

PHYS 110 – Lecture 4

Today: “Careers in Physics”

- Announcements
- Dallas Johnson (Engineering Career Services)
- Mentor break out (careers)

Still no iClicker?

Home page

Schedule

Gradebook

Course Description

Course Grading

iClicker Information

Course Syllabus

Lecture Zoom Links

Undergraduate Programs

Advising

Saturday Physics for Everyone

The Physics Van

AAPT Career Center

Illinois Engineering Career Services

PHYS 110 Fall 2021

Home page

Announcements

Instructors

Ms. Merissa Milton
Physics Department Senior Academic Advisor
majones2@illinois.edu
217-244-9524

Prof. Yann Chemla
Associate Head for Undergraduate Programs
ychemla@illinois.edu
217-333-6501

Options:

- 1) Send me an email right after class
- 2) Log into Zoom during lecture
- 3) TBA

Reminders:

- Register iClickers!
- Check gradebook

<https://courses.physics.illinois.edu/phys110/fa2021/>

iClicker Question: What do Illinois Physics Bachelors do with their degrees?

Most (>50%) get a PhD and become professors:

A. True

B. False

- Illinois Physics Bachelors take many career paths
- Career options are extremely **flexible**



Physics is a flexible degree that gives you a **first-principles and fundamental understanding of nature**, strong math and analytical skills, and technical expertise... and that will prepare you for many different careers!



Madhulla Guhathakurta
Associate Research
Professor; Physicist



Kelth Ofsowitz
System Safety Engineer



Jennifer Grope
Physics Teacher



Clara Asmall
Physicist



Harold Chadsey
Astronomer



Serglo Valdes
Reactor Coolant System
Engineer



Mark Tritch
Project Engineer

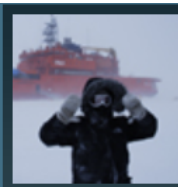


Carl Landis
Associate Medical Physicist



Pyrotechnician

Matthew manages professional
firework displays ...



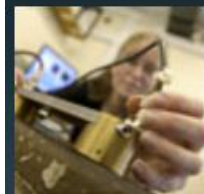
Ice Scientist

Katharine looks at what's going
on at the Earth...



Sound Engineer

Tony works as a sound system
engineer for mus...



Material Scientist

Rachel uses ultrasound to
ensure your safety on...



Particle Physicist

Ben works on the T2K
experiment, doing research...



Laser Fusion Scienti...

Kate uses powerful lasers in an
attempt to buil...



Jason Coleman
Senior Programmer



Steve Calderone
Programmer Analyst



Coastal Scientist

Sally's job is to predict what will
happe...



Satellite Engineer

Maggie leads a team of
scientists and engineers...



Science Journalist

Alok is a science journalist for
the Guardian n...

SPS & physics.org

The sky's the limit.

In Engineering Career Services, we're committed to producing the best outcomes for our students.

From the minute you step on campus, you can utilize our resources for searching for internships and co-ops, creating résumés and cover letters, and finding your dream job. Additionally, we cultivate strong, lasting relationships with the top companies in engineering in order to pass those networks on to you. The education, experiences, and resources at Grainger Engineering at Illinois will prepare you to hit the ground running upon graduation.

[SCHEDULE AN APPOINTMENT](#)



Dallas Johnson
Senior Coordinator
Engineering Career Services
dallas1@illinois.edu

Careers in Physics

ATTENTION PHYSICS STUDENTS:

You Have Options



Q: What can you do with a physics degree?

A: Get a PhD and become a physics professor OR ...

What comes after the "or" is not widely known in many physics departments, even though data show that less than a third of physics bachelor's degree recipients enroll in a physics or astronomy graduate program within one year of graduating. People with undergraduate degrees in physics pursue a variety of fascinating, fulfilling, and well-paying careers. This is evidenced by decades of data collected by the Statistical Research Center at the American Institute of Physics. Illustrated below are the common paths of physics bachelor's recipients based on the most recent data. Unless otherwise indicated, all data are for graduates of US physics programs who remain in the United States.

