# Physics Careers: To the Bachelor's Degree and Beyond

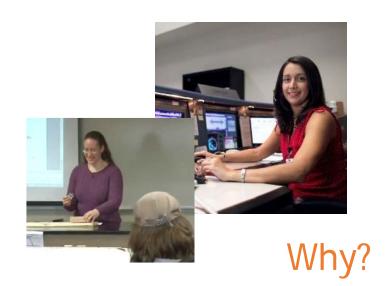
Crystal Bailey American Physical Society



### Who is a Physicist?

### Anyone with a Physics Degree

- BS
- BA
- MS
- PhD, etc.



- Definition is consistent with other disciplines (e.g. Chemistry)
  - Defines a common set of experiences (and texts)
    - Inclusive view is better for survival of discipline

### What makes them Physicists?

Shared experiences creates familiarity—not only with the same Physics concepts, but also with the culture of the discipline.

However, most importantly, even a basic Physics training imparts essential problem solving skills—"how to think"—which is the hallmark of a physicist.

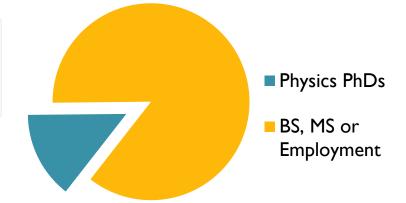


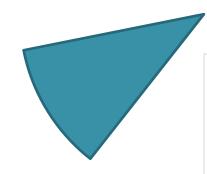
# Where do Physicists Work?

### Not where you think!

What is a "traditional physicist"? A physics professor? A PhD researcher? The "most common" career path?

The AIP Statistical Research Center estimates that 1 in 7 physics bachelors will choose to finish a Physics PhD.



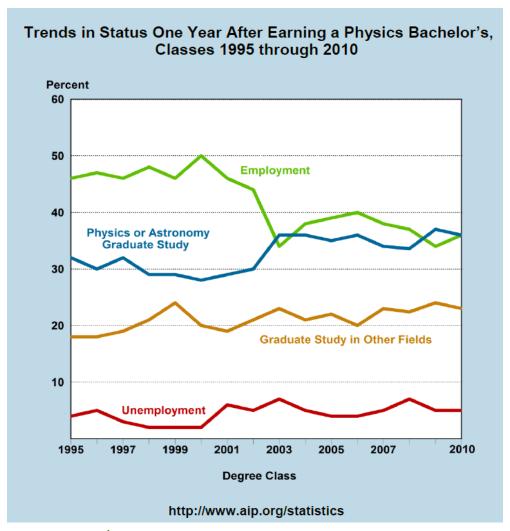


So ~14% of all Physics Degree holders will actually become Physics PhDs—and by extension "traditional physicists."



# Bachelor's Degree

Between 1995 and 2007, about one-third to one-half of Bachelor's degree recipients went directly into the workforce.



The remainder went on to graduate school:

- Mostly in Physics and Astronomy
- A significant proportion went to graduate school in other fields.

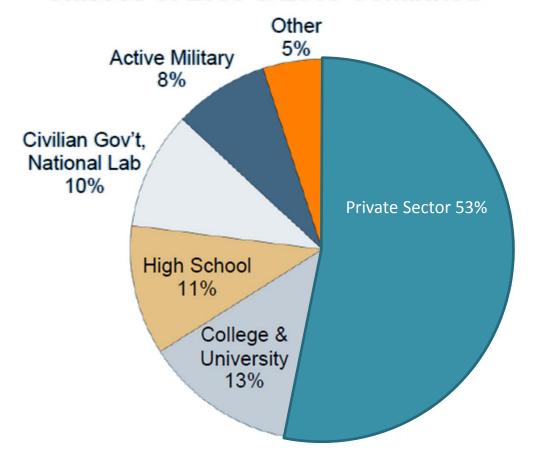
Many physics bachelor's degree recipients pursued advanced degrees in other areas...

...and less than 7% of them were unemployed!

