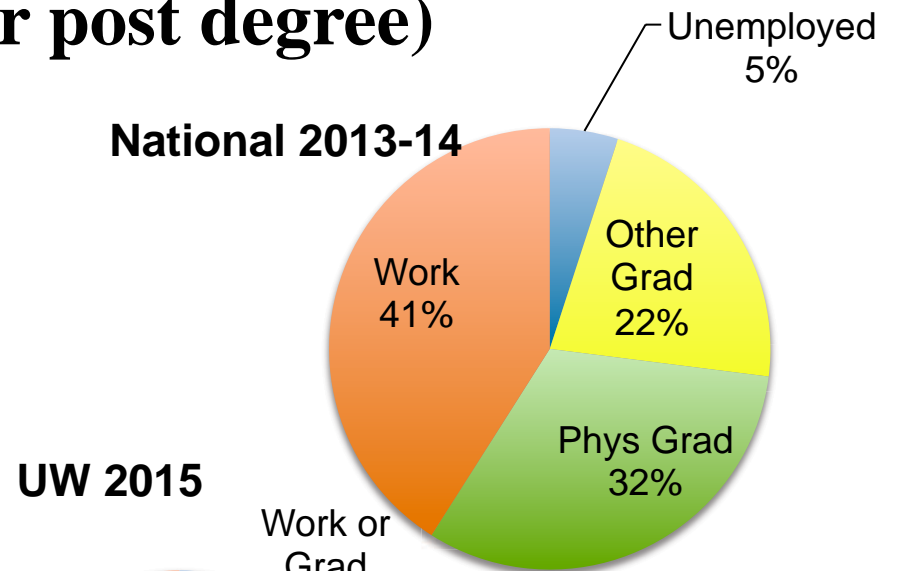
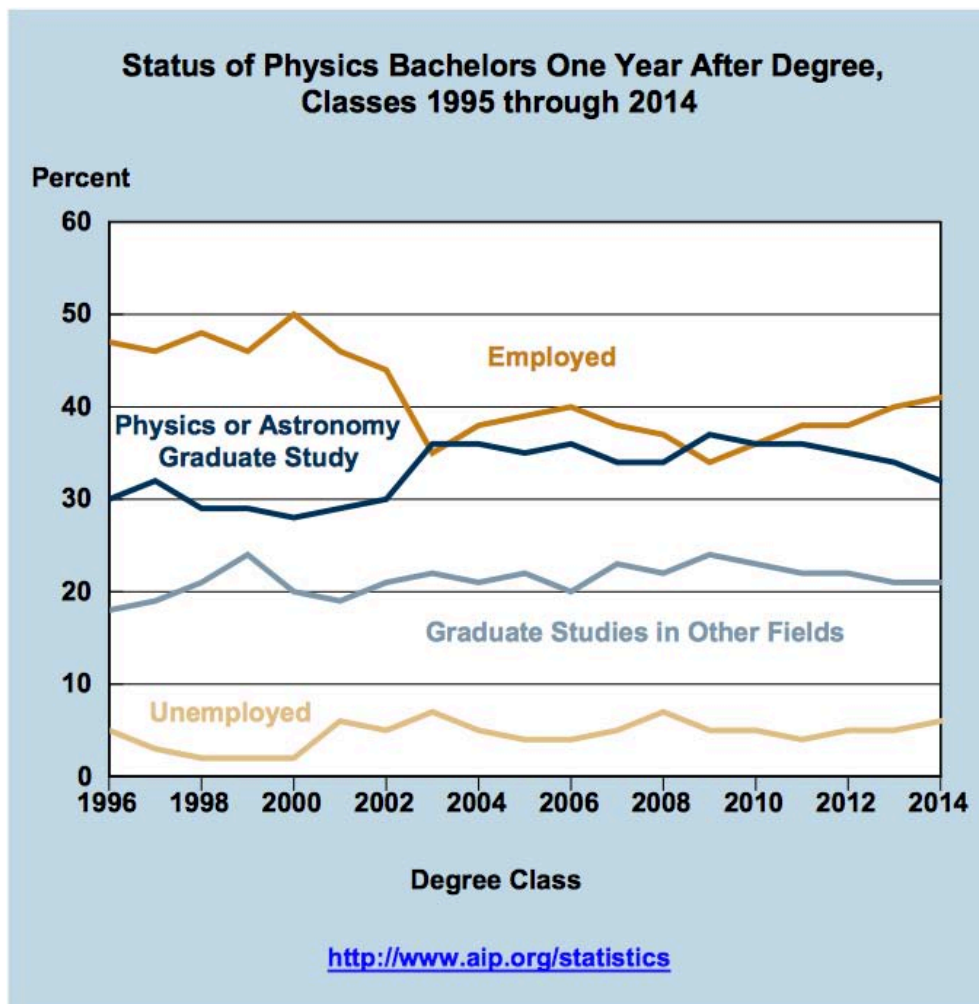
2012 LSAT

| Major | Mean | # |
|---------------|-------|--------|
| Physics | 162.1 | 126 |
| Political Sci | 154.3 | 12,215 |
| Pre-Law | 149.0 | 994 |
| OVERALL | 153.6 | 66,197 |

$$\frac{228 + 126}{6776} = 5.2\%$$

What else could I do?

Trends in initial outcomes of physics bachelor's Classes of 1995 to 2014 (1 year post degree)



<http://www.aip.org/statistics>

Who hires physics bachelor's?

