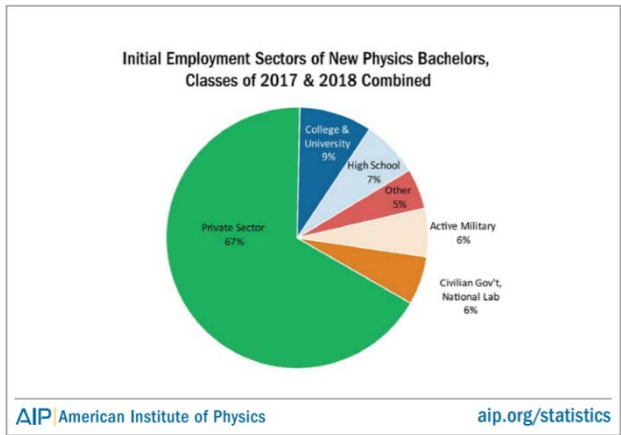


PHYSICS...NOW WHAT?



A physics degree can lead you to a broad range of science, engineering, and technology careers.

About one out of six physics bachelor's degree recipients in the United States go on to earn a physics or astronomy PhD, and only about 30% of those work in academia.

The others have fulfilling careers in the private sector, in government agencies or national laboratories, and in other sectors.

Check out the American Institute of Physics (<https://www.aip.org/career-resources>) for more information on careers in physics.

### Career Options for Physicists

## 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.  
 • One-third graduate with a double major, many in math.  
 • One-seventh start at two-year colleges.

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

- ~30% attend graduate school in physics or astronomy.  
 • 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.
- ~50% enter the workforce.<sup>1</sup>  
 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 \$57,000.  
 • **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.
- ~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).  
 • As a group, physics majors score among the highest of all majors on medical school and law school admission tests (the MCAT and LSAT).  
 • 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.<sup>2</sup>

**~1/2 continue with graduate studies.<sup>3</sup>**  
 • 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 enters the workforce.<sup>4</sup>**  
 • 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 out of 6 US physics bachelor's receive a physics or astronomy PhD.<sup>5</sup>**  
 • A doctorate in physics takes an average of 6-7 years.  
 • Most PhD students are fully supported by teaching or research assistantships or fellowships.

**~1 out of 12 US physics bachelor's receive an exiting physics or astronomy master's degree.<sup>6</sup>**  
 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.  
 • 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 accept a temporary position (e.g., a postdoc, primarily at a university or with the government).<sup>7</sup>
- ~40% accept a potentially permanent position.<sup>4</sup>  
 • ~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 \$102K.
- Employment sectors of physics PhDs 10-14 years since receiving their degree.**  
 • 45% Private sector  
 • 42% Academia  
 • 8% 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. Stan Nicholas and Patrick J. Mulvey, *Master of Physics Departments with Employment and Degree Status*, 2016, September 2017.
2. AIP Statistical Research Center, *AIP Physics Doctoral Research Experience of Physics Undergraduates*, Fall 2016.
3. AIP Statistical Research Center, *AIP Physics Doctoral Physics Students How They Earned*, Spring 2017.
4. Susan White and Employment Ops, *Physics Undergraduates in Their First College*, April 2013.
5. AIP Statistical Research Center data from follow-up surveys of physics bachelors, masters, and PhDs, www.aip.org/statistics/employment.
6. Casey Leazer, Jeffrey and Patrick Mulvey, *MCAT, LSAT and Physics Bachelor's*, December 2013.
7. Patrick J. Mulvey and Stan Nicholas, *Trends in Physics PhDs*, February 2014.

©2016 prepared by the AIP Statistical Research Center, September 2014.

Learn more at the Careers Toolbox website:  
[www.spsnational.org/careerstoobox](http://www.spsnational.org/careerstoobox)

AIP | SPS | Updated 12/2017

(From <https://www.spsnational.org/sites/default/files/sites/default/files/files/site-wide/Career-Options-Poster%202017.pdf>)

## WHAT DOES A PHYSICIST DO?

Physicists study the interactions of matter and energy. Theoretical physicists and astronomers may study the nature of time or the origin of the universe. Some physicists design and perform experiments with sophisticated equipment such as particle accelerators, electron microscopes, and lasers. Physicists typically do the following:

- Develop scientific theories and models to explain the properties of the natural world, such as atom formation
- Plan and conduct scientific experiments and studies to test theories and discover properties of matter and energy
- Write proposals and apply for research grants
- Do complex mathematical calculations to analyze physical and astronomical data, such as finding new planets in distant solar systems
- Design scientific equipment, such as telescopes and lasers
- Develop computer software to analyze and model data
- Write scientific papers that may be published in scholarly journals
- Present research findings at scientific conferences and lectures

Physicists explore the fundamental properties and laws that govern space, time, energy, and matter. Some physicists study theoretical areas, such as the fundamental nature of atoms and molecules and the evolution of the universe. Others design and perform experiments with sophisticated equipment such as particle accelerators, electron microscopes, and lasers. On the basis of their observations and analysis, they try to discover and formulate laws that explain the forces of nature, such as gravity, electromagnetism, and nuclear interactions. Others apply their knowledge of physics to practical areas, such as the development of advanced materials and medical equipment.

Many physicists do basic research with the aim of increasing scientific knowledge. For example, they may develop theories to better explain what gravity is or how the universe was formed.

Others do applied research, using knowledge gained from basic research to develop new devices, processes, and other practical applications. Their work may lead to advances in areas such as energy, electronics, communications, navigation, and medical technology. For example, lasers are now used in surgery and microwave technology is now in most kitchens.

If you are considering graduate school, be sure to find research opportunities as part of your undergraduate work.

A Ph.D. in physics, astronomy, or a related field is needed for most jobs, especially those in basic research or in independent research in industry. A typical Ph.D. program takes about five to seven years to complete. After receiving a Ph.D. in physics or astronomy, many begin their careers in a temporary postdoctoral research position, which typically lasts 2 to 3 years. Physicists also may work in interdisciplinary fields, such as biophysics, chemical physics, and geophysics.

## **WHAT CAN YOU DO WITH A PHYSICS BACHELORS DEGREE?**

Starting salaries with a Physics Bachelors Degree: <https://www.aip.org/statistics/physics-trends/starting-salaries-physics-bachelors-classes-2017-2018>

- Technician or research assistant in fields of physics, engineering, and computer science
- High school math or science teacher
- Healthcare Fields
- Legal work (physics majors understand complicated arguments from principle)
- Business (a physics background will make the quantitative parts of business school curriculum pretty straightforward)
- Banks, investment firms, insurance agencies, etc are drawn to science and math majors because of their strength with numbers and computers

## **INTERNSHIPS AND RESEARCH EXPERIENCE AS A STUDENT**

Start your internship search early. Begin with a game plan to increase your career potential and obtain a summer internship or research experience.

- Make sure your resume is all set and up-to-date with summer experiences. Remember to always highlight your technical skills, as well as your professional skills.
- What research are you going to pursue this semester?
- What leadership and teamwork opportunities are you going to look into?
- What career fairs are you planning to attend? Are you ready? Do you need to attend a Career Fair Prep workshop, [check Handshake](#) for this semester's dates and times.

Some large organizations fill summer internships in the fall. Consider starting with these places:

- Check out [Oak Ridge Institute for Science and Education opportunities](#).
- Check [Handshake](#) for many different internships
- Review the websites of the National Labs
  - Argonne National Lab
  - Brookhaven National Lab
  - Fermi Lab
  - Lawrence Berkeley National Lab
  - Lawrence Livermore National Lab
  - Los Alamos National Lab
  - Oak Ridge National Lab
  - Pacific Northwest National Lab
  - Sandia National Lab
- Department of Energy Scholars
- MIT Lincoln Lab
- Naval Research Laboratory
- National Institutes of Health
- National Institute of Standard and Technology
- US Air Force Pathways Internship Program

- US Air Force Research Lab
- US Army Natick Solder Research, Development & Engineering Center
- US Army Pathways Internship Program
- US Army Research Lab
- US Navy Pathways Internship Program
- [Mass Technology Collaborative](#) Internship program
- [Mass Life Sciences Internship Challenge](#) – You do not have to be a life sciences major. They are looking for students studying all different sciences to intern in life sciences companies.
- Check out the [CNS Completed Database of Internships and Research](#), to see where previous Physics majors have gotten experiential learning. Add yours, when you have completed it.
- Prepare for upcoming internship or research interviews with [Big Interview](#), which teaches you how to answer questions, and practice video answers.
- You can also [schedule a mock interview with a CNS Career Advisor](#). Bring a job description and your resume.

