

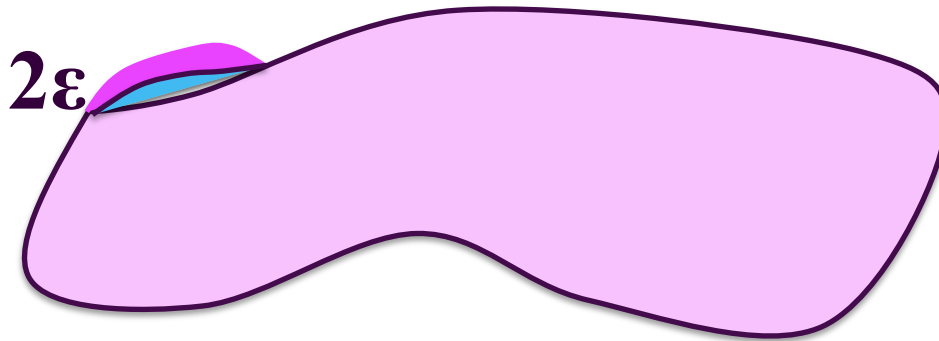
So you're thinking of going to Graduate School?

Prof. Marjorie Olmstead

**Associate Chair for Undergraduate Affairs
UW Department of Physics**

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 scientist
- 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**

2009 MCAT

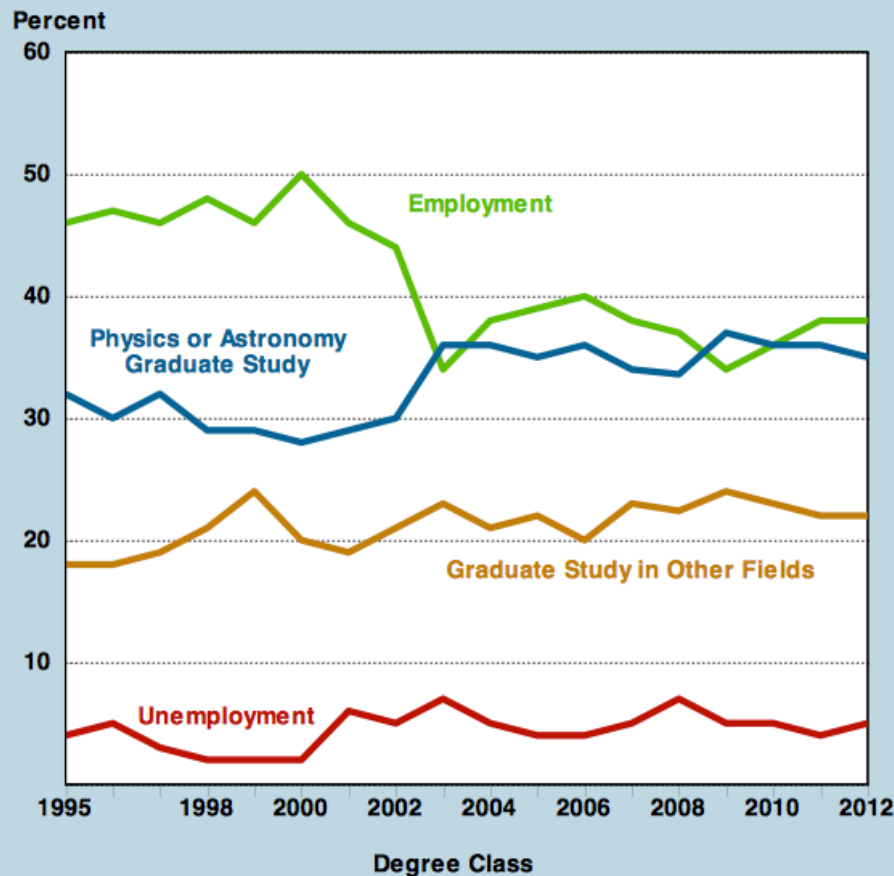
Major	Phys Sci	Bio Sci	Verbal	#
BioMedEng	10.9	10.7	9.6	1005
Physics	11.1	10.3	9.6	207
Biology	8.7	9.5	8.7	12,705
OVERALL	9.2	9.8	9.0	41,487

2009 LSAT

Major	Mean	#
Physics	161.5	180
Political Sci	153.0	14,964
Pre-Law	148.3	1,078
OVERALL	152.6	81,530

What do Physics Bachelor's do after graduation?

Trends in initial outcomes of physics bachelor's Classes of 1995 to 2012 (1 year post degree)



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

2011 + 2012 Grads

38%: Get a Job

36% Physics/Astro GS

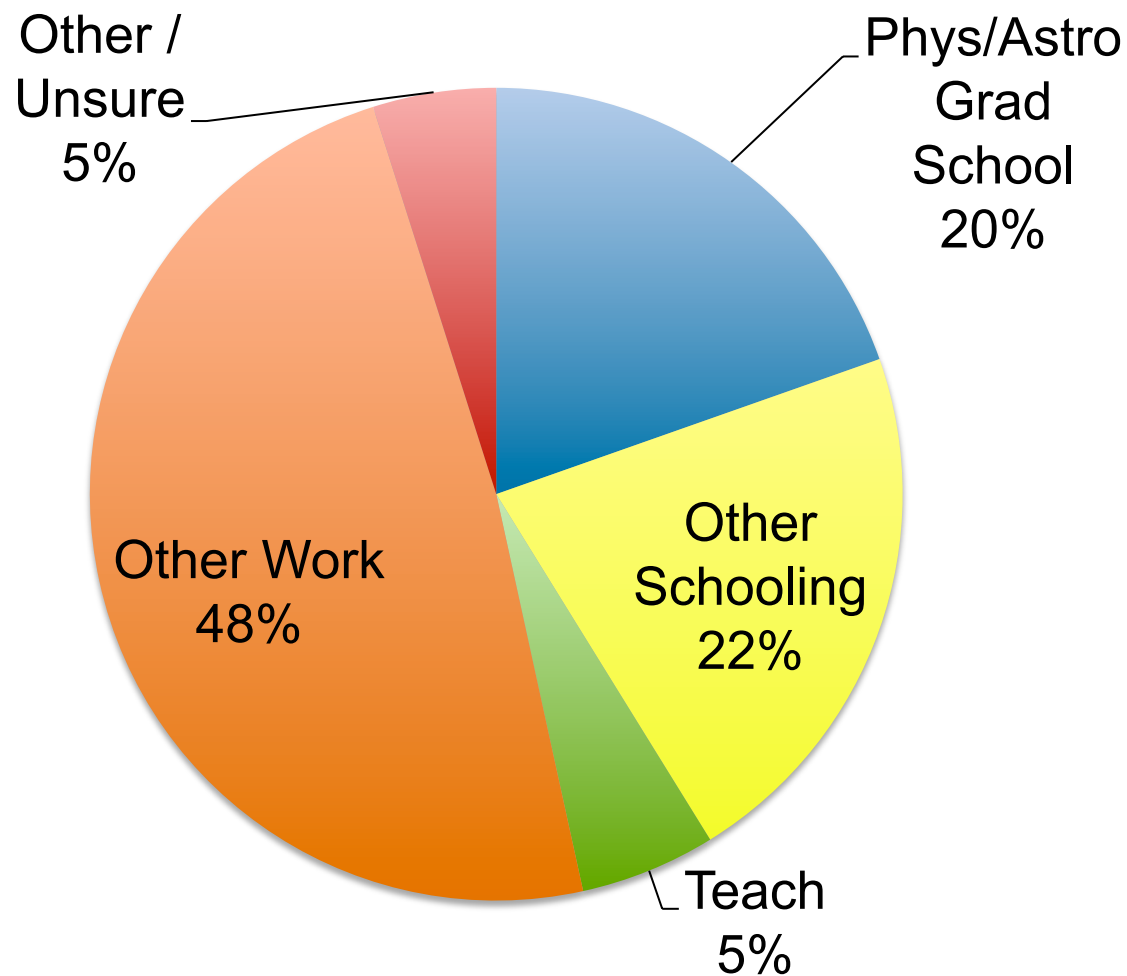
22% Other Grad School

4% Unemployed

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

UW Physics class of 2013 & 2014

From “Apply to Graduate” survey



Who hires physics bachelor's?