Over 8,400 physics bachelor's degrees were awarded in the class of 2015–16.

A record high! Typically...

- Three-fourths of those who earn physics bachelor's degrees have **research experience**.²
- One-third graduate with a **double major**, many in math.³
- One-tenth start at **two-year colleges**.⁴

Within one year of earning a physics bachelor's degree...

20% enroll in graduate programs other than physics or astronomy or in professional degree programs.

- About half enter an **engineering** program; the rest enter programs in math, medicine, education, or another field.⁵
- As a group, physics majors score among the highest of all majors on medical school and law school admission tests (the **MCAT** and **LSAT**).⁶
- Students in professional degree programs are more likely to be **self-funded** than students in research-based graduate programs, who usually have teaching assistantships, research assistantships, or fellowships.⁷

~30% attend graduate school in physics or astronomy.⁵

- About 3/4 enroll in a **PhD program**; the remainder choose a master's degree program.⁷
- Most are **fully supported** by teaching assistantships, research assistantships, or fellowships.

Of those who start graduate school in physics or astronomy...

~50% enter the workforce.⁵
Common employment sectors include:

Private sector

- ~2/3 of those who enter the workforce take jobs in the private sector.
- Of those that enter the private sector, the large majority hold science, technology, engineering, and math (STEM) positions.
- Those in private-sector STEM positions are well compensated, with a median starting salary of about \$57K.

Colleges or universities

- More than half of the students in these positions were employed at the same institution they graduated from. Many work in research or IT.

Civilian government

- The civilian government sector includes national labs. The vast majority of these positions are in STEM fields, many related to defense or energy.

Active military

- Physics bachelor's work across all branches of the armed forces. Many work in aviation or nuclear power.

High school teaching

- About a quarter of the high school teachers indicated that their undergraduate degree had a high school physics teaching focus.

The Statistical Research Center does not formally follow the career paths of these individuals, but we hear that they go on to successful careers in engineering, management, education, law, medicine, business, and a variety of other areas.

Add to the mix:

Foreign citizens coming to the United States for a graduate degree, students who earned bachelor's degrees in another field but want a graduate degree in physics, and students who earned a physics bachelor's degree in previous academic years.

~1 out of 6 US physics bachelor's receive a physics or astronomy PhD.⁷

- A doctorate in physics takes an average of **6–7 years**.⁷
- Most PhD students are **fully supported** by teaching or research assistantships or fellowships.⁵

Within one year of earning a physics PhD...

~1 out of 12 US physics bachelor's receive an exiting physics or astronomy master's degree.⁷

Exiting master's degree recipients are individuals who leave their current department upon receiving a master's degree. Many other students earn an en route master's degree, continuing on to a physics PhD in the same department.

- Over half of those who earn exiting master's degrees do so with a **specific research focus**.³
- A master's degree in physics usually takes about **two years**.

For US citizens, within one year of earning an exiting master's degree...

~1/2 enter the workforce.⁵

- About half work in the **private sector**, virtually all in STEM fields.
- The largest portion of exiting master's working in the private sector are employed in the field of engineering.
- Other common employment sectors for exiting master's include **colleges and universities, high schools, and civilian government**.

~1/2 continue with graduate studies.⁵

- Most transfer to other institutions to earn a **physics PhD**.
- Others transfer to programs in **related fields** such as materials science, engineering, medical physics, and mathematics.

~1/2 accept a temporary position
(e.g., a postdoc), primarily at a university or with the government.⁵

~40% accept a potentially permanent position.⁵

- ~3/4 of new PhDs accepting potentially permanent positions are employed in the **private sector**.
- The **median starting salary** for new physics PhDs employed in the private sector is **\$105K**.

Employment sectors of physics PhDs 10–14 years since receiving their degree.⁸

- 45% Private sector
- 43% Academe
- 6% Government
- 6% Other

References and Notes

The following data references published by the Statistical Research Center of the American Institute of Physics are available online at: www.aip.org/statistics.