APS physics

# Initial Employment of Physics Bachelors

#### Initial Employment Sectors of Physics Bachelor's, Classes of 2009 & 2010 Combined



Physics Bachelors in 2009-10 found initial employment in a variety of areas.

Over half of physics bachelor's degree recipients in 2009-2010 found work in the private sector.

http://www.aip.org/statistics



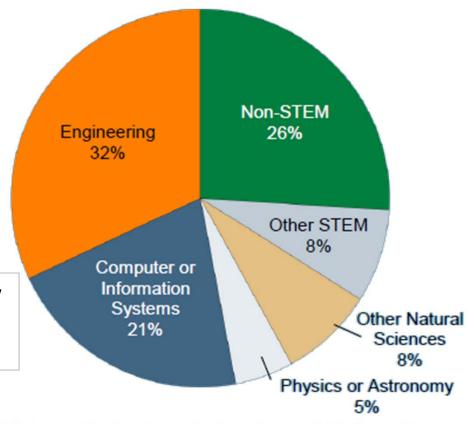
### Physics Bachelors in the Private Sector

Field of Employment for Physics Bachelor's in the Private Sector, Classes of 2009 & 2010 Combined

Of these, many went into engineering or computer science.

A significant portion went into "non-STEM" fields

Physics bachelors are highly employable, in a variety of career paths.



STEM refers to natural Science, Technology, Engineering, and Mathematics.

http://www.aip.org/statistics



### In fact...

A physics bachelor's degree now ranks higher in starting salary than many other technical fields (including mechanical engineering).

The typical starting salary for a physics bachelor degree has increased by nearly \$10,000 since 2003.

### What's a Bachelor's Degree Worth?

Typical Salary Offers by Campus Recruiters, AY 2008-09

#### Bachelor's Field **Chemical Engineering** Computer Science **Electrical Engineering Physics** Mechanical Engineering **Mathematics** Civil Engineering Finance Nursina Accounting Marketing Chemistry Secondary Education Psychology Biology / Lifescience 30 50 60 70 80 0 10 20 40 Starting Salary in Thousands

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

Reprinted from the Fall 2009 Salary Survey, with permission of the National Association of Colleges and Employers, copyright holder.

APS physics



Maggie Seeds, Physics BS
Consultant
Clarkston Consulting, North Carolina

Educational Background BS – Physics

As a consultant, Maggie has to play many different roles depending on clients' needs, ranging from technical to strategic. She says that her physics background is what allows her to thinking analytically and examine problems from many angles –not to mention persevere through tough situations!

Aaron Weiss, Physics BS

Electrical Engineering Group

Google Advanced Technology and Projects – Mtn View, CA

Educational Background
BS – University of Colorado, Boulder

From his earliest days, Aaron wondered how everything worked, and was drawn to physics because it helped him uncover the complex and fascinating nature of the universe.



Today, he uses what he has learned about the natural world—combined with a healthy love of building electronics—to create devices which are on the cutting edge of technology.

www.aps.org/careers

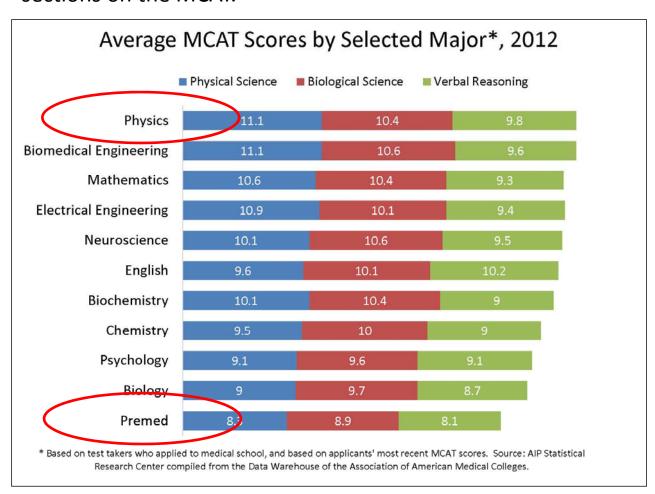
bailey@aps.org



# Beyond the Bachelor's Degree

#### **Medical School**

Physics majors out-performed many other majors (including pre-med) on all three sections on the MCAT.