➤ Washington Employers that recently hired new physics bachelor recipients

<https://www.aip.org/statistics/washington>

- Amazon
- Areva
- Bainbridge Parks & Recreation
- Battelle
- Best in Class Education Center
- Blue Box Group
- Bombsheller
- Bruker Elemental
- Cascade Gasket, Inc.
- Chipton Ross
- Corvus and Columba LLC
- David Evans and Associates, Inc.
- Det Norske Veritas
- Device Inside, Inc.
- Eagle Harbor Technologies, Inc.
- Electroimpact
- Exotic Metals Forming Company
- Financial Partners, Inc.
- Flexasoft
- Google
- Gravity Jack, Inc.
- HopeSource
- Hewlett Packard
- Intentional Software
- L&S Engineering.
- Lockheed Martin
- Logos Bible Software
- Marchex, Inc.
- Micro Encoder, Inc.
- Microsoft
- Milliman
- NAVSEA
- NW Medical Physics Ctr
- Octapharma Plasma, Inc.
- PNNL
- Pellego
- Physio-Control
- Procure Treatment Centers
- PSC Biotech
- Puget Sound Naval Shipyard
- RAFI USA
- Randstad
- Red Head Steering Gears
- Schneider Electric
- Schweitzer Engineering Labs.
- Seattle Children's Research Inst.
- Space-X
- Tableau Software
- TecAce Software Limited
- Telect, Inc.
- TigerStop
- US Navy
- University of Washington
- Woodruff Scientific Computing
- X2 Biosystems
- Zulily

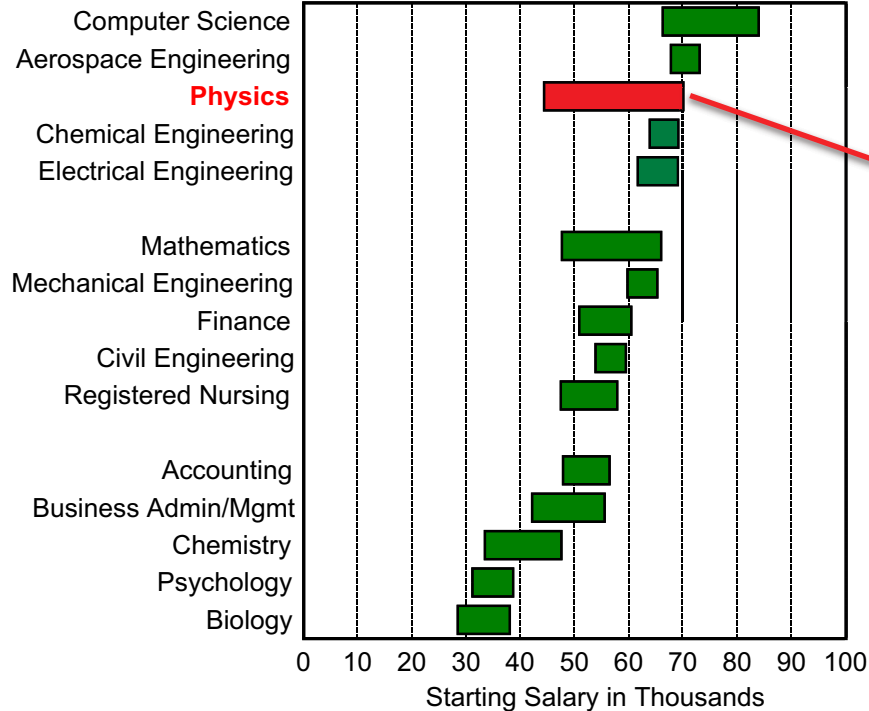
Source: AIP Statistical Research Center, Initial Employment Surveys, classes 2011 thru 2015.

What might you earn?

What's a Bachelor's Degree Worth?

Typical Salaries for Bachelor's Degree Recipients, Class of 2015

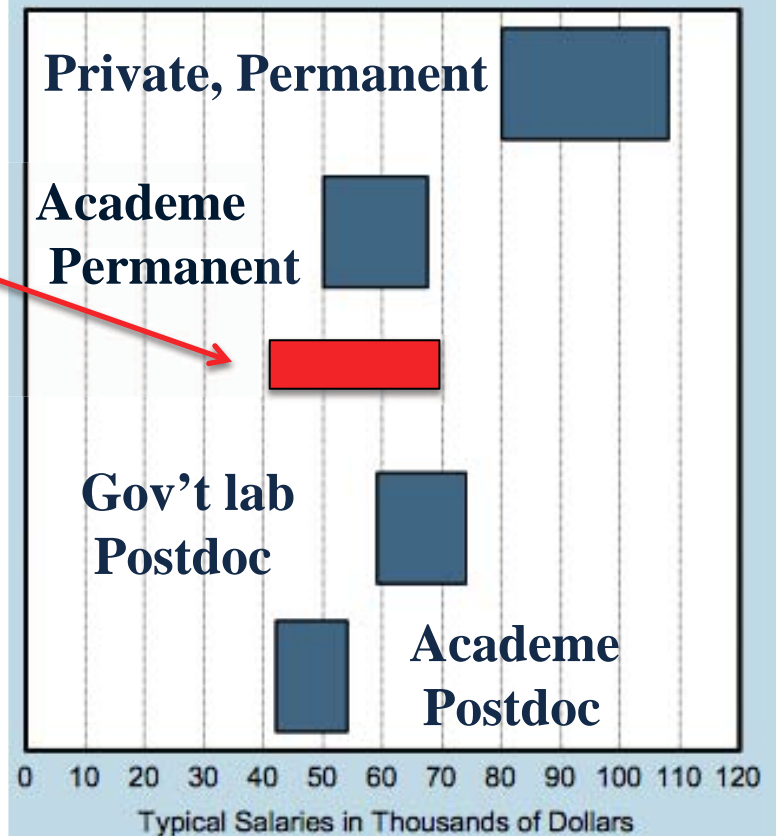
Bachelor's Field



Note: Typical salaries are the middle 50%, i.e. between the 25th and the 75th percentiles.

Reprinted from the Spring 2016 *Salary Survey*, with permission of the National Association of Colleges and Employers, copyright holder.