➤ Some employers in Washington that recently hired new physics bachelor recipients

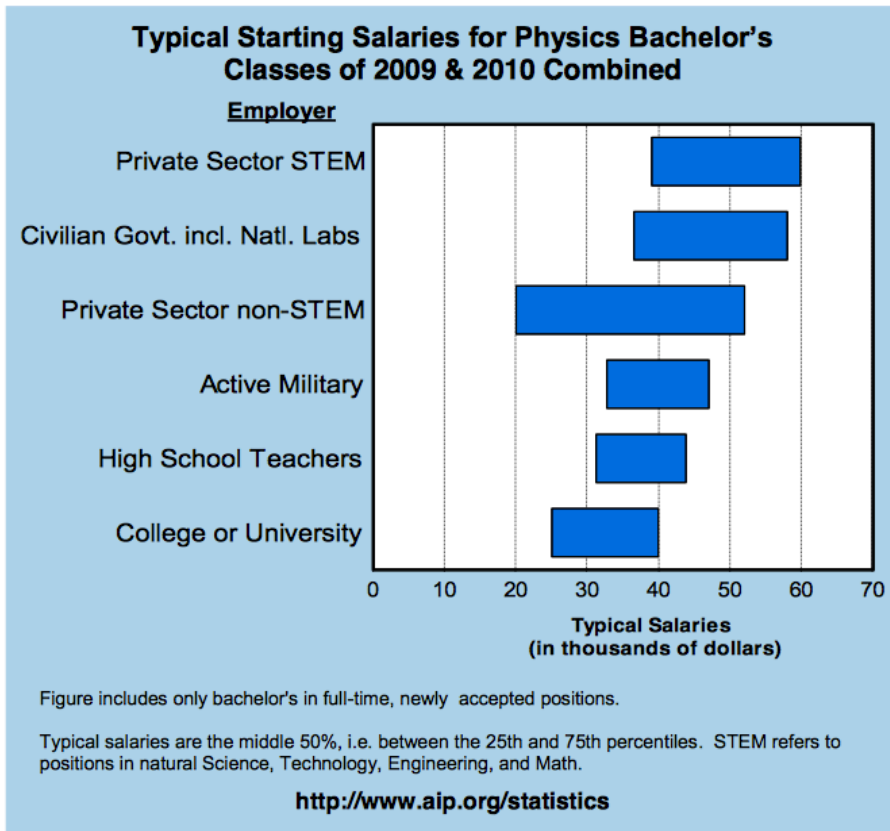
- Absolute Aviation Services
- Astronics AES
- Battelle
- Blue Box Group
- Boeing
- Bruker Elemental
- Cascade Gasket, Inc.
- CleanScapes
- Device Inside, Inc.
- DNV
- ExtraHop Networks
- Financial Partners, Inc.
- Intentional Software
- Microsoft
- Octapharma Plasma, Inc.
- Pacific Northwest National Lab
- Puget Sound Naval Shipyard
- Radiant Zemax, LLC
- Schneider Electric
- Schweitzer Engineering Labs, Inc.
- Speakeasy, Inc.
- Stardust Materials
- Telect, Inc.
- Washington State Department of Health
- Washington River Protection Solutions
- Zulily

Source: AIP Statistical Research Center, Initial Employment Surveys, classes 2009 thru 2011.

<http://www.aip.org/statistics/trends/states/state.html>

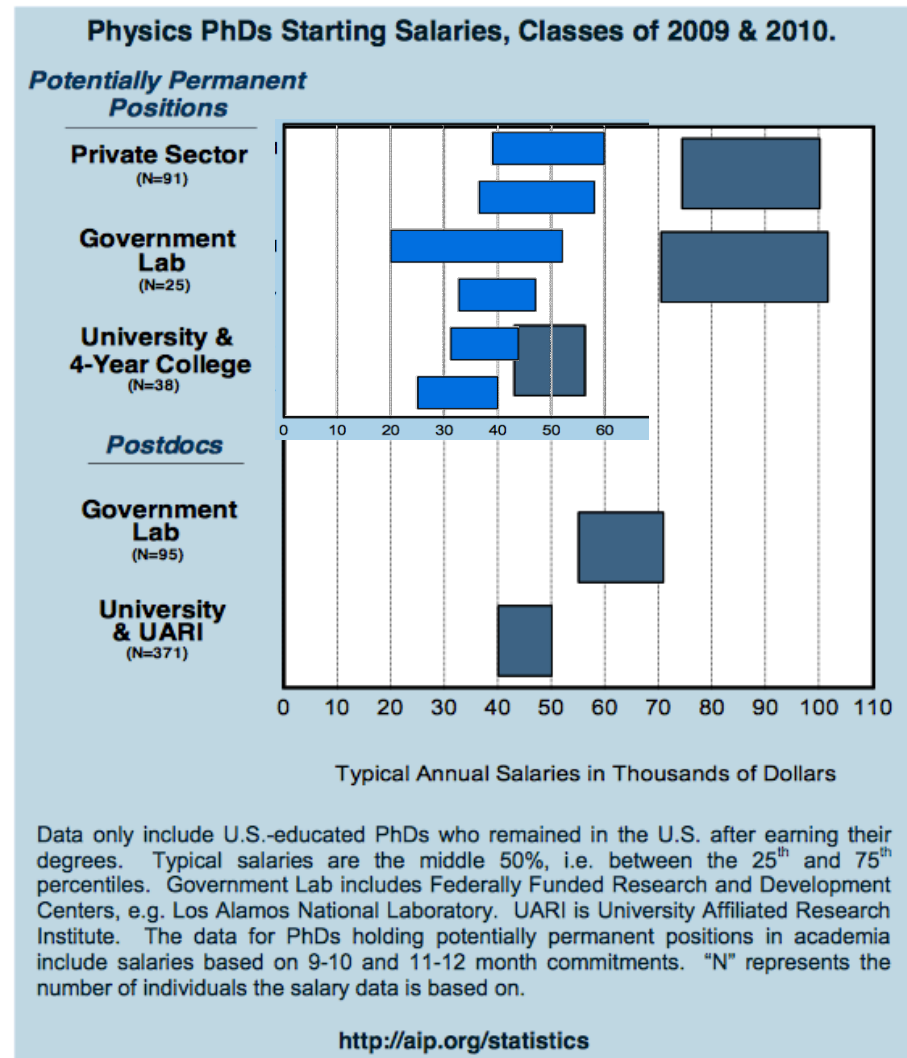
PhD vs Bachelor Starting Salaries

Salary 25% to 75% (k\$)