1. Starr Nicholson and Patrick J. Mulvey, *Roster of Physics Departments with Enrollment and Degree Data*, 2016, September 2017.
2. AIP Statistical Research Center, *AIP Physics Trends: Research Experiences of Physics Undergraduates*, Fall 2009.
3. AIP Statistical Research Center, *AIP Physics Trends: Physics Students Have Broad Interests*, Spring 2011.
4. Susan White and Raymond Chu, *Physics Enrollments in Two-Year Colleges*, April 2013.
5. AIP Statistical Research Center, data from follow-up surveys of physics bachelor's, master's, and PhDs, www.aip.org/statistics/employment.
6. Casey Langer Tesfaye and Patrick Mulvey, *MCAT, LSAT and Physics Bachelor's*, December 2013.
7. Patrick J. Mulvey and Starr Nicholson, *Trends in Physics PhDs*, February 2014.

⁸Estimate provided by the AIP Statistical Research Center, Summer 2014.



Q: What can you do with a physics degree?

A: Get a PhD and become a physics professor OR ...

What comes after the "or" is not widely known in many physics departments, even though data show that less than a third of physics bachelor's degree recipients enroll in a physics or astronomy graduate program within one year of graduating. People with undergraduate degrees in physics pursue a variety of fascinating, fulfilling, and well-paying careers. This is evidenced by decades of data collected by the Statistical Research Center at the American Institute of Physics. Illustrated below are the common paths of physics bachelor's recipients based on the most recent data. Unless otherwise indicated, all data are for graduates of US physics programs who remain in the United States.



~30% attend graduate school in physics or astronomy.⁵

- About 3/4 enroll in a **PhD program**; the remainder choose a master's degree program.*
- Most are **fully supported** by teaching assistantships, research assistantships, or fellowships.

Of those who start graduate school in physics or astronomy...



~50% enter the workforce.⁵

Common employment sectors include:

Private sector

- ~2/3 of those who enter the workforce take jobs in the private sector.
- Of those that enter the private sector, the large majority hold science, technology, engineering, and math (**STEM**) positions.
- Those in private-sector STEM positions are well compensated, with a median starting salary of about **\$57K**.

Colleges or universities

- More than half of the students in these positions were employed at the same institution they graduated from. Many work in research or IT.

Civilian government

- The civilian government sector includes national labs. The vast majority of these positions are in STEM fields, many related to defense or energy.

Active military

- Physics bachelor's work across all branches of the armed forces. Many work in aviation or nuclear power.

High school teaching

- About a quarter of the high school teachers indicated that their undergraduate degree had a high school physics teaching focus.



The Statistical Research Center does not formally follow the career paths of these individuals, but we hear that they go on to successful careers in engineering, management, education, law, medicine, business, and a variety of other areas.



Over 8,400 physics bachelor's degrees were awarded in the class of 2015-16.

A record high! Typically...

- Three-fourths of those who earn physics bachelor's degrees have **research experience**.²
- One-third graduate with a **double major**, many in math.³
- One-tenth start at **two-year colleges**.⁴

Within one year of earning a physics bachelor's degree...



20% enroll in graduate programs other than physics or astronomy or in professional degree programs.

