Breaking the Myth of the "Non-Traditional" Physicist

The Real Story About Employment for Physics Graduates

Friday, July 7, 2017
Thomas Jefferson National Accelerator Facility
Newport News, VA

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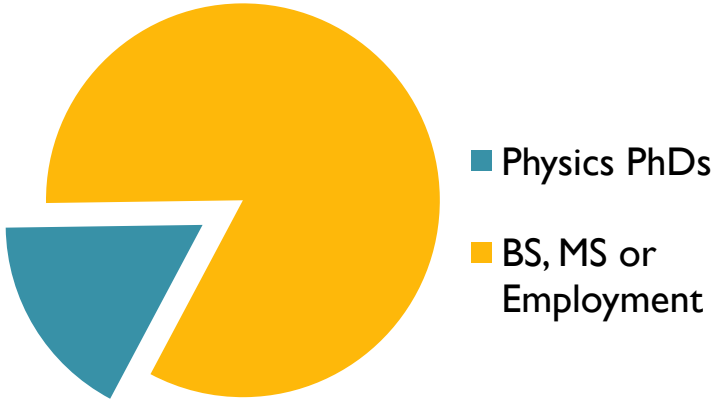
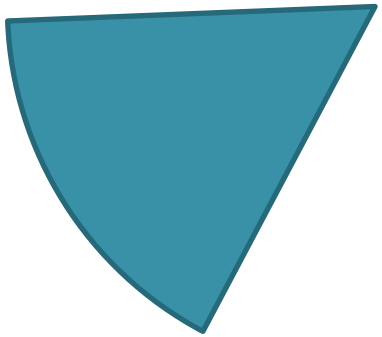
Where do Physicists Work?

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 6 physics bachelors will choose to finish a Physics PhD.





So ~17% of all Physics Degree holders will actually become Physics PhDs—and by extension "traditional physicists."

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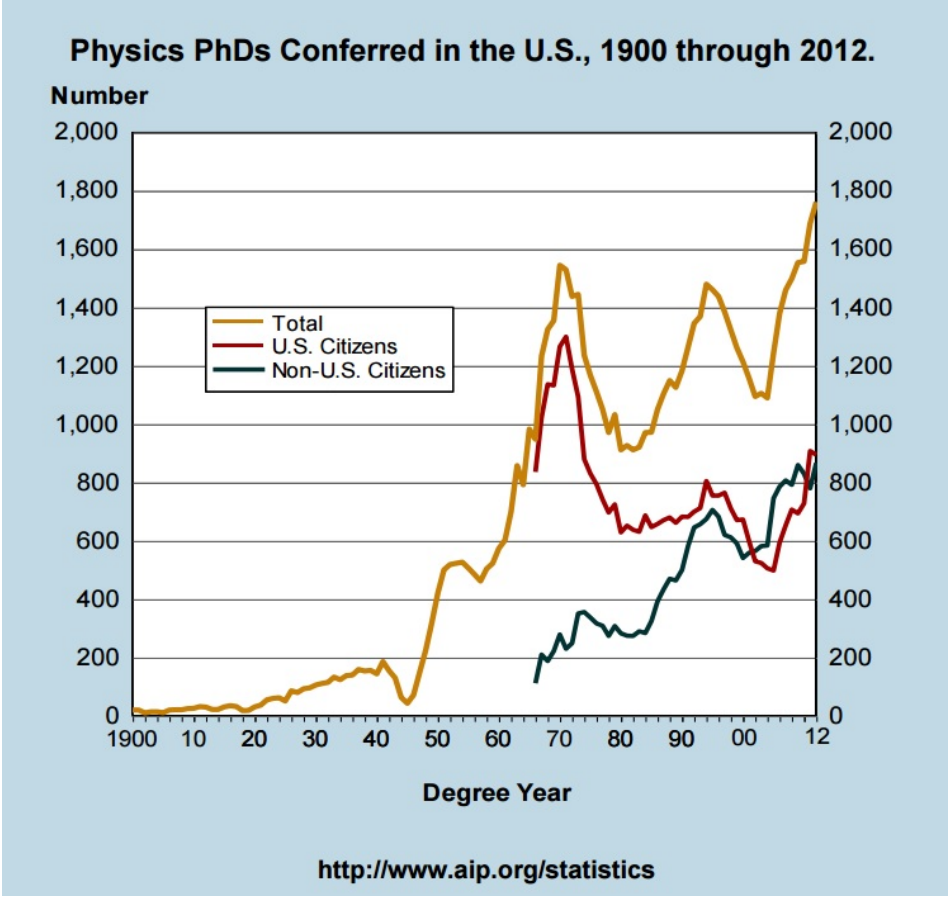
PhD Job Force: Supply