Starting Bachelors

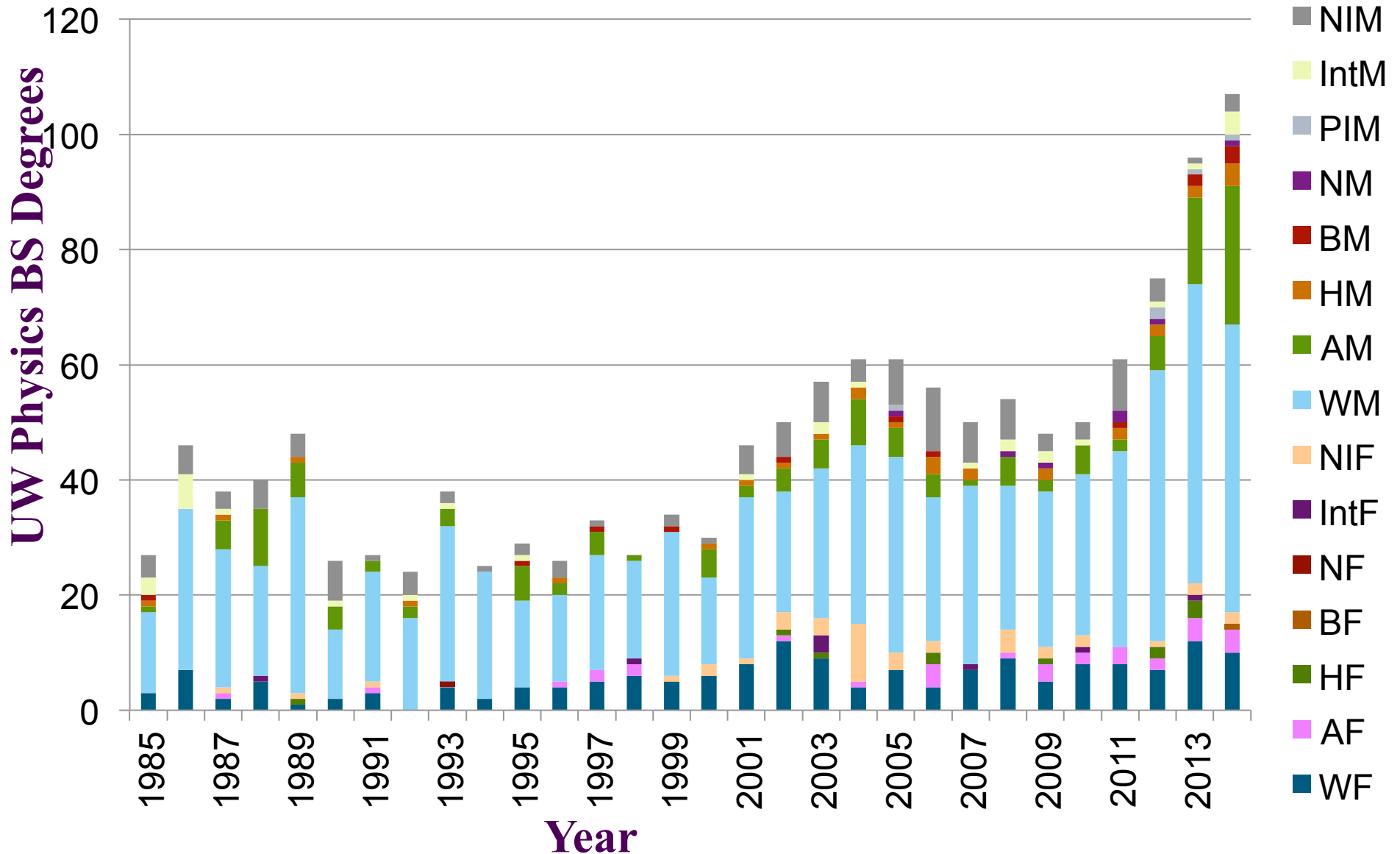
<http://www.aip.org/statistics>



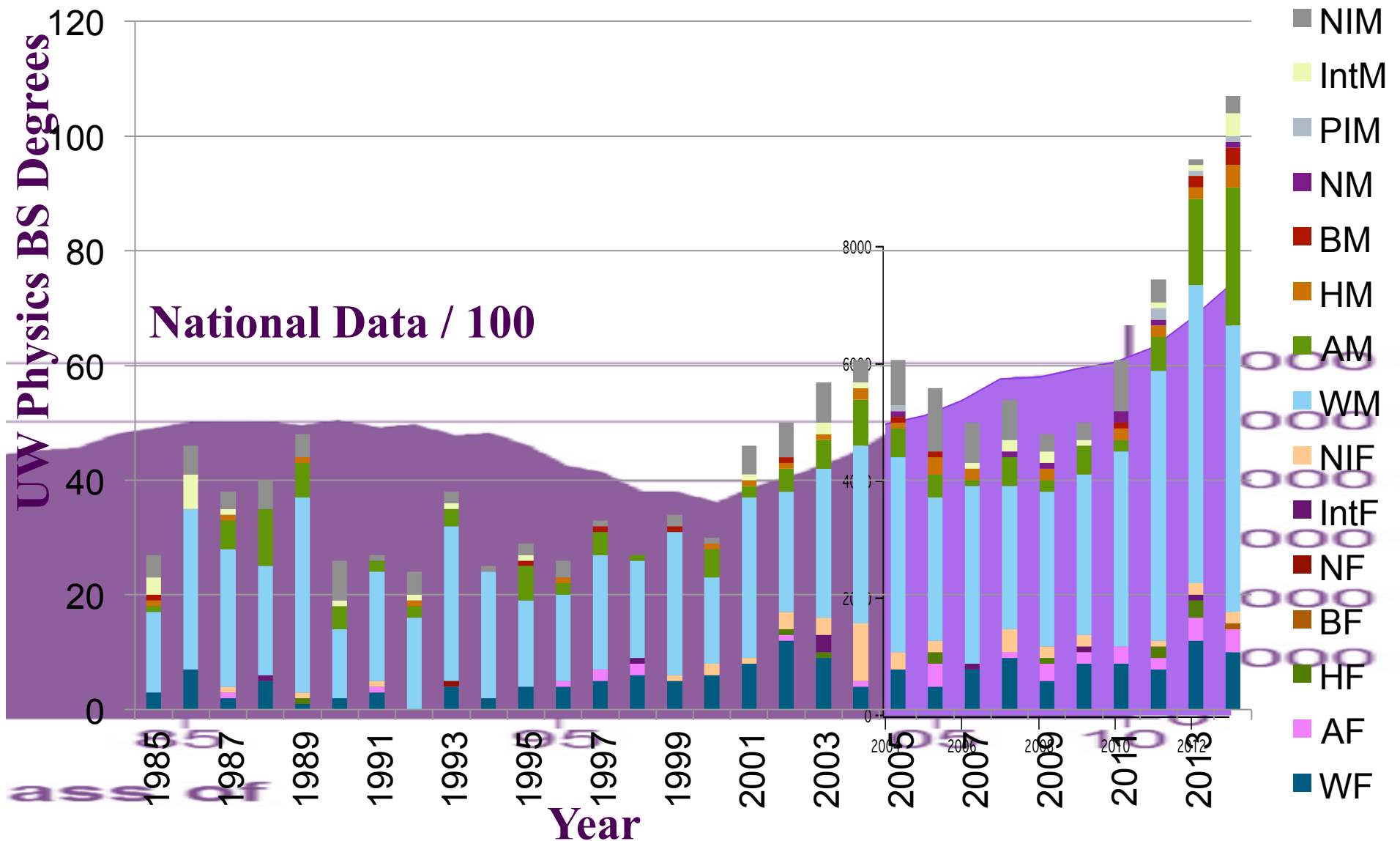
Starting PhD

2009-10 data

UW Physics is growing

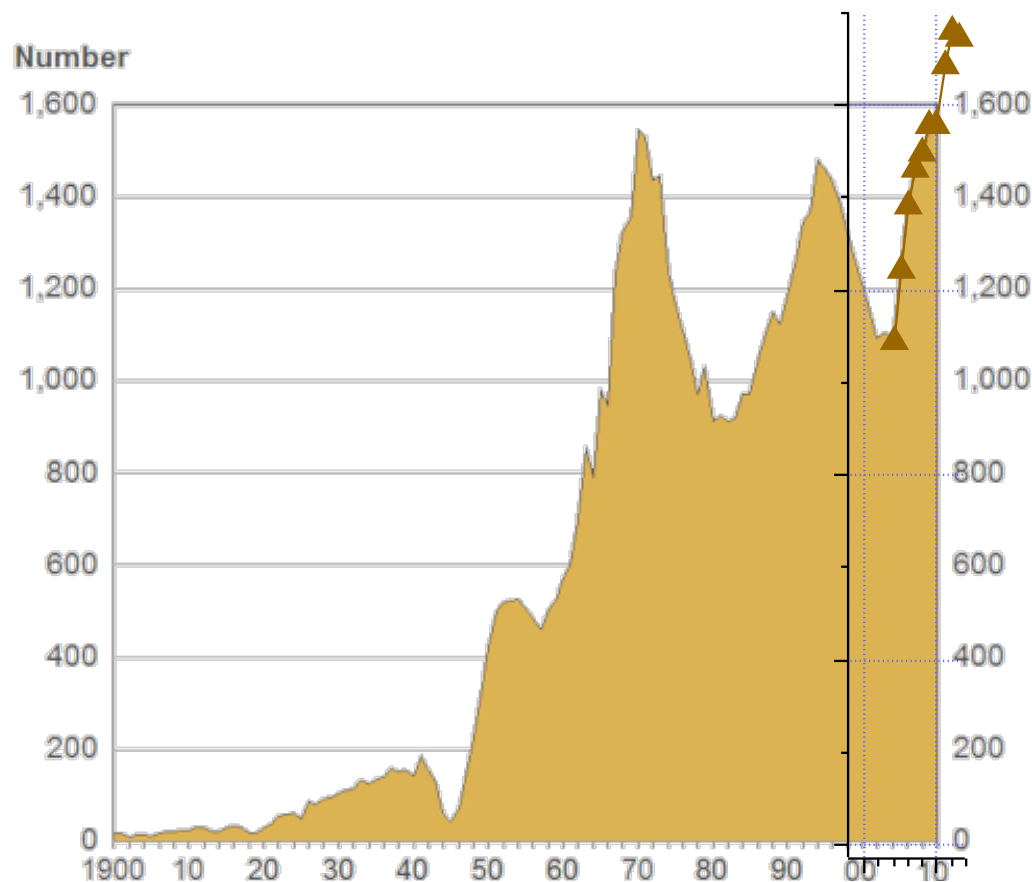


UW Produces $\sim 1\%$ of US Physics BS



How many people get a PhD?

Physics PhDs Conferred in the US, 1900 through 2010.