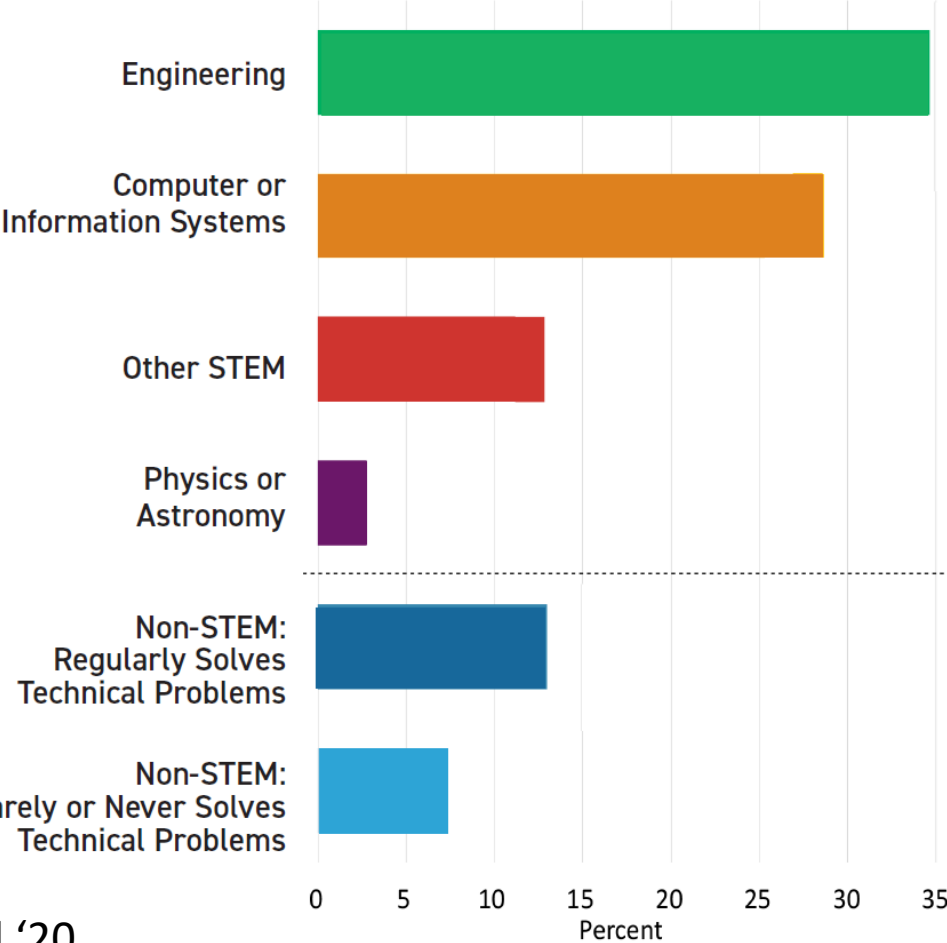
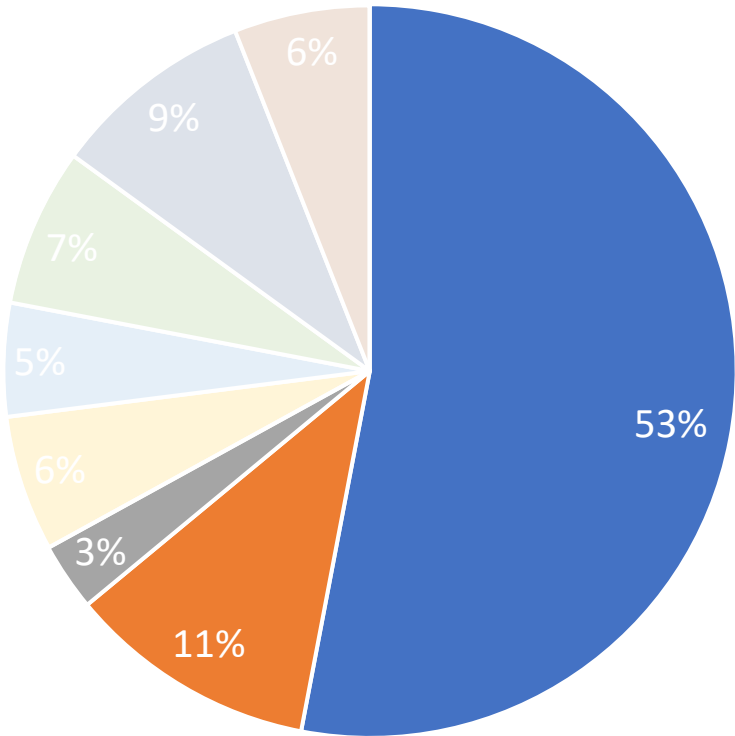
- About half enter an **engineering** program; the rest enter programs in math, medicine, education, or another field.⁵
- As a group, physics majors score among the highest of all majors on medical school and law school admission tests (the **MCAT** and **LSAT**).⁶
- Students in professional degree programs are more likely to be **self-funded** than students in research-based graduate programs, who usually have teaching assistantships, research assistantships, or fellowships.⁵

