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

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November 2019
What is a PhD?

➤ Take some piece of knowledge about the universe from (frontier – ε) to (frontier + ε)

➤ Start out knowing nothing about a topic, and four years later you are the world expert

➤ “License to think” – allows you to direct research projects, teach @ college/univ, write grants
Why Go to Grad School?

- Participate in the excitement of the intellectual frontier
- Deeper understanding of a subject
- Better/different job prospects
- DON’T Drift into graduate school
What else could I do?

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

2017/18
- 47% job
- 29% P/A grad
- 19% other grad
- 5% seeking

Field of Employment
- Engineering 36%
- Computer or information systems 23%
- Non-STEM 25%
- Other STEM 13%
- Physics or Astronomy 5%

http://www.aip.org/statistics
NSF Data on Physics B.S. Careers

NSF Table 3-2. Broad occupation category of employed U.S. scientists and engineers with a bachelor's as the highest degree, by field of highest degree: 2013

STEM: 42%
STEM-related: 19%
Non-STEM: 38%

Non STEM: 38%
Life Science: 1%
CS/Math: 13%
Physical Sci: 14%
Social Sci: 0%
Engineering: 14%
Health: 0%
Technician: 9%
STEM Teacher: 3%
STEM Manager: 8%
What's a Bachelor's Degree Worth?

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

Bachelor's Field
- Computer Science
- Aerospace Engineering
- Physics
- Chemical Engineering
- Electrical Engineering
- Mathematics
- Mechanical Engineering
- Finance
- Civil Engineering
- Registered Nursing
- Accounting
- Business Admin/Mgmt
- Chemistry
- Psychology
- Biology

Starting Salary in Thousands

0 10 20 30 40 50 60 70 80 90 100

Private STEM
- 1 yr post B.S. (2016/7)
- 1 yr post Ph.D. (2016/7)
- 10 yr post PhD (2011)

Private Sector

Gov't Sector

Academic Sector

What might I earn?
Who gets a physics PhD?

Physics PhD’s— 2017 data  N=1865

- 56% US Citizens
- 17% Female
- 27% of US citizens are non-white

PhD Programs are no longer tracking B.S.
Who gets a physics PhD?

Physics PhD’s—2017 data N=1865

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UW now produces 2% of Physics 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%

Total # Departments ~ Same

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2013</th>
<th>2018</th>
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<tbody>
<tr>
<td>Bachelors</td>
<td>509</td>
<td>497</td>
<td>503</td>
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<tr>
<td>Masters</td>
<td>64</td>
<td>57</td>
<td>57</td>
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<tr>
<td>PhD</td>
<td>189</td>
<td>198</td>
<td>201</td>
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<tr>
<td>Total</td>
<td>762</td>
<td>752</td>
<td>761</td>
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What else can I do with a PhD?

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

Common Careers of Physicists in the Private Sector
PhDs educated in the U.S. 10-15 years earlier

- 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
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
- Read other people’s ideas, get trained
- Dream New Ideas
- Take Data/Calculate
- Analyze Results
- Present work
- GRADUATE
- Publish results
“Standard Path” to the Ph.D.

Take Classes
2-3 years

Dream New Ideas

Analyze Data
2-4 years

Take Data

Present work

Read other people’s ideas, get trained

GRADUATE

Publish results
So if I do go to grad school …

- What happens?
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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.

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

Current UW Rates: $27-31k/yr
Current NSF Fellowship: $34k/yr

Roommates
Used Car, New Computer

* NSF deadline is late October
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?
Top Tier? Big? Close to home?

- **Ranking**
  - Rankings are out of date – new hires make a big difference
  - Top tier hire each other’s grads
  - Next tier = schools like UW
  - Lower tiers often have pockets of top-ranked subfields

- **Size**
  - Large comprehensive department lets you change sub-fields
  - Small lets you be a bigger fish in a smaller pond
  - Your professional network = your grad school contacts

- **Interdisciplinary Connections**

- **Geography**

- **Department Climate – Visit!!**
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?
Selection Criteria

Probable success depends on traits such as:
- Commitment
- Creativity
- Maturity
- Confidence
- Leadership
- Communication Skills

Good match between your goals and research in the department (and not too many in one area)

Successful research (or independent) experience

Your UG academic performance and GRE

Meet all deadlines; essay spelling and grammar
UW Admission Statistics

- 700 Apply ⇒ 90 – 100 Admit ⇒ 25 Enroll
- Physics GRE of US Admits:
  - Average in the low 800’s (out of 990)
  - Admission rare below the mid 600’s
- Undergrad GPA:
  - Average GPA = 3.8
  - Admission rare below ~ 3.5
- Research Experience
  - Expected: Almost everyone has some

UW’s current US News ranking is about 20
What do they know about me?

**GRADES**

**GRE**
Physics + General

**Letter of Rec 1**

**Letter of Rec 2**

**Letter of Rec 3**

**Personal Statement + Cover Letter**

Study for the GRE!
- Very different from classroom exams
- Balance Speed vs. Silly Mistakes
- Get the book “Conquering the Physics GRE”
Personal Statement

- Be honest and sincere
  - Show, don’t tell
- Speak to your strengths and goals
  - OK not to know your specialty, but don’t sound wishy-washy
- Tailor and connect to the target department
  - Mention specific research areas, faculty
- Address any irregularities in your record
  - OK for this to be in letters of reference
- EDIT for grammar, spelling, coherence
  - Have someone read your essay
- Give a copy to your references
Letters of Recommendation

- You need 3 letters from people with a PhD who know you well outside the classroom
  - Thank them if they say you should find someone else
- At least one should be from someone with whom you have done research (either at UW or elsewhere)
  - Summer REU, Local project with results by Autumn Sr Year
- Provide background information
  - Aspects you want them to cover in their letter
- Give plenty of time
  - Send email with a list, including deadlines and links
  - Gently verify/remind as deadline approaches
Checkboxes for Recommenders

- Intellectual Potential
- Intellectual Depth
- Intellectual Independence
- Intellectual Curiosity
- Critical Thinking
- Analyze a Problem and Formulate a Solution
- Creativity and Imagination
- Academic Performance
- Research Aptitude & Potential
- Lab Skills & Techniques
- Potential for Teaching
- Potential for career advancement

- Motivation
- Maturity
- Self-confidence
- Resilience
- Concern for others
- Social Skills
- Ability to Work with Others
- Ethics and Integrity
- Facility with English Language
- Oral Communication
- Written Communication
- Planning and organization

Relative to other students at the same level, is this student: Top 5%, 10%, 25%, above average, other, unable to judge.
Overall Advice

- Do research summer after junior year
  - Form a GRE study group wherever you are

- Don’t overload your schedule senior year
  - Applications and visiting weekends = extra half class

- Apply to 7–10 places
  - 2-3 “Reach”, 2-3 “Safety”
  - Don’t apply anywhere you aren’t willing to go

- Stand out from the rest
  - Apply WELL BEFORE the deadline
  - Visit, call and/or email someone you want to work with
    - (but don’t bug them too much....)

- Check that file is complete
  - Contact Grad Assistant by email
  - Follow up on late letters, transcripts, etc.
It’s not for everyone, but ...

- Grad study in Physics can be a grand adventure.
- A Physics PhD prepares you for a wide variety of careers and life experiences.
- If this is what you want, and you are willing to work towards it at subsistence wages for 6 years, **GO FOR IT!**
Grad Student Panel