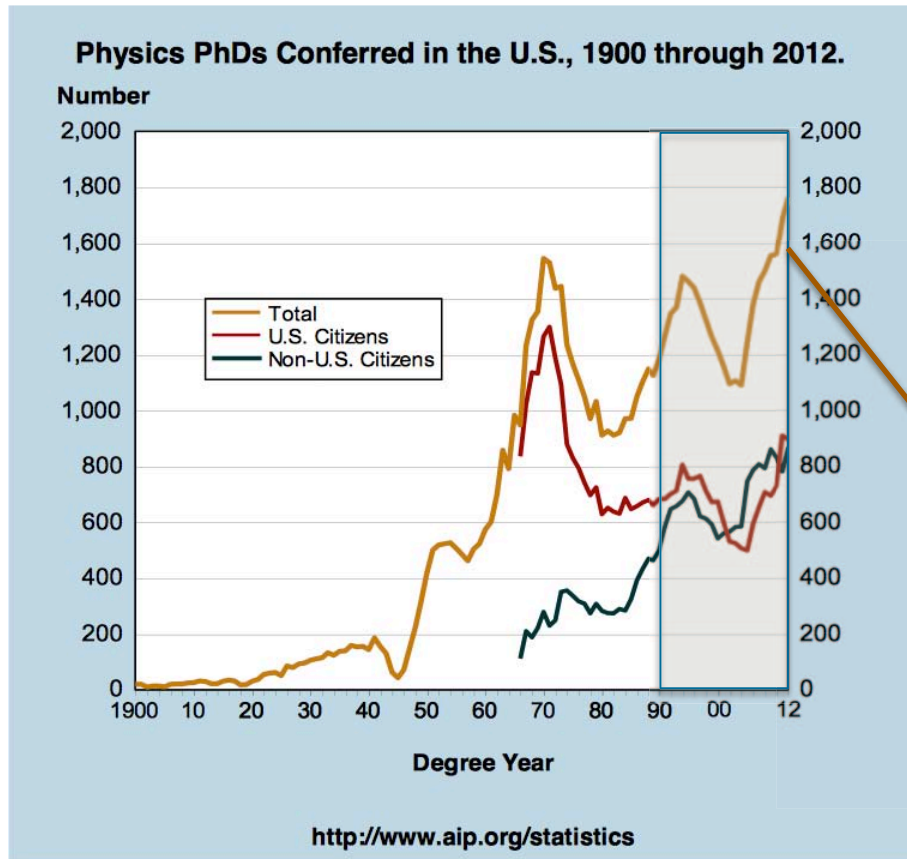
PhD Starting Salaries 2013-14



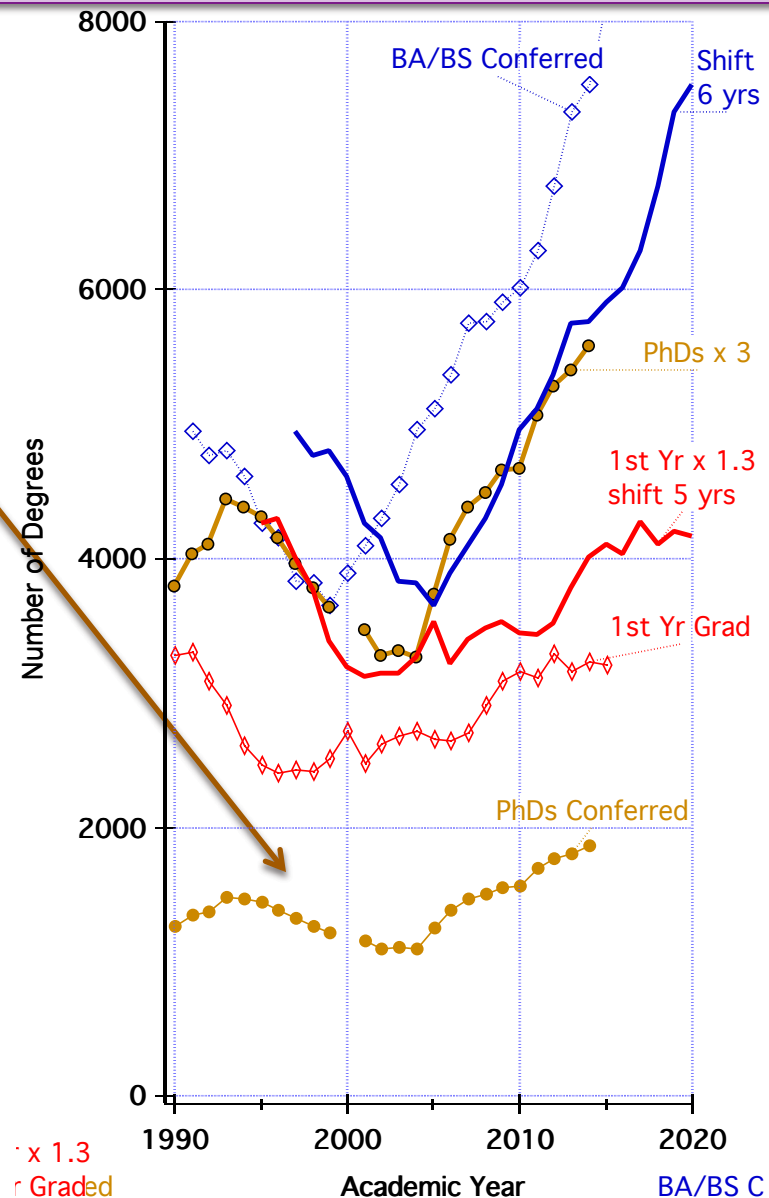
Follow us @AIPStatistics

Fall 2016

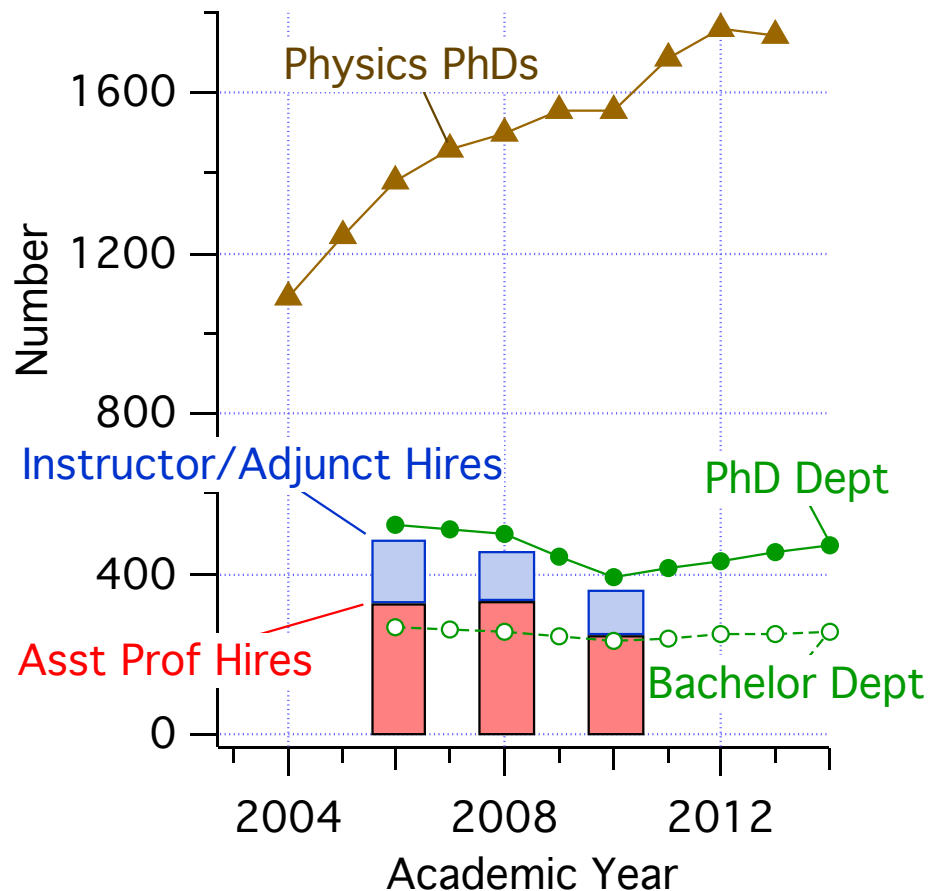
How many people get a PhD?



Will PhD Programs