About 50% of Illinois Physics majors enter the workforce after graduation in a wide range of careers and sectors

Employment Sectors for New Physics Bachelors

Field of employment for New Physics Bachelors Employed in private sectors

- Private sector, STEM
- Private sector, non-STEM (technical)
- Private sector, non-STEM (non-technical)
- Civilian govt.
- Active military
- High school teacher
- College or University
- Other

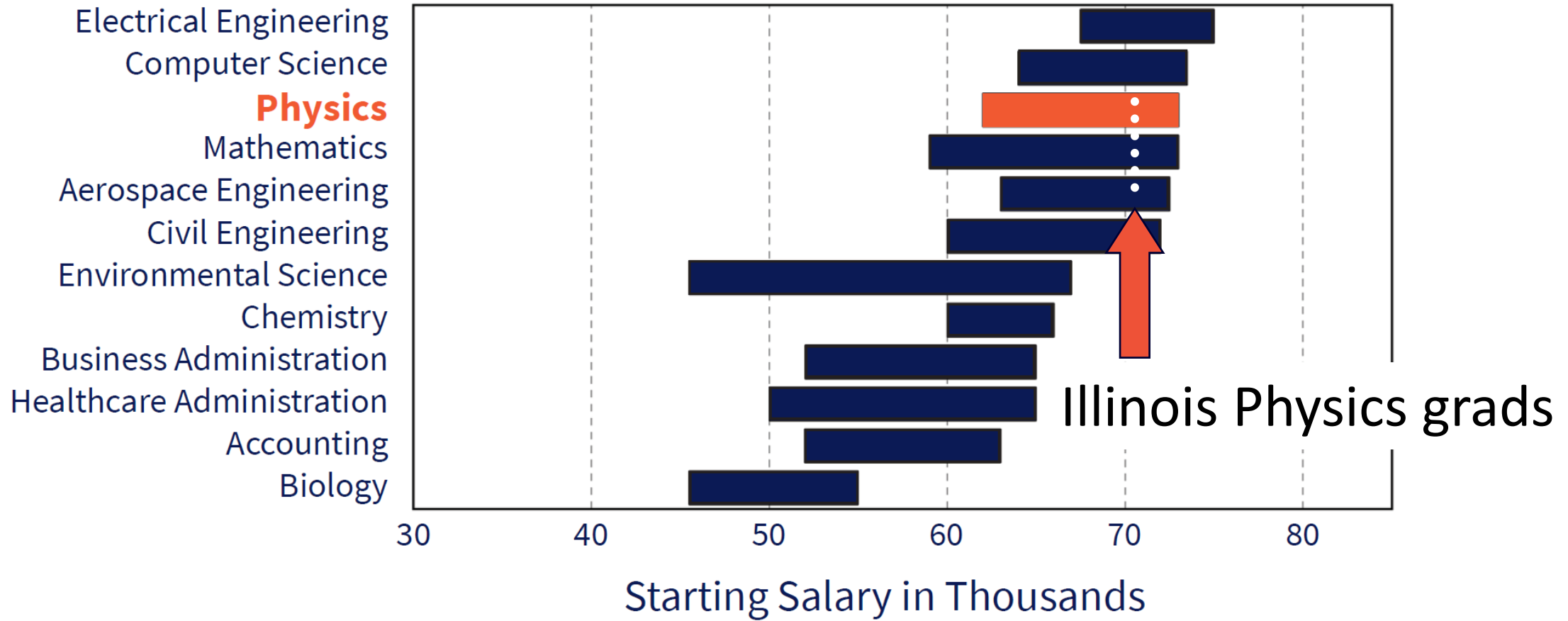


Illinois Physics Majors Post-Graduation

Private sector (50%, \$72.5k)

Accenture Consulting	Jump Trading
Belvedere Trading	JP Morgan Chase
Chicago Tech Academy	Olenick & Associates
CISCO Systems	Qualcomm
CreateASoft	Simplex Investments
Crystal Lake Central HS	Studio 222
Elk Grove HS	Twitch LLC
Epic	U-Line Distributor
Google	U.S. Army Core of Engineers
Green Line Engineering	Viasat
HRL Labs	...
IBM	
IMC Finance	
Inservice Engineering	
Intel	

Typical Starting Salaries for 2020 Bachelor's Degree Recipients



Data adapted from National Association of Colleges and Employers Winter 2020 Survey

iClicker Question: What are your graduation plans?

