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](https://www.aip.org/career-resources)) for more information on careers in physics.


**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?


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

Quick Facts: Physicist

| 2020 Median Pay          | $128,950 per year |
| Entry-Level Education    | Doctoral or professional degree |
| Number of Jobs, 2019     | 20,500            |
| Job Outlook, 2019-29     | 7% (Faster than average) |
| Employment Change, 2019-29 | 1,400            |


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  www.cns.umass.edu/careers
UMass Handshake Database of Internships & Jobs https://umass.joinhandshake.com/
What Can I Do With This Major? https://www.umass.edu/careers/planning

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

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

Physics Job Search Links

- **American Association of Physics Teachers** (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)
- American Institute of Physics (https://www.aip.org/career-resources)
- American Meteorological Society (www.ametsoc.org)
- American Physical Society (www.aps.org)
- APS Career Center (https://www.aps.org/careers/employment/index.cfm)
  - APS Online Career Center (http://careers.aps.org/search.cfm)
- Institute of Physics (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)
- Physics Today Job Search (www.physicstoday.org/jobs/)
- Physlink.com Job Board (www.physlink.com/community/jobboard.cfm)
- Science Careers (http://www.sciencecareers.sciemag.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)
- TIPTOP Jobs/Brightrecruits.com (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)