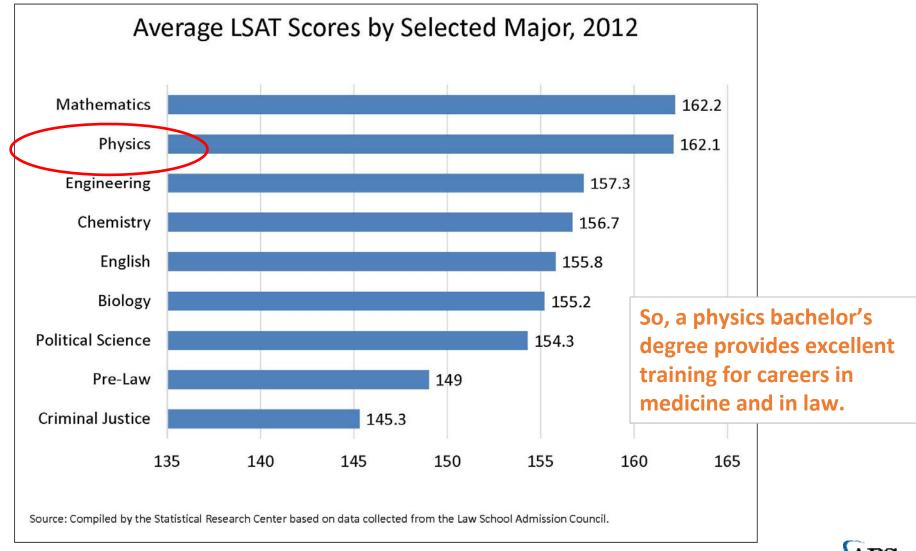
Physics majors also account for less than 1% of individuals taking the exam...

These factors make Physics majors stand out compared to other med school applicants.



### Or Law School?

Physics majors also received the highest average LSAT scores compared to several other majors (including Pre Law).

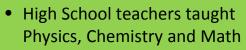


Paps.org Physics

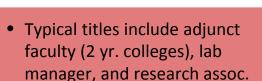
# Master's Degrees

Between 2009-2011, 50% of physics masters recipients entered or remained in the workforce.

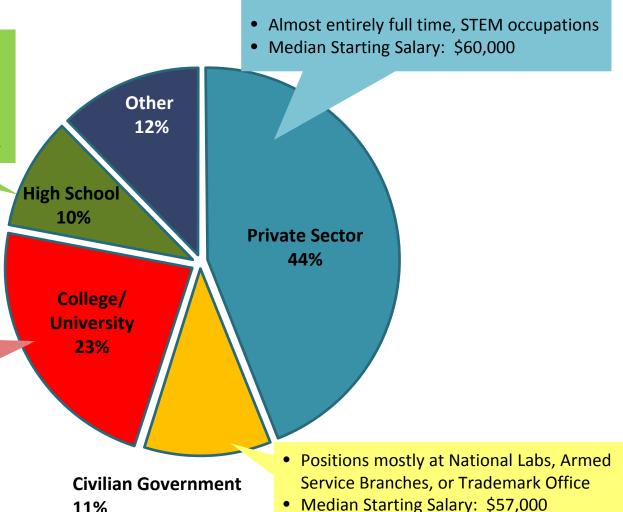
11%



 Salaries for those continuing employment after earning their MS were \$13,000 more than new hires.