expand with rise in B.S.?



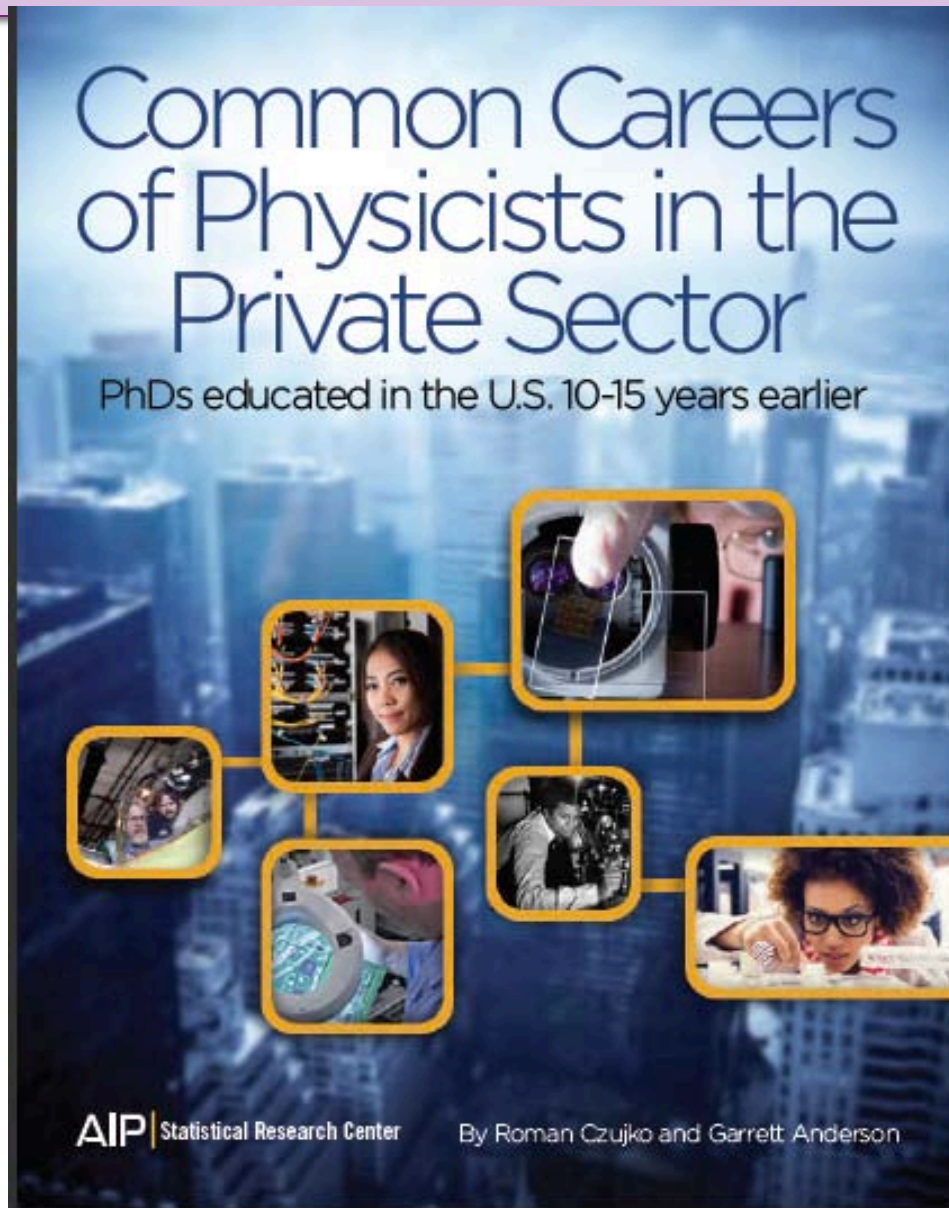
Newly Hired Faculty Growth < PhD



2008 Hire /2004 PhD = 40%
2010 Hire /2006 PhD = 26%
2014 Hire /2010 PhD = 30%

Jobs like mine: →10%?
General Academic: <30%

What else can I do with a PhD?