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.



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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.

Type of Employment of Physics PhDs by Employment Sector One Year After Degree, Classes of 2013 & 2014 Combined

Sector of Employment	Initial Employment Type			Overall %
	Postdoc %	Potentially Permanent %	Other Temporary %	
Academic*	75	20	71	52
Private	1	70	18	31
Government	21	8	3	14
Other	3	2	8	3
	100%	100%	100%	100%

Note: Data only include US-educated physics PhDs who remained in the US after earning their degrees. Data are based on the responses of 655 postdocs, 523 individuals working in potentially permanent positions and 126 individuals working in "other temporary positions."

*The academic sector includes two- and four-year colleges, universities, and university affiliated research institutes.

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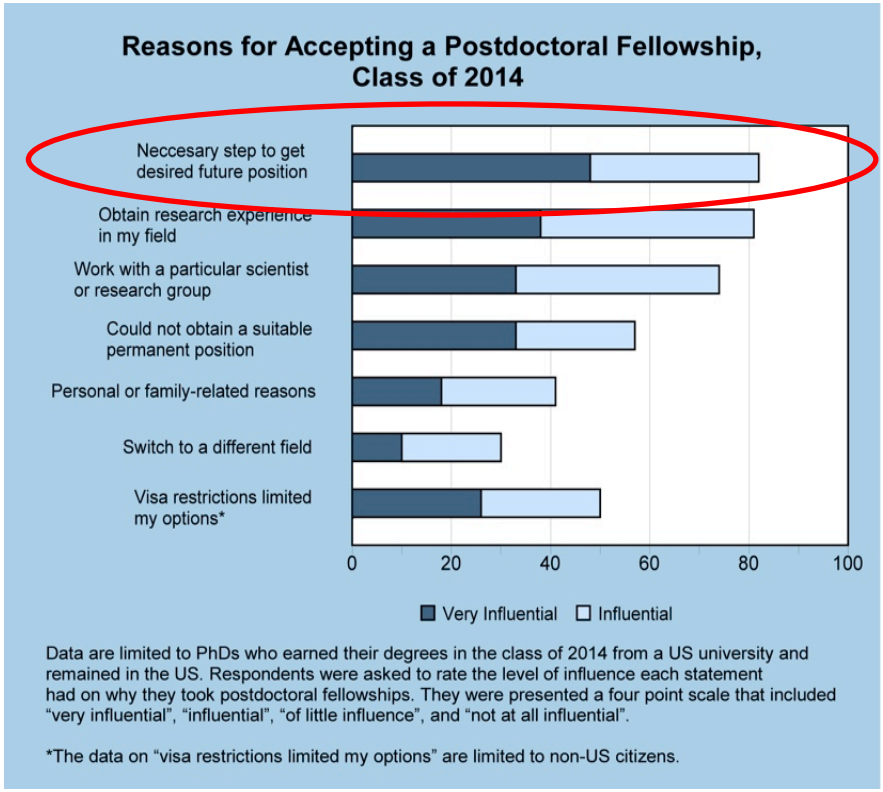
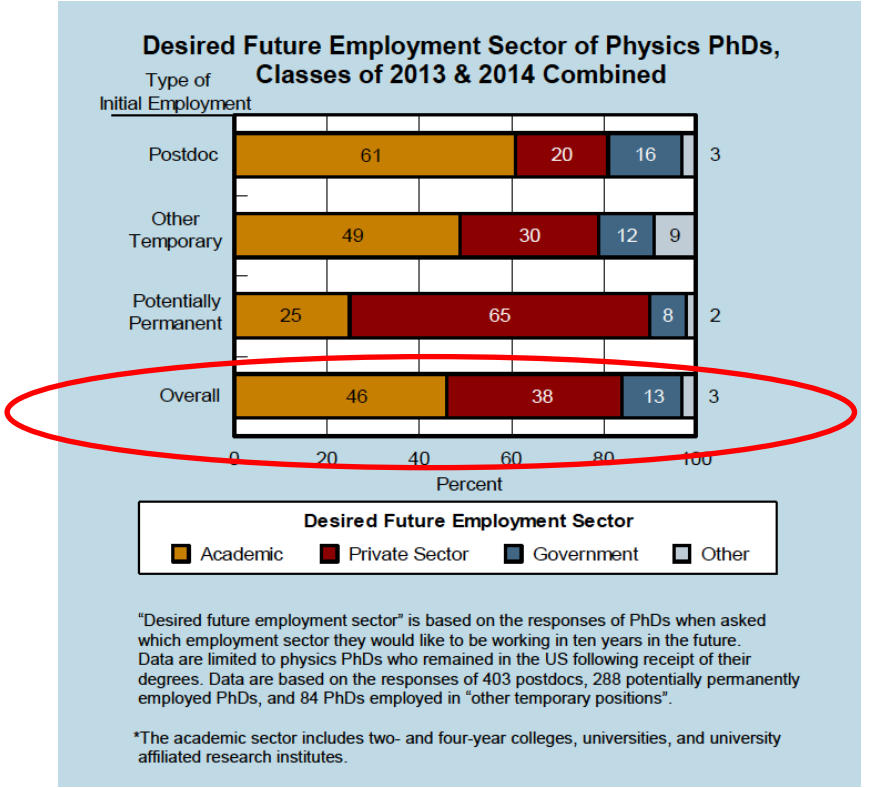
PhD Job Force: Demand