• Median Starting Salary: \$38,500



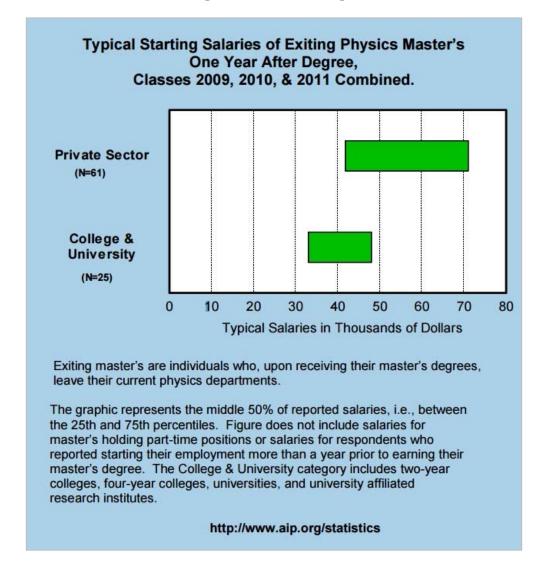
www.aps.org/careers

bailey@aps.org

Not surprisingly, physics master's degree holders working in the private sector earned considerable more than their colleagues at colleges and universities.

Private Sector MS grads who earned their degree while working earned considerably higher (~\$83K).

A physics master's degree will open the door to more advanced positions in a variety of technical fields, with higher salaries.



APS physics

#### Sam Wurzel, Physics MS

Co-Founder and CEO Octopart, Inc. - New York, NY

#### **Educational Background**

BS – Engineering and Physics, Brown University MS – Physics, University of Colorado, Boulder

Sam's inspiration arose out of frustration as a physics grad student searching for parts in huge paper catalogs!

Fortunately he was able to focus his frustration into the creation of Octopart, an online parts search engine which today serves over 700,000 users.



Ginger Kerrick, Physics MS

Flight Director

NASA Johnson Space Center - Houston, TX

#### **Educational Background**

BS – Physics, Texas Tech University MS – Physics, Texas Tech University

Though her original goal was either to become an astronaut or a basketball player, life circumstances sent her down a different path.

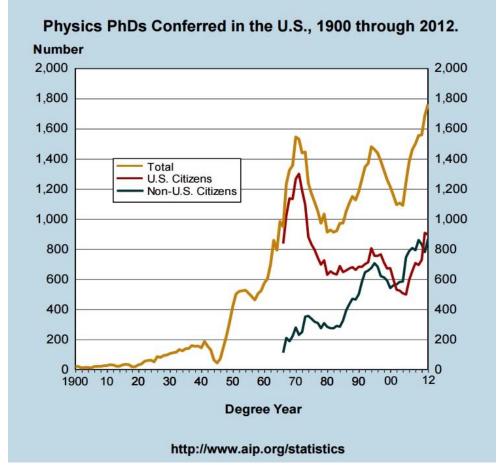
As flight director for NASA, Ginger uses her Physics training every day to solve problems creatively and quickly, to help get astronauts home safely.

# PhD Job Force: Supply

At the time of the 2014 report, the AIP Statistical Research center found the number of physics PhDs conferred in the US to be the highest in the past century: 1,762.

Based on current enrollments, we should expect PhD degree production to level off at around 1,700/year in the next four years.

Bottom line: the US can expect to continue putting large numbers of Physics PhDs into the workforce.





### What are PhDs doing with their degrees?

The largest percentage of Physics PhDs found initial employment in Postdoctoral and other temporary positions...

...but the vast majority of permanent jobs were in the private sector.

# Employment Type of Physics PhDs by Employment Sector One Year After Degree, Classes of 2011 & 2012 Combined

Sector of Employment	Postdoc %	Potentially Permanent %	Other Temporary %	Overall %
Academic*	74	22	78	57
Private	1	64	14	23
Government	21	11	4	16
Other	4	3	4	4
_	100%	100%	100%	100%
Number of resp.	859	485	140	1,484

Note: Data only include US-educated physics PhDs who remained in the US after earning their degrees.

http://www.aip.org/statistics

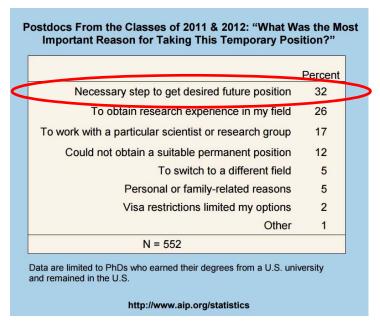


<sup>\*</sup>Includes university affiliated research institutes.