- Self-employed
- Finance
- Gov't Contractors
- Health & Medicine
- Industry
 - Engineering
 - Computer Science
 - Physics
 - Other STEM
 - Non-STEM

Most Common Activities:

- solving complex problems
- managing projects
- writing for a technical audience

PhD 10-15 Years Post Degree

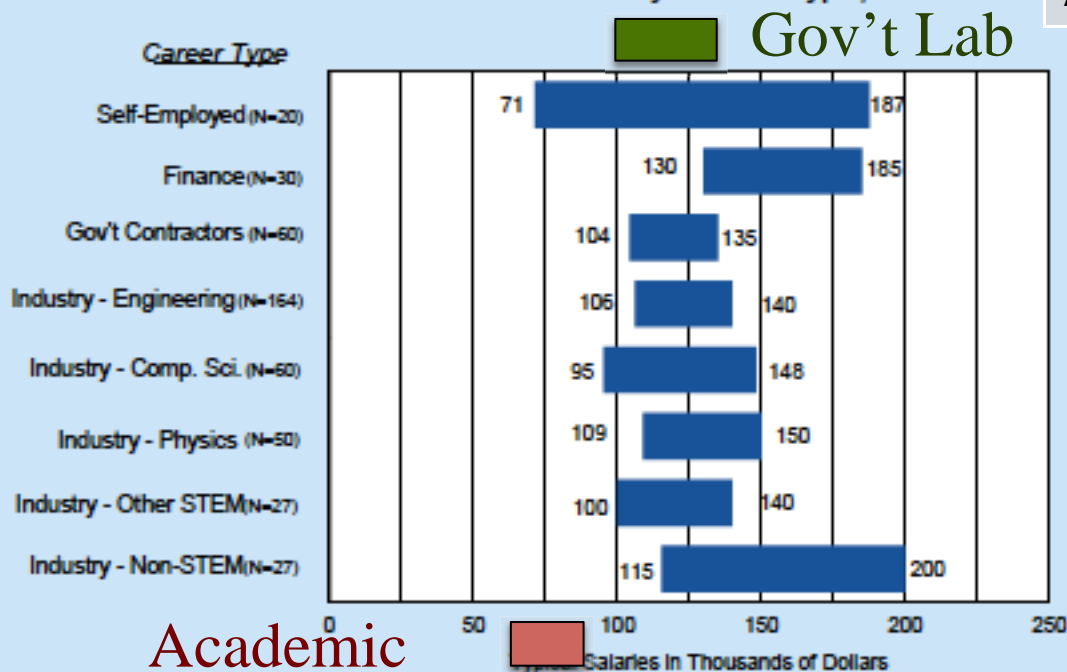
1 yr out

Figure 2.1



| Sector | 2011 Salary | N |
|-----------|---------------|-----|
| Private | \$105k-\$150k | 438 |
| Gov't Lab | \$100k-\$130k | 190 |
| Academia | \$62k - \$85k | 533 |

Physicists in the Private Sector
Salaries by Career Type, 2011



Data include US-educated physicists who earned their PhDs 10-15 years earlier and were working full-time in the US in 2011. Respondents were asked to provide their current annual salary excluding bonuses, overtime, and additional compensation. Typical salaries are the middle 50%, i.e. between the 25th and 75th percentiles. "N" represents the number of physicists who responded to the survey, were full-time employed, and provided salary data.

PhD Plus 10 Study - www.aip.org/statistics

Classes of 1996-7 and 2000-2001
Polled by AIP in 2011

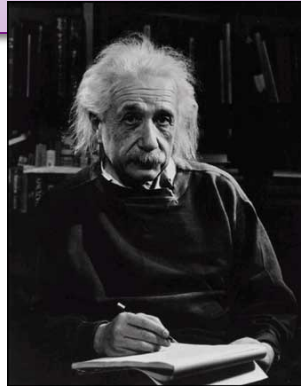
So if I do go to grad school ...

- What happens?
- How long does it take?
- How do I finance it?
- How do I figure out where to go?
- What are grad schools looking for?

“Standard Path” to the Ph.D.



Take Classes



Dream New Ideas



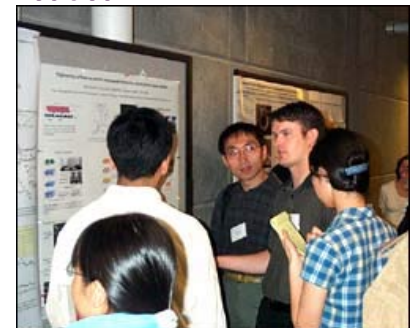
Analyze Data



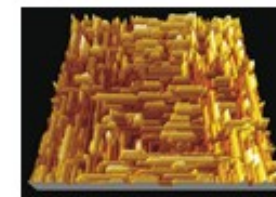
**Read other
people's ideas,
get trained**



Take Data



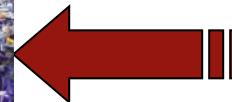
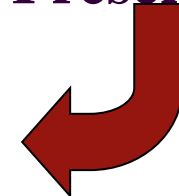
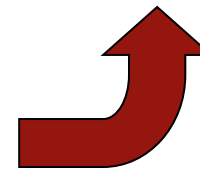
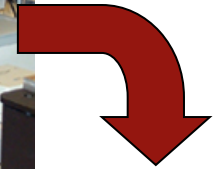
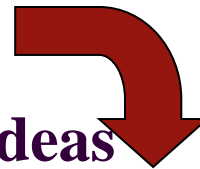
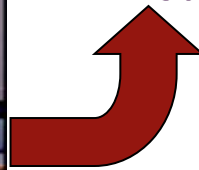
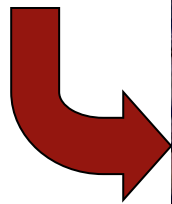
Present work



Publish results



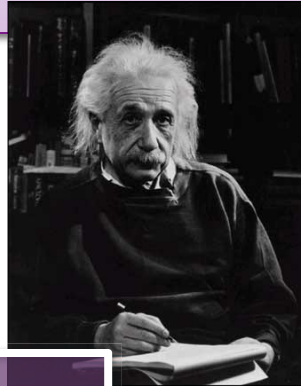
GRADUATE



“Standard Path” to the Ph.D.