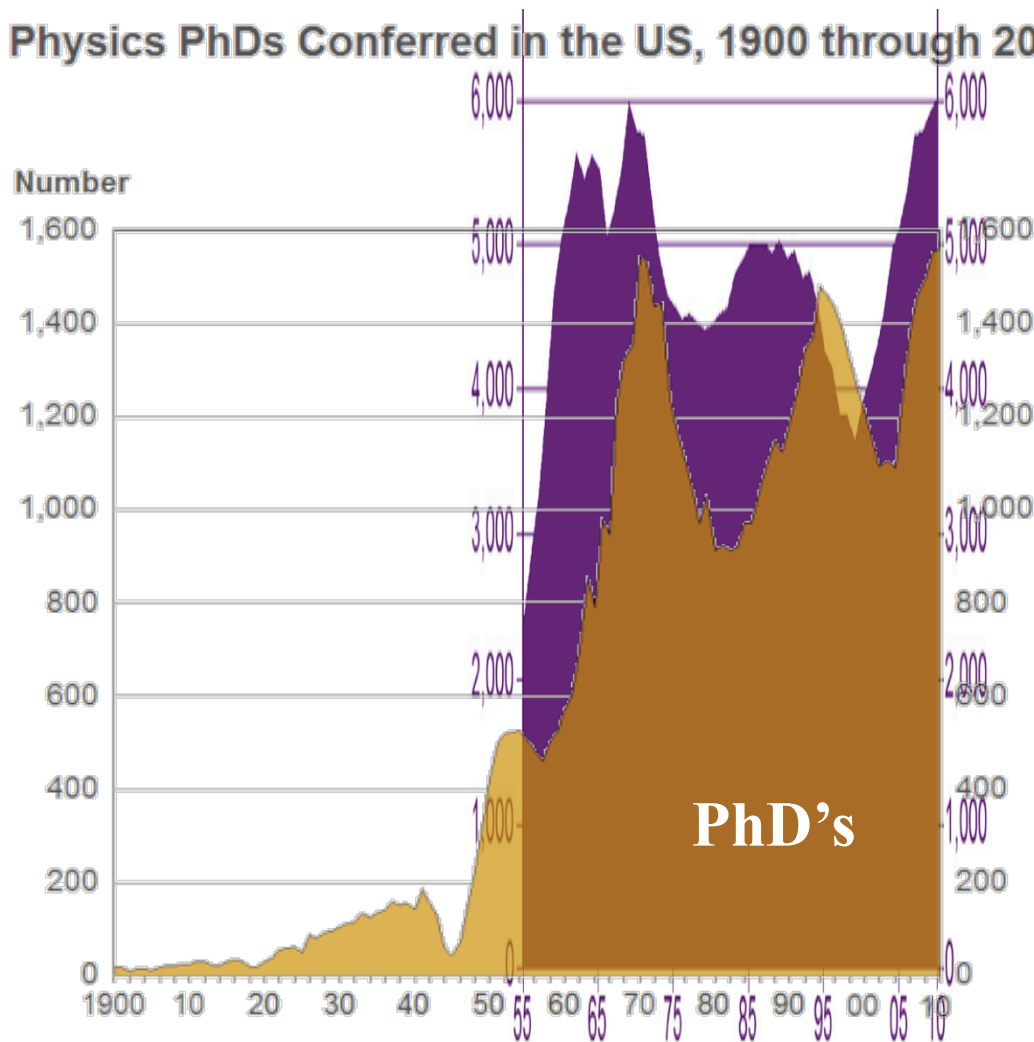


PhD's– 2009 data:

- **US: ~ 50% of 1237 degrees to US Citizens**
- **Germany: 1570**
- **France: 491**
- **UK: 415**
- **Japan: 374**
- **Next 5: 674**
- **Next 10: 345**

How many people get a PhD?

Physics PhDs Conferred in the US, 1900 through 2010.



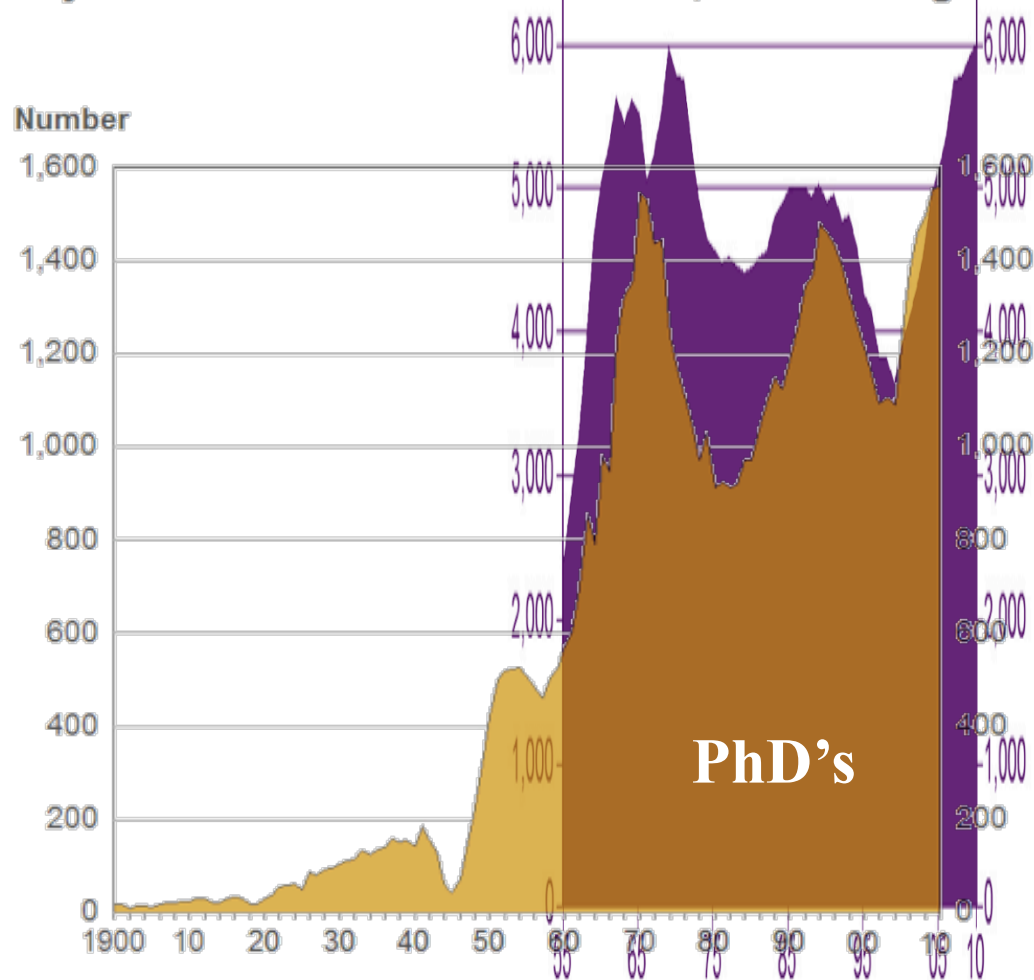
Bachelors scaled by ~30%

PhD's– 2009 data:

- **US: ~ 50% of 1237 degrees to US Citizens**
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- **Japan: 374**
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How many people get a PhD?

Physics PhDs Conferred in the US, 1900 through 2010.