## **JOB SEARCH RESOURCES**

### **Some Massachusetts employers who hire new physics bachelor recipients**

(from <https://www.aip.org/statistics/massachusetts>)

- |  |   |   |
|--|---|---|
| • 2Is Inc                                      | • Eastridge Solutions                           | • Microfluidics International Corporation |
| • Absolute Robot                               | • Electronic Theatre Controls                   | • MIT Lincoln Laboratory                  |
| • Acentech                                     | • EMC Corporation                               | • My True Inc.                            |
| • Amazon                                       | • EverQuote                                     | • National Bureau of Economic Research    |
| • Analytics Operations Engineering             | • FibroGen                                      | • New England Controls                    |
| • Antenna Research Associates                  | • GEA Process Engineering, Inc.                 | • Newgrange Design                        |
| • Applied Physical Sciences Corp.              | • Giner Inc                                     | • Nufit Media                             |
| • Atlantic Testing Laboratories                | • GNS Healthcare                                | • OCD Tech                                |
| • Atmospheric and Environmental Research (AER) | • Gradient Corporation                          | • Omnclaim Inc.                           |
| • Audley Travel                                | • Harvard-Smithsonian Astrophysical Observatory | • Optikos                                 |
| • Beth Israel Deaconess Medical Center         | • Health Advances                               | • Optum                                   |
| • Boston Children's Hospital                   | • Highland Industries, CH                       | • Pegasystems                             |
| • Boston Consulting Group                      | • Highway Loss Data Institute                   | • Physical Sciences Inc.                  |
| • Boston Medical Center                        | • HubSpot                                       | • Plymouth Grating Laboratory             |
| • Brewer Science                               | • IBM   | • Power Distribution Equipment Company    |
| • Bridj  | • ICS Laboratories, Inc.                        | • Quantopian, Inc.                        |
| • Brigham and Women's Hospital                 | • Intrepid Pursuits                             | • QuEST Global                            |
|  | • IPG Photonics                                 | • Radiation Monitoring Devices, Inc.      |
|  | • John Galt Staffing                            | • RTI International                       |
|  | • KAYAK   | • SciAps Inc.                             |
|  | • KNF&T   |   |

- Cakewalk
- Chandra X-ray Observatory
- Charles Stark Draper Laboratory, Inc.
- CiBO Technologies
- Cognex Corporation
- Cognius
- Comark LLC
- CoolComposites, Inc.
- Dana Farber Cancer Institute
- DataArt
- DetraPel
- Draper
- EASi
- Kyruus, Inc.
- L3
- Lightelligence
- Manpower
- Massachusetts Eye and Ear Infirmary
- Massachusetts General Hospital
- Massachusetts Institute of Technology
- MediaVue Systems
- Medical Diagnostic Laboratories
- Medical Information Technology
- Mevion Medical Systems
- Snelling & Hamel Associates
- Tank Utility
- Tech-etch
- Tecolote Research Inc.
- The Russian School of Math
- Thermo Fisher Scientific
- Torch Technologies
- University of Massachusetts
- Vestmark
- Washington University School of Medicine
- Wayfair
- WiPro
- WiserTogether

### Getting a PhD in Physics

Quick Facts: Physicist	
<b>2020 Median Pay</b>	\$128,950 per year
<b>Entry-Level Education</b>	Doctoral or professional degree
<b>Number of Jobs, 2019</b>	20,500
<b>Job Outlook, 2019-29</b>	7% (Faster than average)
<b>Employment Change, 2019-29</b>	1,400

*[Found on the Occupational Outlook Handbook:*

*<http://www.bls.gov/ooh/life-physical-and-social-science/physicists-and-astronomers.htm>]*

**Some of the largest companies and industries that hire PhD physicists.** (Check out their employment pages for internship or job opportunities, but keep in mind that this list doesn't reflect *all* companies or ones that are necessarily hiring right now):

- Raytheon
- IBM
- Lockheed Martin Corporation
- Lucent Technologies
- Boeing Company
- Eastman Kodak Company
- Science Applications International Corporation
- General Atomics
- Hewlett-Packard Company
- Northrop Grumman Corporation
- AT&T
- Schlumberger Limited
- Motorola Incorporated
- Rockwell International Corporation
- Seagate Technologies
- Osram Sylvania
- Maxwell Optical Industries
- Varian Associates
- 3M Company