### PhD Job Force: Demand

The majority (74%) of graduates who initially become postdocs are in academic settings. The remainder are at national laboratories (21%).

Most postdocs go into their positions in the hopes of moving toward permanent employment.



Immediate Previous Positions of New Physics Faculty, 2007-08 for Tenured and Tenure-Track Hires*					
	Highest Degree Awarded				
	PhD	Bachelor's			
	(%)	(%)			
Postdoc	54	32			
Research Scientist	24	8			
Tenured or Tenure-Track Professor	20	16			
Graduate Student	1	11			
Adjunct, Part-time, or Visiting Faculty	1	28			
*Includes permanent non-tenured faculty at schools without tenure. (Only the 5 most common categories of previous position are shown.)  http://www.aip.org/statistics					

In fact, research shows that at PhD granting universities, previous experience as a postdoc (or as faculty) is a strong indicator of the likelihood of becoming a faculty hire.

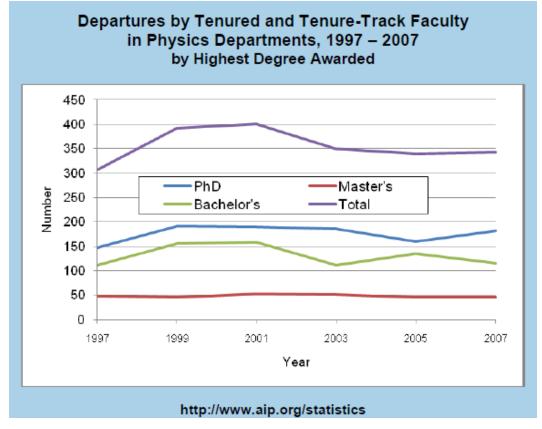
At the same time, becoming a new faculty hire with only a graduate degree is extremely unlikely—even at Bachelor's granting universities.

However the number of departures of tenured and tenure-track faculty has changed little since 2003.

"While there were about 350 departures by tenured and tenure-track faculty during the 2006-2007 academic year...there were 475 recruitments for the same time frame, with 342 tenured and tenure-track faculty members hired in 2007-2008; this... is consistent with what we have seen in prior years."

--Focus on the Faculty Job Market in Physics and Astronomy Departments, AIP Statistical Research Center

Bottom Line: the job market for faculty in universities and other institutions is very stable.



"Stable" means that overall, not many jobs are being lost. At the same time, not many are being created, either.

Given that we are graduating more than 1,700 PhDs/yr, with more than half of them going into postdocs with an intention of continuing as physics faculty, supply will continue to outweigh demand for the tenure-track academic career path.

### PhD Employment in the Private Sector

Recall that the majority (64%) of graduates who initially went into permanent employment positions were in the private sector.

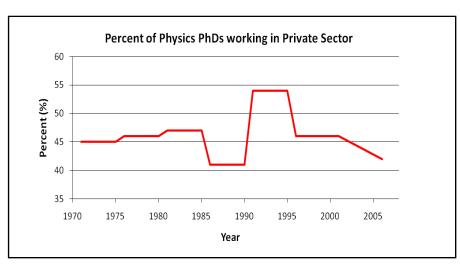
According to the NSF Survey of Doctoral Recipients, in 2010 the private sector was the largest single employment base of Physics PhDs: about 47% (the next highest was 4 year colleges, at 38%).

This was also true in 2001, when the private sector employed 46% of Physics PhDs<sup>1</sup>...

...and was also true in 1993, when the private sector again employed 46% of Physics PhDs<sup>2</sup>.

In fact, the same data has shown consistent support for Physics PhDs in the private sector since 1971.

