Physics & Astronomy Career Workshop #1

Career Formation:
What Do Physicists Do, and What Should I Do?

11 October 2023
A FEW FACTS: PHYSICS DEGREES IN THE US

• 8618 people graduated with bachelor’s degrees in physics in 2021/22
• 2015 people graduated with PhDs in physics in 2021/22
• 434 people were hired as full-time physics faculty members in 2018/19 (~75 of those were already faculty)
• 5% of all physics BS/BA recipients eventually end up as physics professors

Various reports, AIP Statistical Research Center
Classes of 2019 and 2020 combined
Field of Graduate Study for Physics Bachelors One Year After Degree, Classes of 2019 & 2020 Combined

- Physics or Astronomy: 65%
- Other: 18%
- Engineering: 17%

Figure based on responses from 2,593 physics bachelors degree recipients who indicated that they continued into graduate study.
Initial Employment Sectors of New Physics Bachelors, Classes of 2019 & 2020 Combined

- Private Sector: 59%
- College & University: 18%
- High School: 6%
- Other: 8%
- Active Military: 3%
- Civilian Gov't, National Lab: 7%
Field of Employment for New Physics Bachelors in the Private Sector, Classes of 2019 & 2020 Combined

- Engineering: 35%
- Computer Software: 24%
- Non-STEM, Regularly Solves Technical Problems: 14%
- Non-STEM, Rarely or Never Solves Technical Problems: 8%
- Other STEM: 15%
- Physics or Astronomy: 4%

STEM refers to natural science, technology, engineering and mathematics. Regularly solving technical problems refers to respondents who selected “Daily”, “Weekly”, or “Monthly” on a four-point scale that also included “Rarely or Never”.

aip.org/statistics
Common Job Titles of New Physics Bachelors

Engineering
- Systems Engineer
- Electrical Engineer
- Design Engineer
- Mechanical Engineer
- Project Engineer
- Optical Engineer
- Manufacturing Technician
- Associate Engineer
- Application Engineer
- Development Engineer
- Process Engineer / Technician
- Product Engineer
- Product Manager
- Research Engineer
- Test Engineer
- Technical Services Engineer
- Integration Engineer

Computer Hardware/Software
- Software Engineer / Developer
- Programmer
- Web Developer
- IT Consultant
- Systems Analyst
- Technical Support Staff
- Data Analyst

Business/Finance
- Business Analyst
- Consultant
- Project Manager
- Investment Associate / Trader

Research and Technical
- Research Assistant
- Research Associate
- Research Technician
- Lab Technician / Assistant
- Scientist

Education
- High School Physics Teacher
- High School Science Teacher
- Middle School Science Teacher

Starting Salaries for New Physics Bachelors, Classes of 2019 & 2020 Combined

Salaries (in thousands)

<table>
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<tr>
<th>Sector of Employment</th>
<th>$0</th>
<th>$20</th>
<th>$40</th>
<th>$60</th>
<th>$80</th>
<th>$100</th>
<th>$120</th>
<th>$140</th>
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<td>Private Sector STEM</td>
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<td>Civilian Government (incl. Nat. Labs)</td>
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Figure only includes bachelors in full-time, newly accepted positions. The full starting salary range is represented by the lines extending to each side of the box. The box represents the middle 50% (25th to 75th percentile) of the salaries. The vertical line within the box represents the median starting salary for the sector. The dots outside of the lines are statistical outliers. Solves technical problems refers to respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never" when asked how frequently they solved technical problems in their position.
35% of graduates

24% of graduates

Percentages represent the physics bachelors who choose "daily", "weekly", or "monthly" on a four point scale that also included "never or rarely".
Physics PhDs 1 Year Later

Physics Doctorates
1,900

14% left the U.S.

Remained in the U.S.
1,630

50%
Postdoc Positions
595 University
195 Government*
25 Other

43%
Potentially Permanent Positions
515 Private Sector
105 Academe
50 Government*
35 Other

5%
Other Temporary Positions
50 Academe
20 Private Sector
10 Other

Classes of 2021 & 2022 combined
In 1991, the survey questionnaire was changed to measure “other temporary” employment as a separate category. Data are limited to PhDs who earned their degrees from a US university and remained in the US.
Employment Field of New Physics PhDs, Classes of 2015 & 2016 Combined

<table>
<thead>
<tr>
<th>Percent</th>
<th>Employment in physics - same subfield as dissertation</th>
<th>Employment in physics - different subfield from dissertation</th>
<th>Employment in other fields</th>
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<tr>
<td>50%</td>
<td>12</td>
<td>19</td>
<td>69</td>
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<td>6%</td>
<td>25</td>
<td>53</td>
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<td>39%</td>
<td>66</td>
<td>16</td>
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Other Fields:
- Computer software: 23%
- Engineering: 14%
- Business or finance: 11%
- Other sciences: 9%
- Education: 3%
- Medical services: 1%
- Other: 5%
Field of employment for new physics PhDs (potentially-permanent positions)