## Career Planning Websites and Links

UMass Amherst CNS Career Center	<a href="http://www.cns.umass.edu/careers">www.cns.umass.edu/careers</a>
UMass Handshake Database of Internships & Jobs	<a href="https://umass.joinhandshake.com/">https://umass.joinhandshake.com/</a>
What Can I Do With This Major?	<a href="https://www.umass.edu/careers/planning">https://www.umass.edu/careers/planning</a>

*(Click on "What Can I do with this Major" icon on the right-hand column.)*

FOCUS2 Career and Education Planning	<a href="http://www.umass.edu/careers/planning">www.umass.edu/careers/planning</a> for sign-in button
CNS Completed Research/Internships Database	<a href="https://secure.cns.umass.edu/webforms/internships">https://secure.cns.umass.edu/webforms/internships</a>
UMass Amherst Career Services Events Calendar	<a href="http://www.umass.edu/careers">www.umass.edu/careers</a>

## Physics Job Search Links

- **American Association of Physics Teachers** ([www.aapt.org](http://www.aapt.org))  
Joining professional associations provides good opportunity for networking and creating professional relationships, broadening your knowledge, and accessing job listing available only to members.
- American Astronomical Society ([www.aas.org](http://www.aas.org))
- American Institute of Physics (<https://www.aip.org/career-resources>)
- American Meteorological Society ([www.ametsoc.org](http://www.ametsoc.org))
- American Physical Society ([www.aps.org](http://www.aps.org))
- APS Career Center (<https://www.aps.org/careers/employment/index.cfm>)
  - APS Online Career Center (<http://careers.aps.org/search.cfm>)
  - 021 Career Guide: (<https://reader.exacteditions.com/issues/91811/spread/1>)
- Institute of Physics ([www.iop.org](http://www.iop.org))
  - Sign up for the Career "Shape Up" series (<https://info.aps.org/careers/shape-up>): Want to understand the career opportunities available to you with a physics degree? Or get tips on your job search? Shape Up sends you tips, resources, and challenges to help you achieve your specific career goals.
- National Aeronautics and Space Administration ([www.nasa.gov](http://www.nasa.gov))
- Physics Today Job Search ([www.physicstoday.org/jobs/](http://www.physicstoday.org/jobs/))
- Physlink.com Job Board ([www.physlink.com/community/jobboard.cfm](http://www.physlink.com/community/jobboard.cfm))
- Science Careers (<http://www.sciencecareers.sciencemag.org>)
- \* **Society for Physics Jobs for Undergrads** <https://jobs.spsnational.org/jobs/>
- Society of Physics Students: Careers Using Physics ([www.spsnational.org/cup/home.html](http://www.spsnational.org/cup/home.html))
- TIPTOP Jobs/Brightrecruits.com ([brightrecruits.com/tiptop](http://brightrecruits.com/tiptop))  
Database of science and engineering positions

## IMPORTANT TRANSFERABLE QUALITIES TO INCLUDE ON YOUR RESUME (WHETHER YOU'RE PURSUING A JOB IN PHYSICS OR NOT)

- **Advanced mathematical skills.** Physicists perform complex calculations involving calculus, geometry, algebra, and other areas of mathematics. They must be able to express their research in mathematical terms.
- **Analytical skills.** Physicists need to be able to carry out scientific experiments and studies. They must be precise and accurate in their analysis because errors could invalidate their research.
- **Critical-thinking skills.** Physicists must carefully evaluate their own work and the work of others. They must determine whether results and conclusions are based on sound science.
- **Interpersonal skills.** Physicists must collaborate extensively with others—in both academic and industrial research contexts. They need to be able to work well with others towards a common goal.
- **Problem-solving skills.** Physicists use scientific observation and analysis to solve complex scientific questions.
- **Speaking skills.** Physicists present their research at scientific conferences, to the public, or to company management and other employees.
- **Writing skills.** Astronomers write reports that may be published in scientific journals. They also write proposals for research funding.

*Some information taken from Occupational Outlook Handbook, University of Pennsylvania Department of Physics & Astronomy, Purdue University Department of Physics, and Dartmouth College Department of Physics and Astronomy*

### What Do Employers Look For? (NACE 2020 Job Outlook for Students)