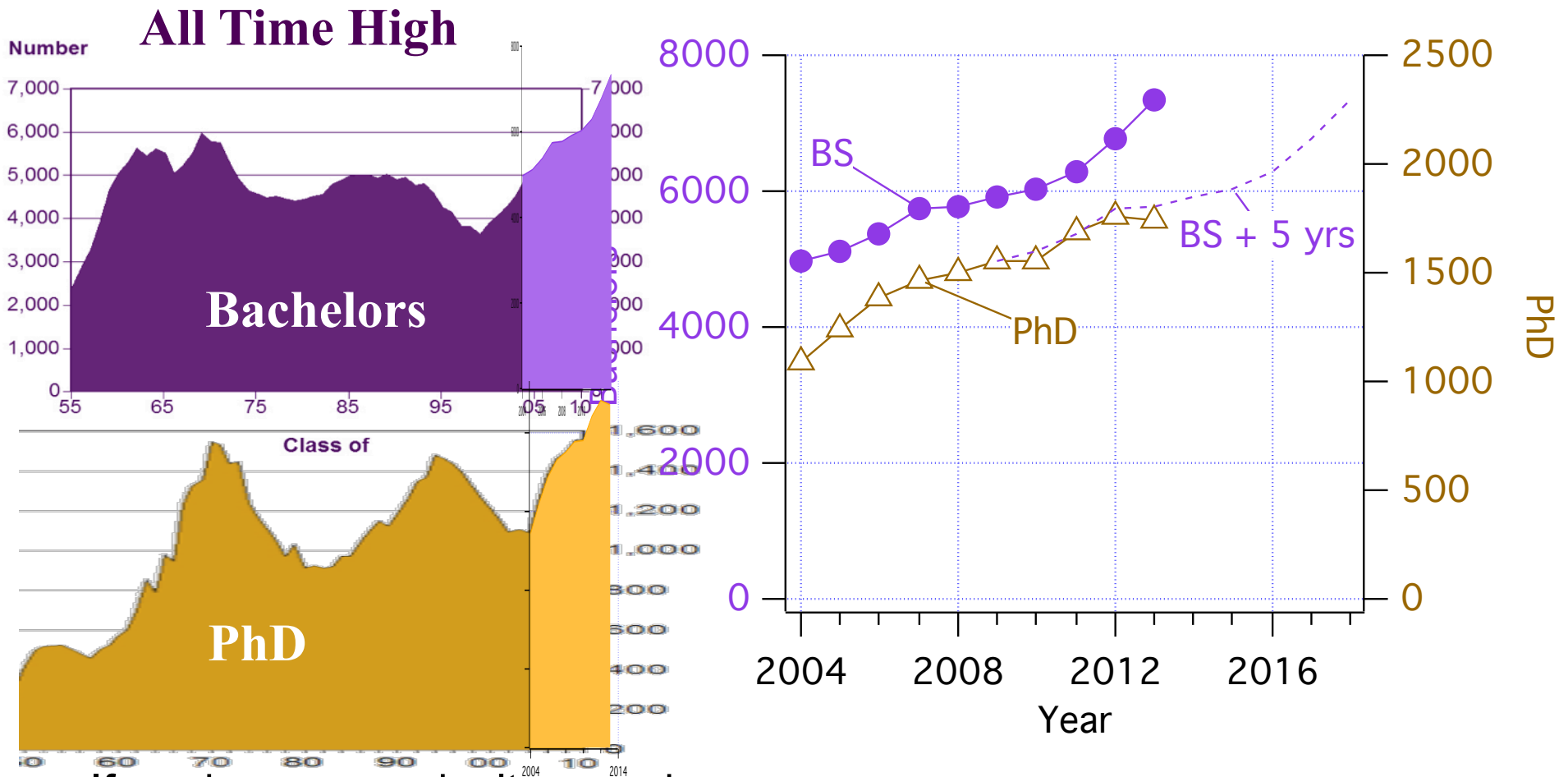


Bachelors scaled by 30%
Shifted by 5 years

PhD's– 2009 data:

- **US: ~ 50% of 1237 degrees to US Citizens**
- **Germany: 1570**
- **France: 491**
- **UK: 415**
- **Japan: 374**
- **Next 5: 674**
- **Next 10: 345**

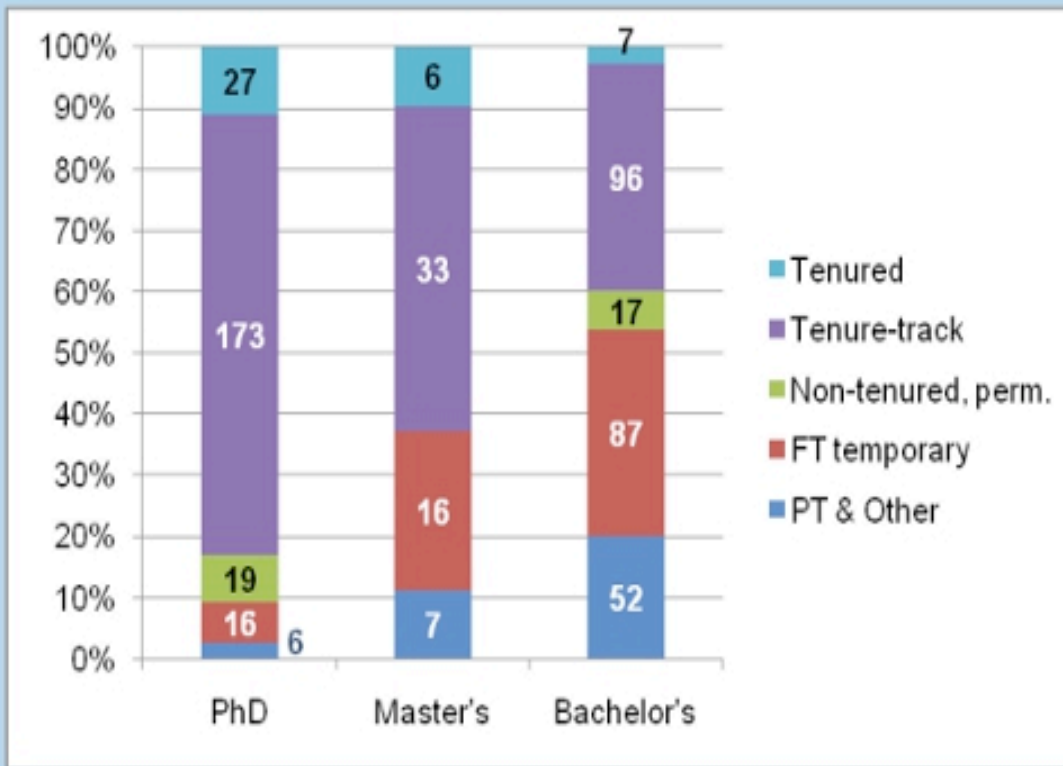
What might you expect?



- If grad programs don't expand, it could be harder to be accepted to grad school
- If they do, it might be harder to find a job when you are done

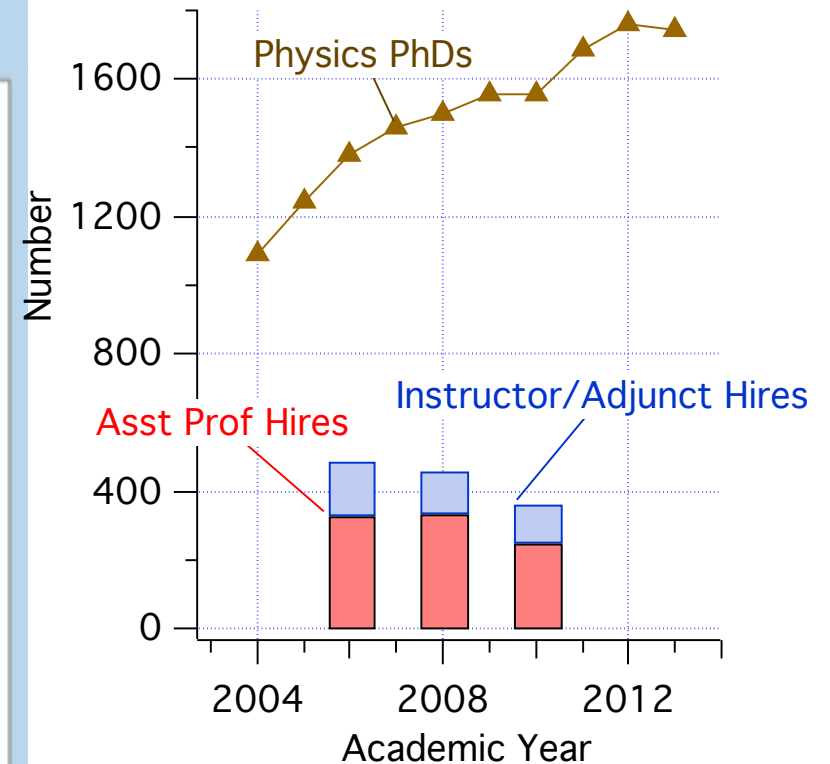
Availability of Faculty Jobs

Current Positions of New Faculty Members, 2007-08



The Highest Degree at Institution of new faculty members.

Total TT = 302
Total Inst/Temp = 138



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

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

Job Satisfaction -- 1st Year

➤ Satisfaction is generally quite high.

Initial Employment classes of 2009 & 2010



Ph.D. Class of 2009 & 2010. (Those checking choices 3, 4 on 4 point scale)

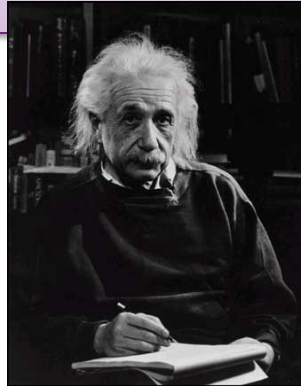
So if I do go to grad school ...