Take Classes



Brain New Ideas



Analyze Data

2-3 years

2-4 years



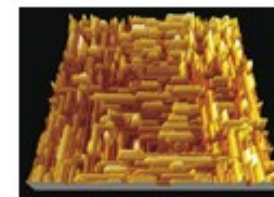
Read other people's ideas, get trained



Take Data



Present work



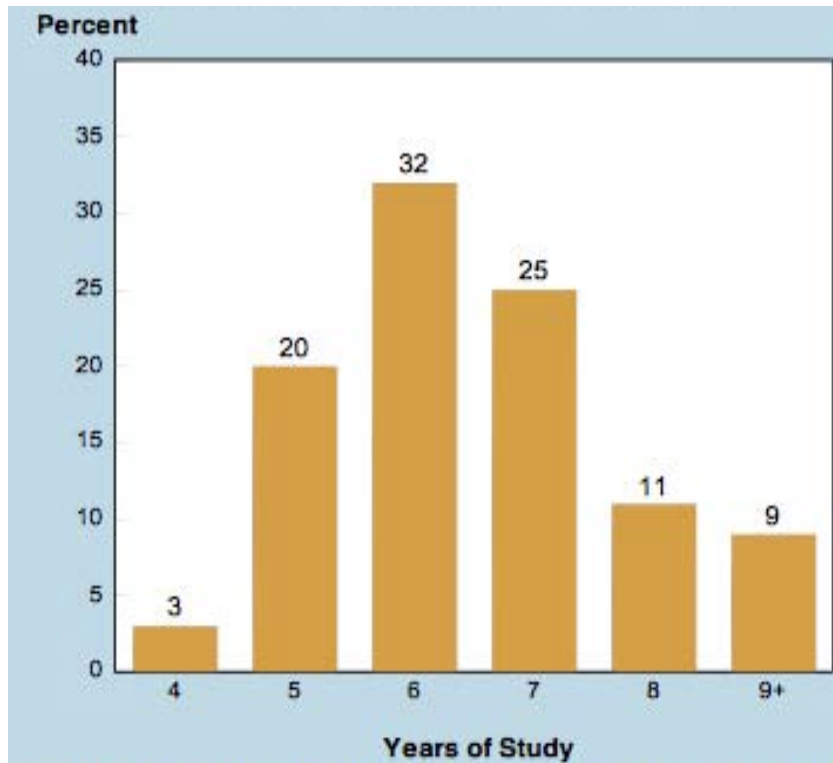
Publish results



GRADUATE

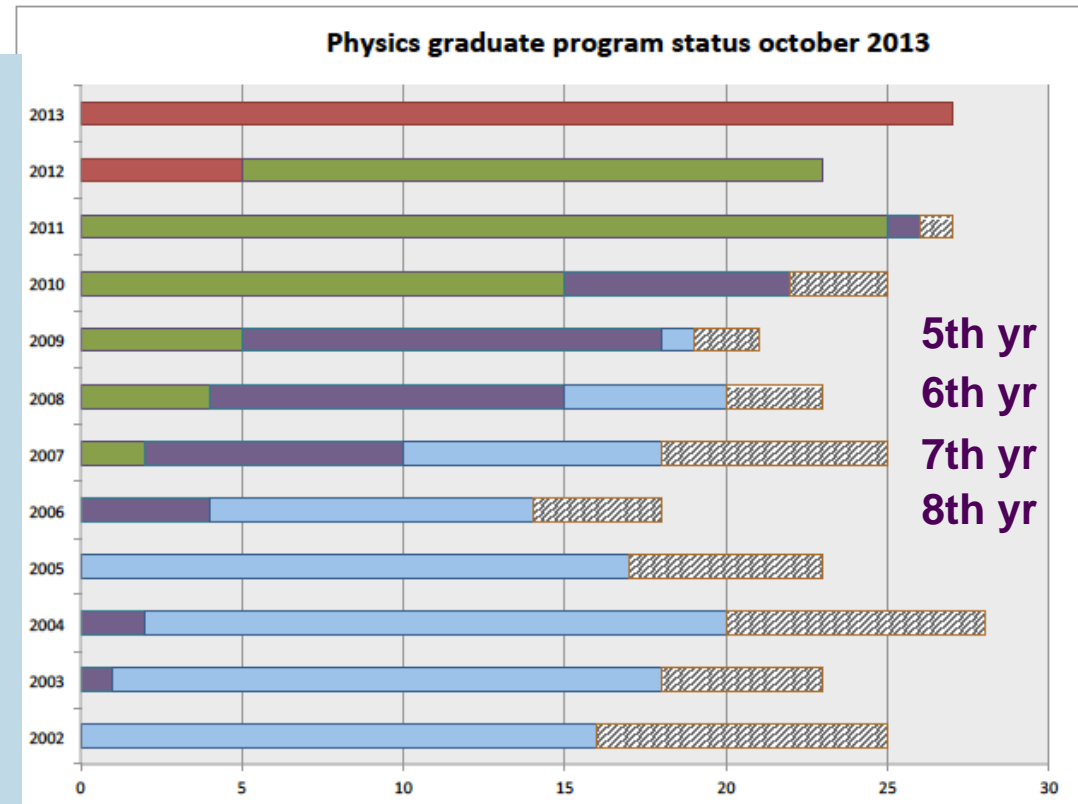
How long does it take?