The majority (85%) of graduates who initially go into the academic sector are postdocs or temporary faculty. The remaining postdocs are mostly in national labs (21%).

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





Overall, **46% of Physics PhDs** surveyed expected to have permanent careers in academia.

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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.)

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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 unlikely—even at Bachelor's granting universities.

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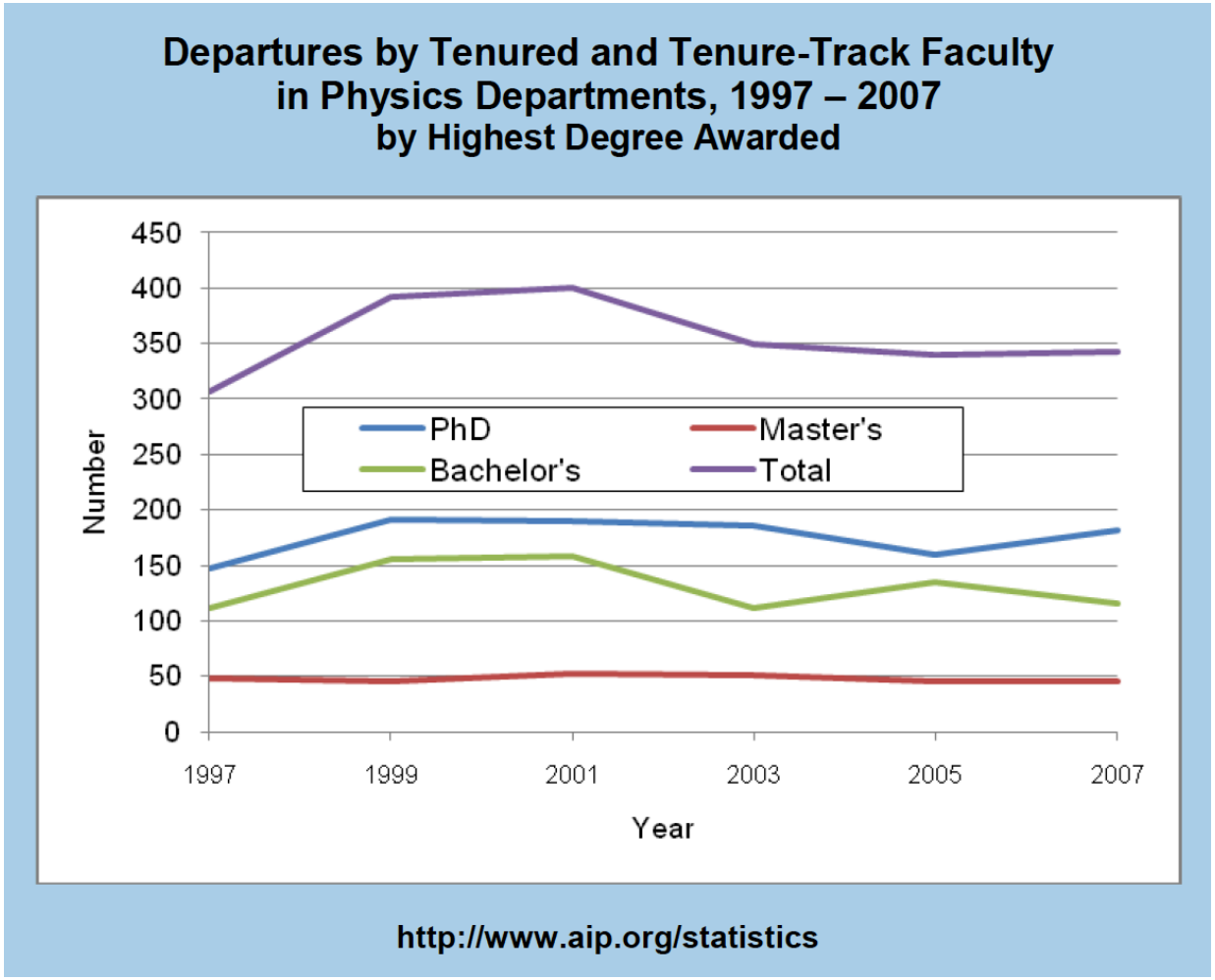
Yet the number of departures of tenured and tenure-track faculty has changed little since 2003.



"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

Not all faculty positions are created alike

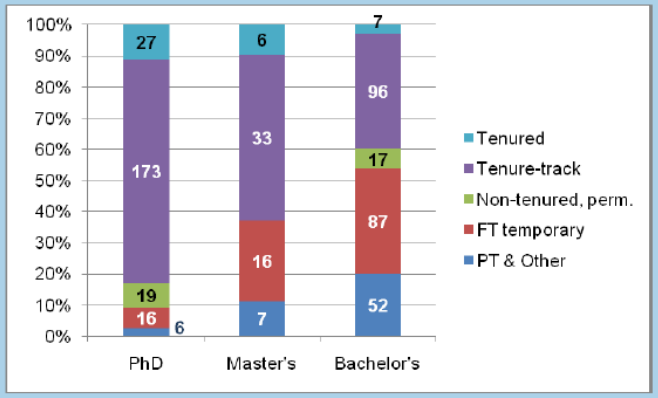
- The type of faculty position varies widely according to institution.
- Many individuals who do get new faculty positions will spend time waiting for a desired situation to open up.

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 over 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.

Current Positions of New Faculty Members, 2007-08



The numbers on the graph indicate the number of new faculty members.