- 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.



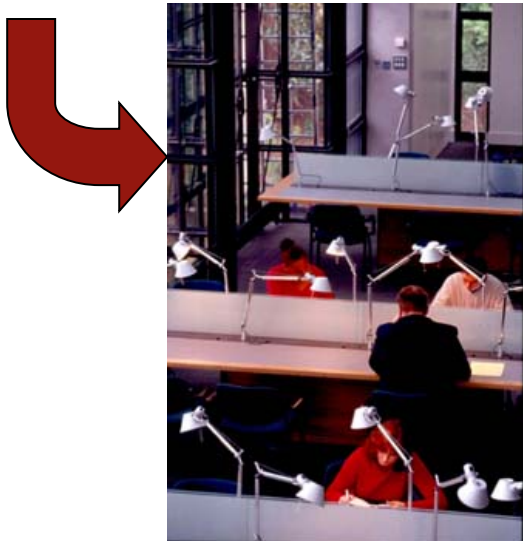
Take Classes



Dream New Ideas



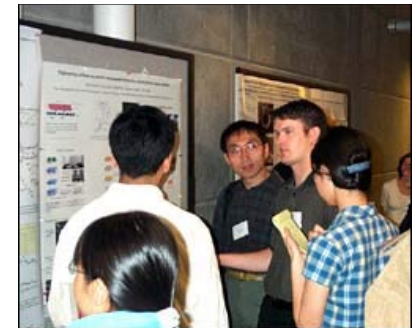
Analyze Data



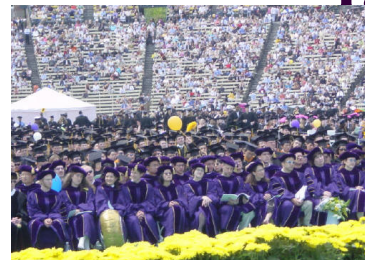
**Read other
people's ideas,
get trained**



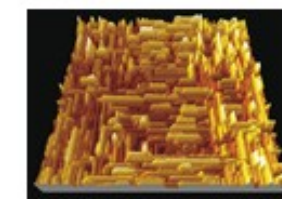
Take Data



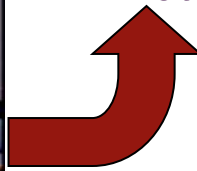
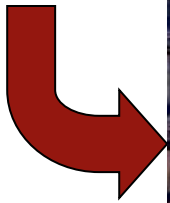
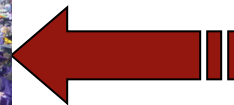
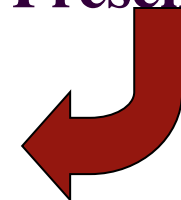
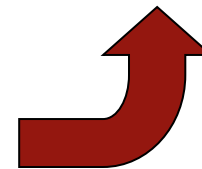
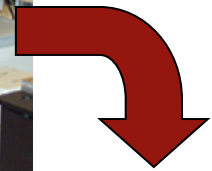
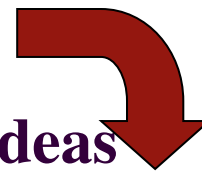
Present work



GRADUATE



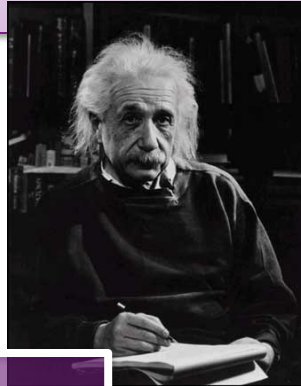
Publish results



“Standard Path” to the Ph.D.