AIP Statistics



Classes of 2010-2011

UW Statistics



Number of PhD Students

Pre-qual Pre-General Post-General Ph.D. Left

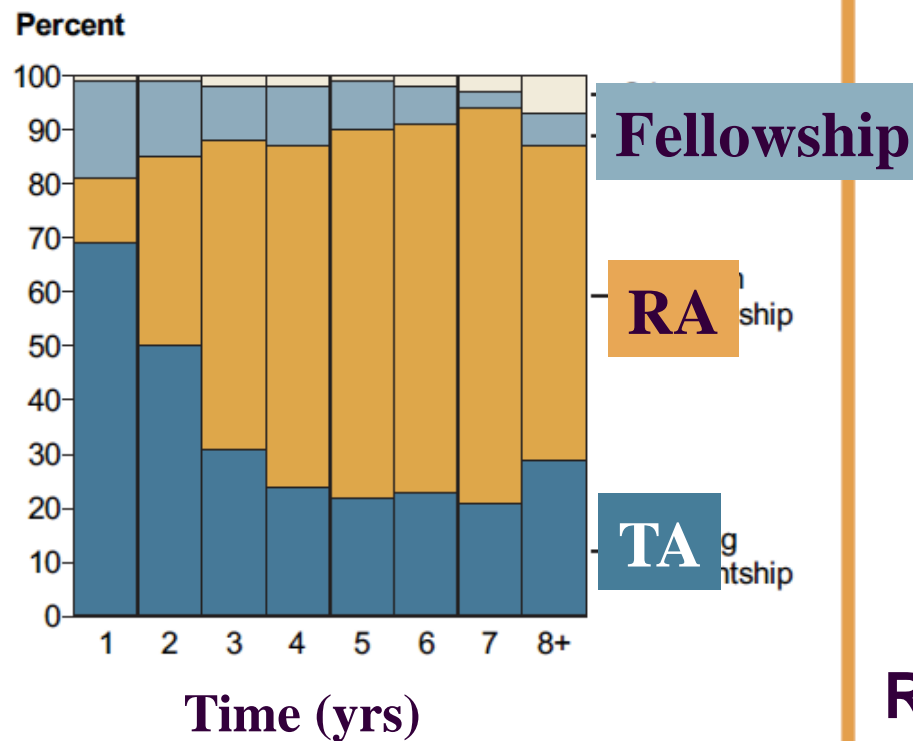
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- What are grad schools looking for?

You get PAID to go to grad school!!

PLUS: Your tuition gets paid
& you don't have to pay off student loans until you graduate

Primary Type of Support for Physics Doctoral Students



Source: AIP Graduate Student Survey, 2006

You don't add to your savings, but you don't deplete them, either.

Current UW Rates:

\$2228-\$2572/mo (\$27-31k/yr)

Current NSF Fellowship:

\$2833/mo (\$34k/yr)

Roommates

Used Car, New Computer

So if I do go to grad school ...

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Gradschoolshopper.com

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- Financial aid package
- Research budget
- Grants & research expenditures
- Department size
- Faculty, enrollments, and degrees granted

Browse Graduate Programs by:

- GRE requirements
- TOEFL requirements
- Admission deadlines
- Financial aid deadlines
- Specialties for degree program
- Departmental research specialties
- Institutional & Department location



Rice University

M.S. in Nanoscale Science/
M.S. in Space Studies
Houston, Texas

[Learn more about this program >](#)

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Information Available

- Description of University
- Deadlines; Average GRE scores, GPA
- Information by subfield:
 - Number of grad students
 - Number of Ph.D.s granted
 - Number of faculty
 - Research \$\$\$
- Fraction TA/RA/Fellowship
- Requirements
 - e.g. Qualifying Exam, Foreign Language

Top Tier? Big? Close to home?

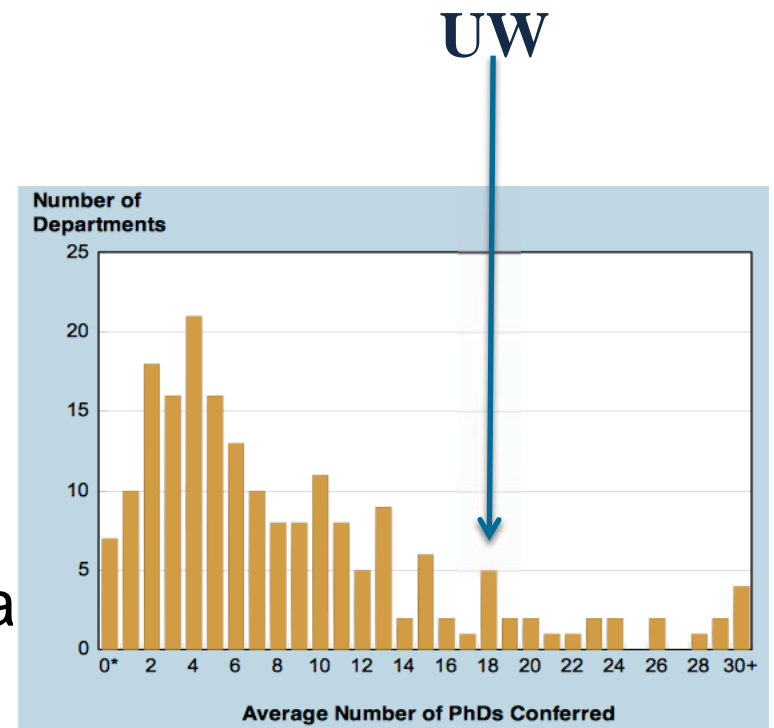
➤ Ranking:

- “Top12” hire each other’s grads
 - Hardest to get into
- Next tier = schools like UW
- Lower ranked departments often have pockets of top-ranked subfields

➤ Size:

- Large comprehensive department lets you change sub-fields easily
- Small lets you be a bigger fish in a smaller pond

➤ Geography



So if I do go to grad school ...

- What happens?
- How long does it take?
- How do I finance it?
- How do I figure out where to go?
- What are grad schools looking for?

What do they know about me?

GRADES

GRE
Physics + General

Letters of
Recommendation

Your Essay +
Cover Letter

- Weighting Varies
- Deadlines IMPORTANT -- usually January
- Schools offer by 4/1; You decide by 4/15
- FOLLOW INSTRUCTIONS
- CHECK SPELLING and GRAMMAR
- TYPE YOUR ESSAY

UW Admission Statistics

- Physics GRE of US Admits:
 - Averages in the low 800's (out of 990)
 - Admission rare below the mid 600's
- Average GPA:
 - Average 3.75 (3.85 last two years)
 - Admission rare below ~ 3.4
 - UW UG Physics: 25% > 3.5; 10% > 3.75
- ADVICE from our Admissions Chair
 - Study for the GRE
 - Get research experience

GREs

- Study for them!!
 - Can increase score >100 points
 - Figure out your best balance of speed and accuracy
- UW physics grad admissions averages:
 - Verbal 606
 - Quantitative 726
 - Analytical 779
 - **Physics >800 (and RISING)**