- A. Graduate school in Physics
- B. Graduate school in another field
- C. Employment in private sector
- D. Teaching
- E. Not sure!



Graduate School



~30% attend graduate school in physics or astronomy.⁵

- About 3/4 enroll in a **PhD program**; the remainder choose a master's degree program.⁶
- Most are **fully supported** by teaching assistantships, research assistantships, or fellowships.

Of those who start graduate school in physics or astronomy...



~50% enter the workforce.⁵

Common employment sectors include:

Private sector

- ~2/3 of those who enter the workforce take jobs in the private sector.
- Of those that enter the private sector, the large majority hold science, technology, engineering, and math (**STEM**) positions.
- Those in private-sector STEM positions are well com-



Add to the mix:

Foreign citizens coming to the United States for a graduate degree, students who earned bachelor's degrees in another field but want a graduate degree in physics, and students who earned a physics bachelor's degree in previous academic years.



~1 out of 6 US physics bachelor's receive a physics or astronomy PhD.⁶

- A doctorate in physics takes an average of **6–7 years.⁷**
- Most PhD students are **fully supported** by teaching or research assistantships or fellowships.⁵

Within one year of earning a physics PhD...



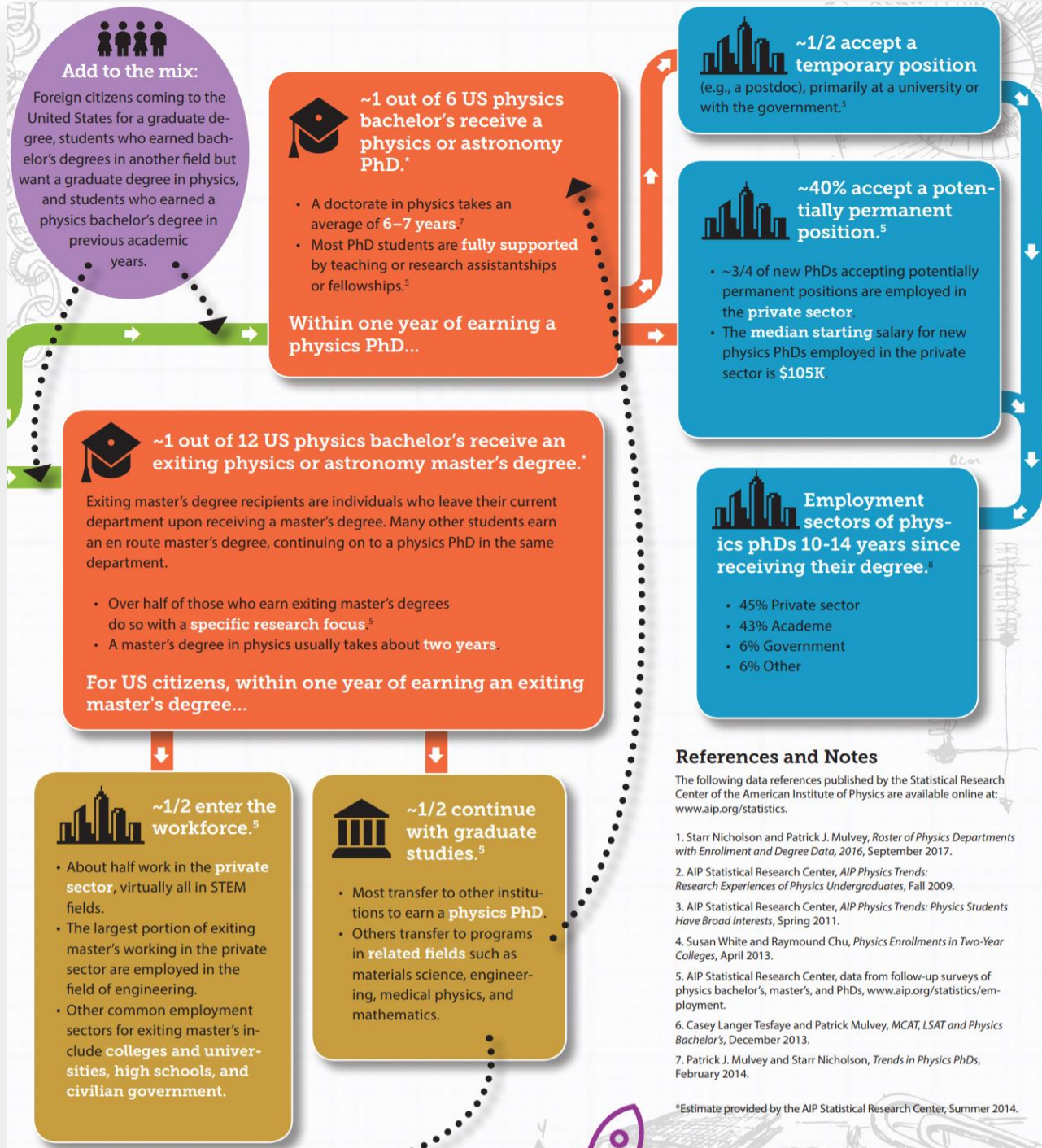
~1 out of 12 US physics bachelor's receive an exiting physics or astronomy master's degree.⁶