Take Classes



Dream New Ideas



Analyze Data

2-3 years

2-4 years



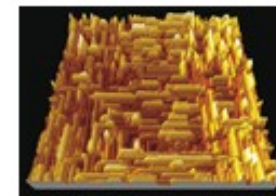
Read other people's ideas, get trained



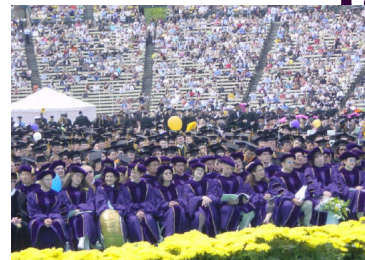
Take Data



Present work



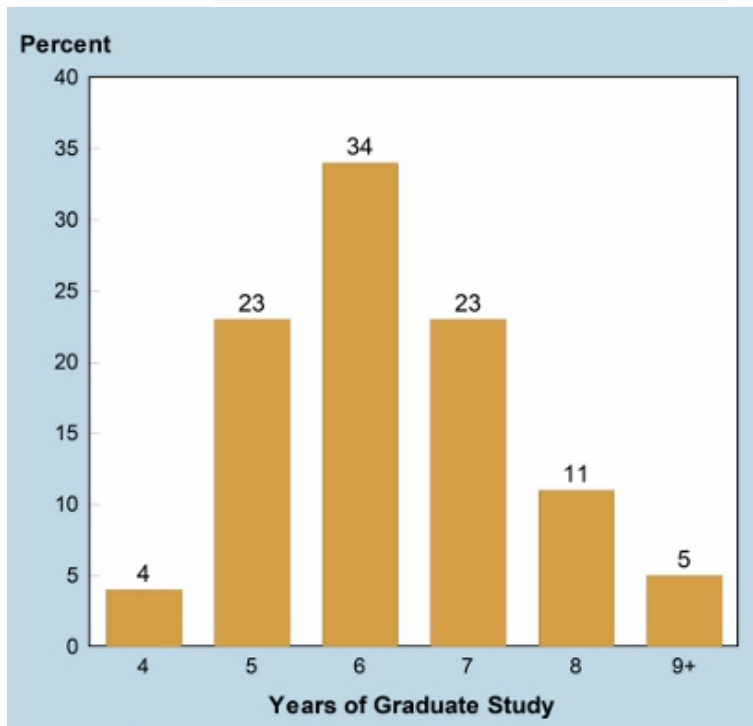
Publish results



GRADUATE

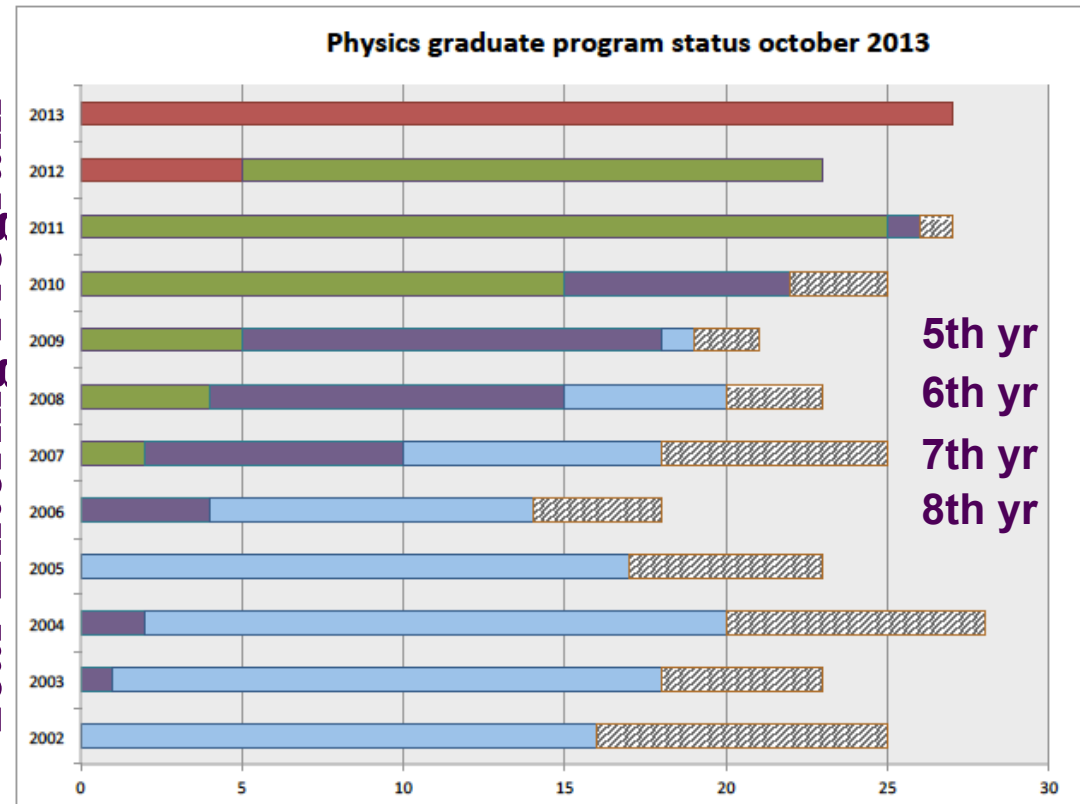
Years to PhD

AIP Statistics



UW Statistics

Year Entering Program



Classes of 2007-2008

Number of PhD Students

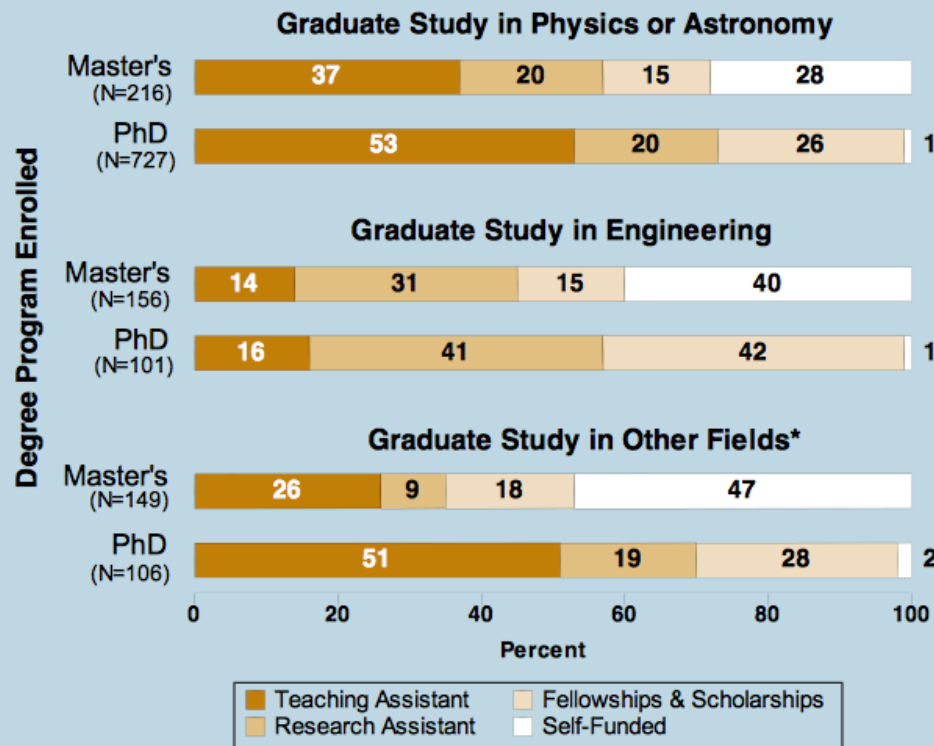
Pre-qual Pre-General Post-General Ph.D. Left

So if I do go to grad school ...

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

You get PAID to go to grad school!!

Primary Types of Financial Support for Physics Bachelor's One Year After Degree, Classes of 2011 & 2012 Combined



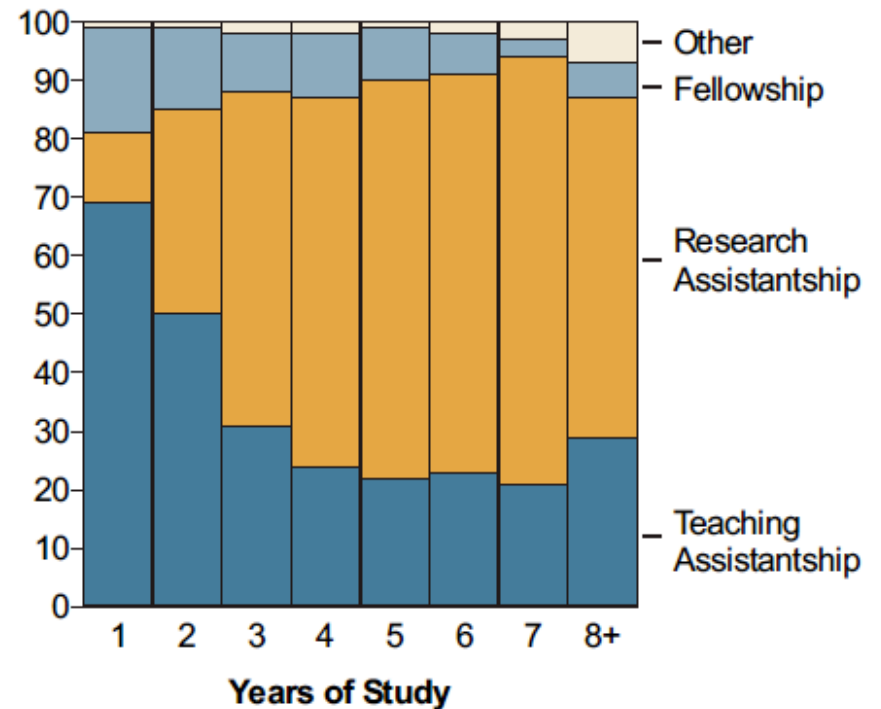
*Does not include professional degree fields such as law and medicine.

2013 Data

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

Primary Type of Support for Physics Doctoral Students

Percent

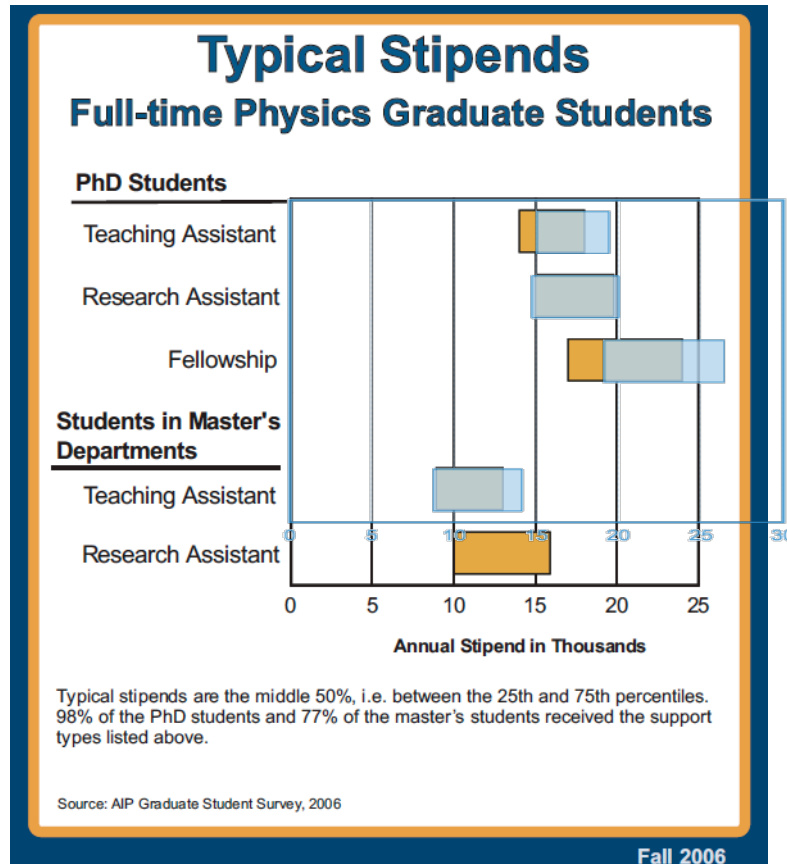


Source: AIP Graduate Student Survey, 2006

2006 Data

It's not much money, but it's enough

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



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

Current UW Rates:
\$1600-\$2000/month
Current NSF Fellowship:
\$2500/mo

2006 DATA

2010 DATA

Roommates
Used Car, New Computer

So if I do go to grad school ...