Letters of Recommendation

- **GET TO KNOW 3-4 FACULTY NOW!!**
- Choose people who KNOW you well
- Ask if they ☐ are willing to write you a ☐ good letter ☐
- Provide background information
- Give plenty of time
- Gently verify/remind as deadline approaches

Personal Statement

- Be honest and sincere
- Connect to the target department
 - Mention specific research areas, faculty
- Speak to your strengths and goals
- Address any irregularities in your record
- EDIT for grammar, spelling, coherence
- Have someone read your essay
 - Professor, Catherine, TA, ...
- Keep your goals in mind

Research Experience

- VERY HELPFUL to your application
- The vast majority of accepted students have some research experience as undergrads
- **It will be expected of someone from UW**
 - OK here or via an REU elsewhere
 - OK during year (Phys 499) or summer

Finding a Research Home

- NSF REU site
 - http://www.nsf.gov/crssprgm/reu/reu_search.cfm
- Talk to Margot
- Talk to your TAs
- Ask around at SPS
- Talk to your profs in physics and elsewhere
- Search Grad school part of our website
- Mary Gates, NASA Space Grant

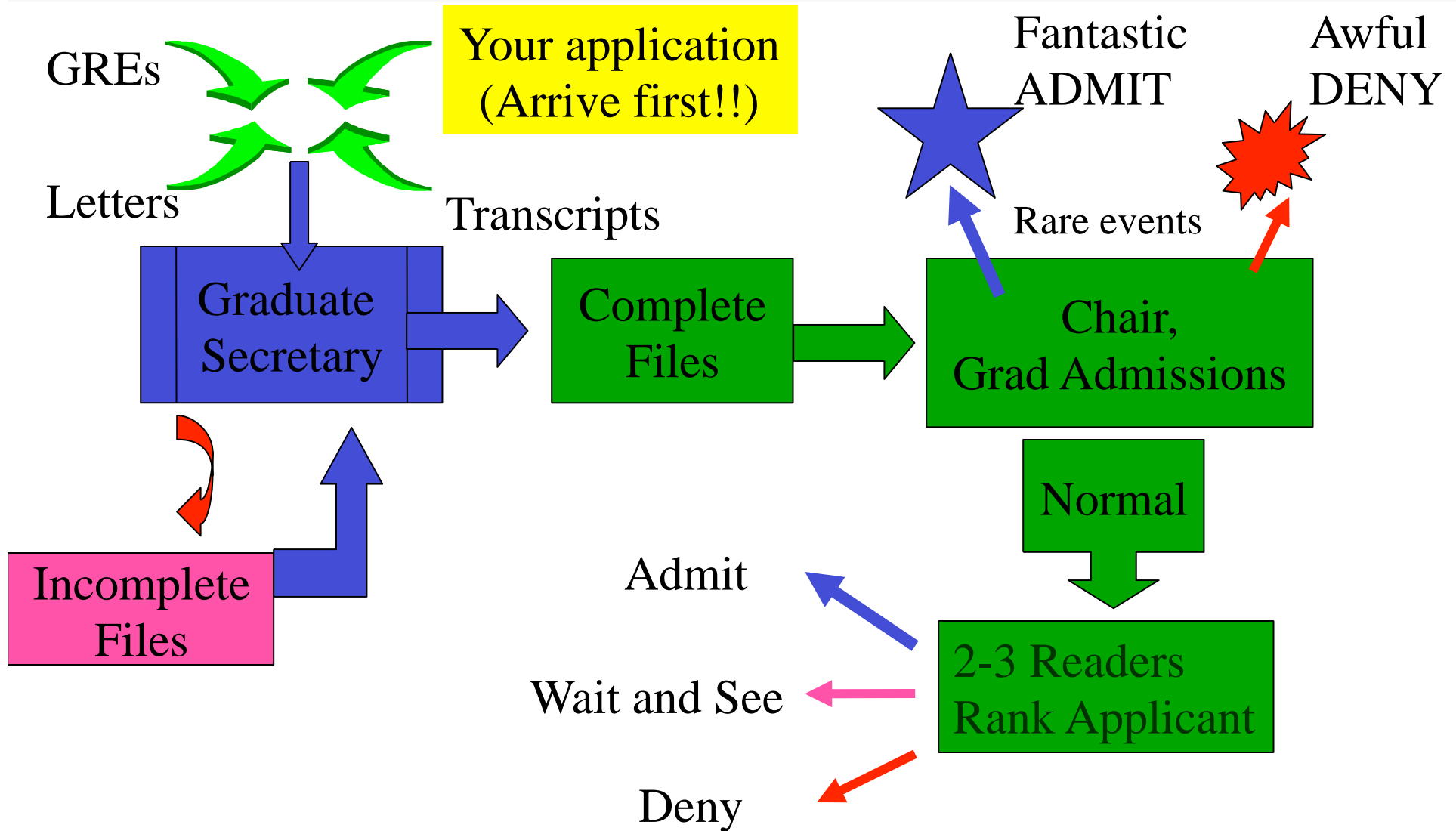
Enclosures

- **Don't** weigh down your application
- **DO** include any published paper or its abstract/citation

Overall Advice

- Consider applying to about 10 places
- Don't apply anywhere you aren't willing to go, but remember to include a safety school
- Get applications in EARLY
- Stand out from the rest
 - Visit
 - Phone call/email someone appropriate
 - (but don't bug them too much....)
- Check that file is complete
 - Contact Grad Assistant by email
 - Follow up on late letters, transcripts, etc.

What happens to it now....?



Selection Criteria

- Probable success depends on traits such as:
 - *Commitment*
 - *Creativity*
 - *Maturity*
 - *Leadership*
 - *Being able to communicate*
- Good match between your goals and research in the department of interest
- Successful research experience
- Your UG academic performance
- Mixed interests (spread out over whole dept) for entering class

Summary

- UG preparation in physics is a solid foundation for a variety of post-graduate programs.
- Grad study in Physics/Astronomy can be a grand adventure.
- Grad school is an opportunity to acquire skills and perspective that are broadly applicable to many fields.
- If it is what you want, then GO FOR IT!