Exiting master's degree recipients are individuals who leave their current department upon receiving a master's degree. Many other students earn an en route master's degree, continuing on to a physics PhD in the same department.

- Over half of those who earn exiting master's degrees do so with a **specific research focus.⁵**
- A master's degree in physics usually takes about **two years.**

For US citizens, within one year of earning an exiting master's degree...

About 50% of Illinois Physics majors enter a PhD program after graduation... but more diversity in disciplines compared with national average



Graduate school gateway to:

- Postdoctoral research opportunities
- Higher paying job in industry & national labs
- Job in academia (i.e., becoming a professor)

Illinois Physics Major Post-Graduation

Private sector (50%, \$72.5k)

Accenture Consulting	Jump Trading
Belvedere Trading	JP Morgan Chase
Chicago Tech Academy	Olenick & Associates
CISCO Systems	Qualcomm
CreateASoft	Simplex Investments
Crystal Lake Central HS	Studio 222
Elk Grove HS	Twitch LLC
Epic	U-Line Distributor
Google	U.S. Army Core of Engineers
Green Line Engineering	Viasat
HRL Labs	...
IBM	
IMC Finance	
Inservice Engineering	
Intel	

Graduate Schools (50%)

Areas

Physics
Applied Physics
Applied Statistics
Architectural Acoustics
Biomedical Engineering
Computer science
Electrical Engineering
Finance
Geophysics
Journalism
Law School
Material Science
Mathematics
Neuroscience
Nuclear Engineering
Secondary Education
...

Institutions

Caltech	Ohio State
Colorado	Ohio University
Cornell	Oxford
Florida	Penn State
Harvard	Princeton
Indiana	Stanford
Johns Hopkins	U Chicago
Maryland	UIUC
Michigan	University of California
Michigan State	Virginia
Minnesota	Washington
MIT	Wisconsin
Northwestern	...
Notre Dame	

Resources

[Engineering Career Services](https://www.aip.org/career-resources)

<https://www.aip.org/career-resources>

<https://jobs.spsnational.org/jobs/>

<https://jobs.physicstoday.org/>

<http://www.physics.org/careerprofiles.asp>

<https://www.gradschoolshopper.com/gradschool/>



Breakout groups

- Discuss career plans, internship/job experiences
- Return to this room in about 15 minutes!