Industry has been the largest employment base for Physics PhDs for decades.



<sup>1</sup>NSF Survey of Doctoral Recipients, 2001 <sup>2</sup>NSF Integrated Survey Data, 1993



### Physics Workforce: Summary

- Faculty positions are NOT the most common career path for physicists!
- Industry is the largest employment base for Physics PhDs...
  - ...and for Physics Masters
  - ....and Physics Bachelors.



Your career path will not be a straight line...

Smart planning requires being aware of—and prepared for—all possibilities.

There is a lot of great science to be done—and opportunity to be found—in a lot of places!

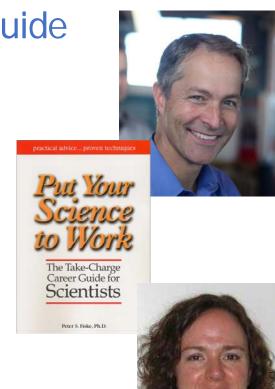


# Ways APS Can Help

### APS Online Professional Development Guide

- Features 5-minute "webinette" clips from the top APS careers webinars
  - APS webinar "Putting Your Science to Work," with Peter Fiske
  - APS webinar "Career Self-Advocacy: How I Got A Six Figure Job in the Private Sector," with Meghan Anzelc
- Each chapter provides comprehensive guidance on key aspects of a successful job search.
- Topics include self-assessment, networking, interviewing and negotiation strategies, and more.

http://go.aps.org/physicspdguide



#### **APS Careers Website**

- Library of Physicist Profiles
  - Advice from physicists representing a diversity of degree paths and careers
- Job Prospects Pages
  - Profiles feature the most common career paths for physicists.
  - Include descriptions of day to day activities, additional skills and training needed, salary information, job outlooks, and links to other relevant resources





- Physics Employment and Salary Information
  - Clearing house for most recent physics employment data from AIP SRC
  - Thumbnails and links to full reports for more information
- APS Webinars Archive
  - On-demand viewing for all webinar presentations

APS physics

#### **APS Job Board**



Shared database (Physics Today, IEEE Computing, AVS, and others) means that there are hundreds of jobs available on the site right now.

#### Job Seekers can:

- Search for jobs on the Job Center (totally free).
- Store your resume, cover letters, and other materials in your profile on the site.
- Apply for positions directly through the Job Center.

# Panels and Networking Opportunities at APS Meetings

- Industrial Careers Workshop at APS March Meeting
- Panels and Networking Receptions
- "Lunch with the Experts"
- Job Fairs at APS March and DPP





APS physics

### Future of Physics Days 2015

Each year APS offer a number of special events just for undergraduate students.

#### Typical events include:

- Career Workshops activities which are specifically designed for undergraduate attendees
- Graduate School Fair—meet face-to-face with representatives from graduate programs
- Student Research Sessions—an opportunity for students to present their research
- Awards reception—all presenters are recognized and top presenters receive prizes from ThinkGeek™





"OH GOD, SOMETIMES YOU CAN BE SUCH A BOHR!"

#### **Other Fun FPD Stuff**

- Official FPD T-shirts—FREE to all undergraduates. And you get to choose the caption in the FPD Caption Contest!
- Undergraduate Epitome —a special publication highlighting meeting events of interest to undergraduate students.

www.aps.org KEYWORD: Future Physics



#### **APS Local Links**

- Locally based, grassroots gatherings of students and physicists
- Focus on students and physicists working in academia, industry, and national labs.



- Groups meet about every 6-8 weeks, usually in a pub or restaurant ("neutral ground").
- Goal is to build mutually beneficial relationships, raise awareness of nonacademic careers, and promote recruitment of student and postdocs into industries.
- Current sites include:

Austin

Boston

- DC - Baltimore

Denver - Boulder

Silicon Valley

St. Louis

Tampa Bay - Orlando

http://go.aps.org/local\_links



# THANKS!!

Questions? Email: bailey@aps.org