Total number of new faculty:
241 in PhD-granting departments
62 in Master's-granting departments
259 in Bachelor's-granting departments

FT – Full-time ◆ PT – Part-time

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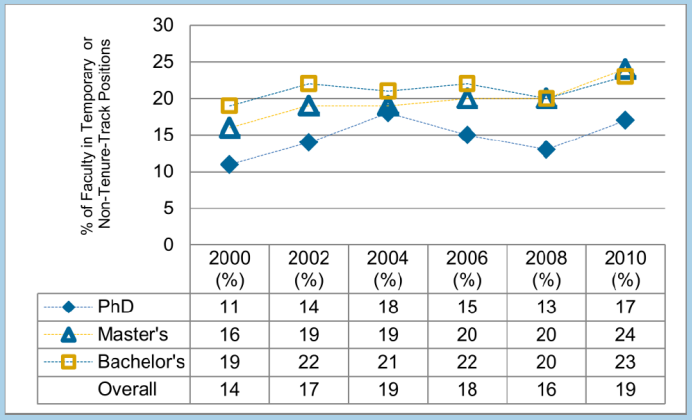
Percent of Full-Time Equivalent Physics Faculty Members Employed in Temporary or Non-Tenure-Track Positions
By Highest Degree Awarded



	2000 (%)	2002 (%)	2004 (%)	2006 (%)	2008 (%)	2010 (%)
PhD	11	14	18	15	13	17
Master's	16	19	19	20	20	24
Bachelor's	19	22	21	22	20	23
Overall	14	17	19	18	16	19

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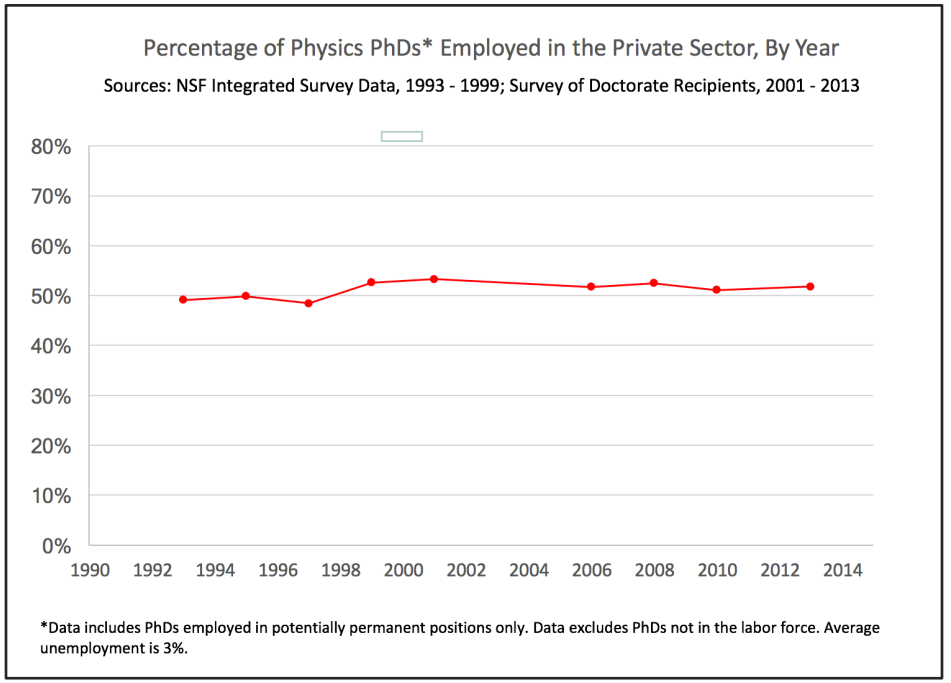
PhD Employment in the Private Sector

Recall that the majority (70%) of graduates who initially went into permanent employment positions were in the private sector.

According to the NSF Survey of Doctoral Recipients[1], in 2013 the private sector was the largest single permanent employment base of Physics PhDs in the workforce: about 52% (the next highest was 4 year colleges, at 34%). In 2010 this figure was 51%

This was also true in 2006, when the private sector employed 52% of Physics PhDs[1]…

…and was even true in 1993, when the private sector again employed 49% of Physics PhDs (compared to 36% in 4-year colleges)[2].