- Physics: 17%
- Computer software: 20%
- Computer hardware: 6%
- Data science: 7%
- Business: 10%
- Non-STEM: 2%
- Other STEM: 4%
- Medicine: 2%
- Education (physics): 17%
- Education (non-physics): 4%
Common job titles for new physics PhDs

**Engineering**
- Aeronautical Engineer
- Applications Engineer
- Battery Test Engineer
- Characterization Engineer
- Development Engineer
- Device Modeling and Testing Engineer
- Laser and Optics Engineer
- Process Technology Development Engineer
- R&D Engineer
- Systems Analyst
- Systems Engineer
- Technical Specialist
- Senior Design Engineer
- Sensor System Engineer

**Computer software**
- Analyst / Programmer
- Application Developer
- Associate Software Engineer
- Autonomy Engineer
- Flight Software Engineer II
- Mathematical Analyst and Developer
- Scientific Programmer

**Data science**
- Data Analyst
- Machine Learning Engineer
- Research Analytics Consultant
- Tech Data Scientist II

**Business**
- Algorithm Developer
- Credit Research Associate
- Data Analyst
- Quantitative Financial Analyst
- Risk Insights Analyst
- Senior Analytics Consultant
Starting Salaries for New Physics Doctorates

Classes of 2019 and 2020 combined
Scientific and Technical Knowledge Used by New Physics PhDs Employed in Potentially Permanent Positions, Classes of 2015 & 2016 Combined

- Solve Technical Problems
- Programming
- Design and Development
- Basic Physics Principles
- Applied Research
- Advanced Physics Principles
- Basic Research
- Advanced Math
- Use Specialized Equipment
- Simulation and Modeling
- Quality Control
- Tech Support

Frequency of Use:
- Daily or Weekly
- Monthly

17% 17% 25%
Career Planning Process

Foundational activities: before you need a job

• Self-knowledge: what are my goals, interests, and values?
• Self-assessment: what are my skills and knowledge?
• Exploration: what kinds of careers are out there and whom can I talk to about them?

Workshops #1 and #2 concentrate on these

Focused activities: when you need a job

• Finding available positions
• Writing a résumé to respond to a job ad
• Interviewing

Workshops #3 and #4 concentrate on these
Foundational activities: Self-knowledge

Keep a career journal

Goals: what is important to me?
- Make the world better
- Make a lot of money
- Live in Colorado
- Work-life balance/time for family or hobbies
- Traveling

Interests: how do I like to spend my time?
- Tinkering with equipment
- Coding
- Analyzing data/figuring out the Universe
- Writing
- Working with other people

Strengths: what am I really good at?
- Keeping track of details
- Seeing the big picture
- Writing
- Working with diverse teams
- Writing code
- Making equipment work
Foundational activities: Self-assessment

Skills inventory: what can I do, and when have I done it?
Identify skills and an example of where you have used them

Technical skills
- Solving complex technical problems
- Teaching: conceptualizing & explaining
- Programming
- Documentation
- Data and error analysis
- Advanced mathematics
- Simulation and modeling
- Using (and repairing) specialized equipment
- Quality control
- Machining

Non-technical skills
- Functioning in a variety of environments and roles
- Writing concisely and accurately
- Presenting information orally
- Tailoring your message to an audience
- Supporting a position with argumentation, logic, data
- Conceiving/designing complex projects
- Implementing and managing to completion
- Managing/leading groups of people
- Managing projects (creating task lists, developing timelines, setting goals, etc.)
- Planning for and obtaining necessary resources (e.g. funding)
- Developing and managing budgets
- Working on a team

You will use this when you write a résumé in workshop #3
Foundational activities: Exploration

What careers am I interested in and whom can I talk to about them?

**What careers?**
Many resources on the UNC P&A Career Info webpage:
https://physics.unc.edu/career-info/

From APS:
Profiles of physicists
https://www.aps.org/careers/physicists/profiles/index.cfm
Common career paths
https://www.aps.org/careers/physicists/prospects.cfm

**Whom to talk to?**
Many physicists can be found on LinkedIn—you need to be there too!
https://www.linkedin.com/

For info on how to join, see
https://careers.unc.edu/students/networking-and-social-media/how-build-your-linkedin-presence

More on this in workshop #2
Foundational activities homework

**Self-knowledge**
Revisit your list of goals, interests, and strengths; discuss with friends, co-workers and family

**Self-assessment**
Keep working on your skills inventory—what else have you done? (Add to it as you learn new skills)

**Exploration**
Watch an APS webinar on a career sector that interests you: [https://www.aps.org/webinars/](https://www.aps.org/webinars/) (OK to do at 2X speed!)

**Exploration**
Look through profiles and career paths (including on LinkedIn—join now!) and use your self-knowledge to identify at least one career path that sounds appealing

*You will report on these and use them in workshop #2*