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Gradschoolshopper.com

AIP | **GradSchoolShopper.com**

Find your future in the
physical sciences and engineering



Google™ Custom Search



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[For Departments ▶](#)

Find information on 2015-2016 graduate programs in physics, astronomy,
and other physical sciences:

Search by school

Specialty for degree program (check any that apply)

- Accelerator
- Acoustics
- Applied Mathematics
- Applied Physics
- Astronomy
- Astrophysics
- Atmosphere, Space Physics, Cosmic Rays
- Atomic, Molecular, & Optical Physics

Degree type

PHD

- Experimental
- Theoretical

MASTERS

- Final degree
- Enroute to PhD

U.S. States (check any that apply)

- | | |
|--------------------------------------|---|
| <input type="checkbox"/> Alabama | <input type="checkbox"/> Montana |
| <input type="checkbox"/> Alaska | <input type="checkbox"/> Nebraska |
| <input type="checkbox"/> Arizona | <input type="checkbox"/> Nevada |
| <input type="checkbox"/> Arkansas | <input type="checkbox"/> New Hampshire |
| <input type="checkbox"/> California | <input type="checkbox"/> New Jersey |
| <input type="checkbox"/> Colorado | <input type="checkbox"/> New Mexico |
| <input type="checkbox"/> Connecticut | <input type="checkbox"/> New York |
| <input type="checkbox"/> D.C. | <input type="checkbox"/> North Carolina |

Outside the U.S. (check any)

- Canada
- China
- Hong Kong
- Mexico
- Taiwan

Featured Programs



Dartmouth College

Department of Physics & Astronomy
Hanover, NH

[Learn more
about this program ▶](#)

News

[AIP Releases the 2015-2016 Edition of
GradSchoolShopper.com & the 50th
Edition of the Book](#)

[Director Interview: Boise State
University's Department of Materials
Science and Engineering](#)

[GradSchoolShopper Advice on the Use of
GRE](#)

[See all news >>](#)

Information Available

- Description of University (tuition, etc.)
- 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

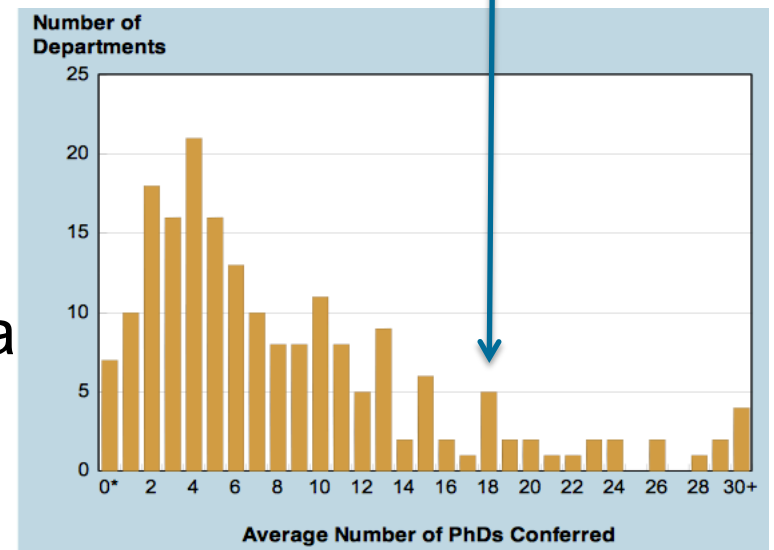
Big vs. Small

➤ Ranking:

- “Top12” hire each other’s grads
 - Hardest to get into
- 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



Universities averaging > 15 PhD/Year

2010 + 2011 + 2012

3

Largest Physics PhD-Granting* Departments in the U.S.

	Annual Average		Annual Average
Massachusetts Inst of Tech	38	U of California, Los Angeles	19
U of California, Berkeley	35	U of California, Davis	18
Harvard U (MA)	29	U of California, San Diego	18
U of Maryland, College Park	29	U of Michigan, Ann Arbor	18
U of Colorado, Boulder	28	U of Minnesota, Minneapolis	18
SUNY, Stony Brook U (NY)	26	U of Washington	18
Stanford U (CA)	26	Brown U (RI)	17
Ohio State U	24	Georgia Inst of Technology	16
U of Wisconsin, Madison	24	Yale U (CT)	16
Cornell U (NY)	23	Arizona State U	15
Stanford U-Applied (CA)	23	Florida State U	15
U of California, Santa Barbara	22	Pennsylvania State U	15
U of Florida	21	Purdue U, West Lafayette (IN)	15
California Inst. of Technology	20	U of Chicago (IL)	15
U of California, Irvine	20	Washington U (MO)	15
Princeton U	19		

Note: List includes departments that averaged 15 or more physics PhDs, classes of 2010, 2011 & 2012 combined. List includes only those departments who contributed degree data for all three years.

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

So if I do go to grad school ...

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Application:

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 3.4-3.7
 - Admission rare below ~ 3.2
- ADVICE from our Admissions Chair
 - Study for the GRE
 - Get research experience

GRE' s

- 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're willing to write you a "good letter"
- Provide background information
- Give plenty of time
- Gently verify/remind as deadline approaches

Personal Statement

- Be honest
- Be sincere
- Connect to the target department
 - Mention specific research areas, faculty
 - Get letters from people known to that department (REUs are good for this)
- Speak to your strengths and goals
- Address any irregularities in your record
- EDIT for grammar, spelling, coherence
- Have a prof or friend read your essay

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

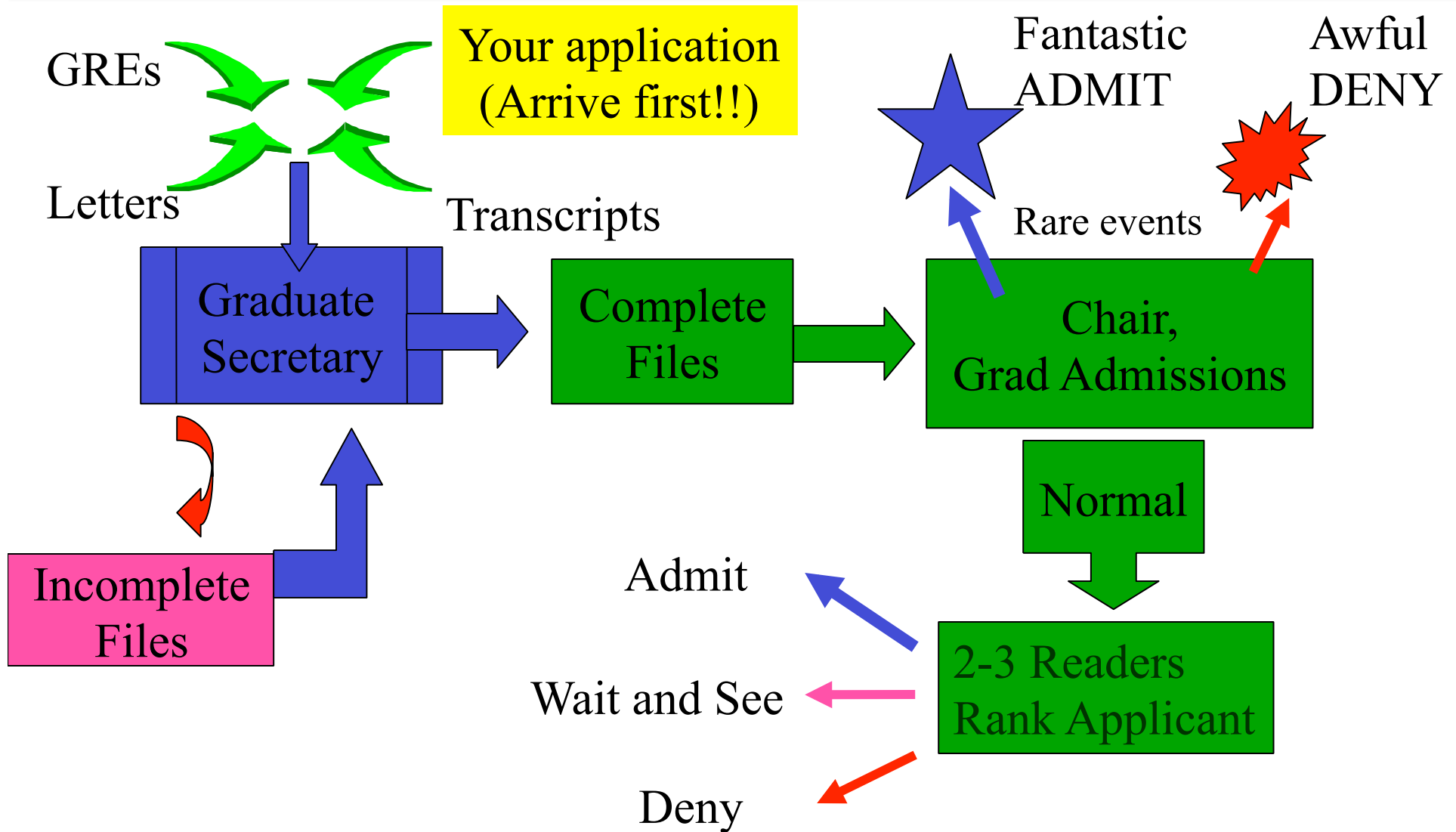
Enclosures

- **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!