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

[1]NSF Survey of Doctoral Recipients, 2001 - 2013
[2]NSF Integrated Survey Data, 1993

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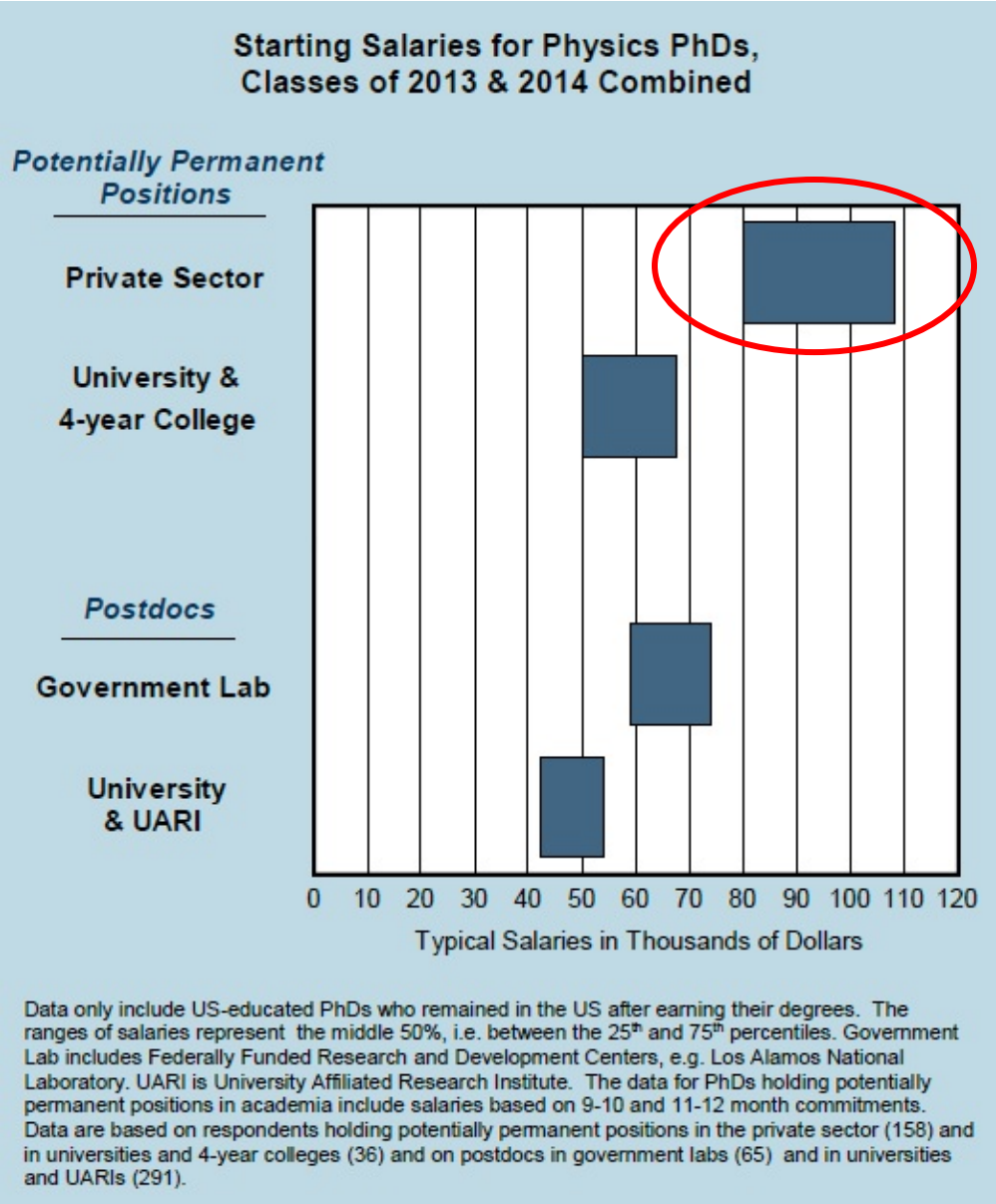
Not only does the private sector provide the largest number of jobs for physics PhDs, it also provides the highest-paying jobs, with a median starting salary over $90K.

By comparison, average typical starting salaries at Universities and 4-year colleges is around $50K…

…and a University postdoc position typically offers between $40K and $50K.

So, the private sector also offers well-paying employment to Physics PhDs.



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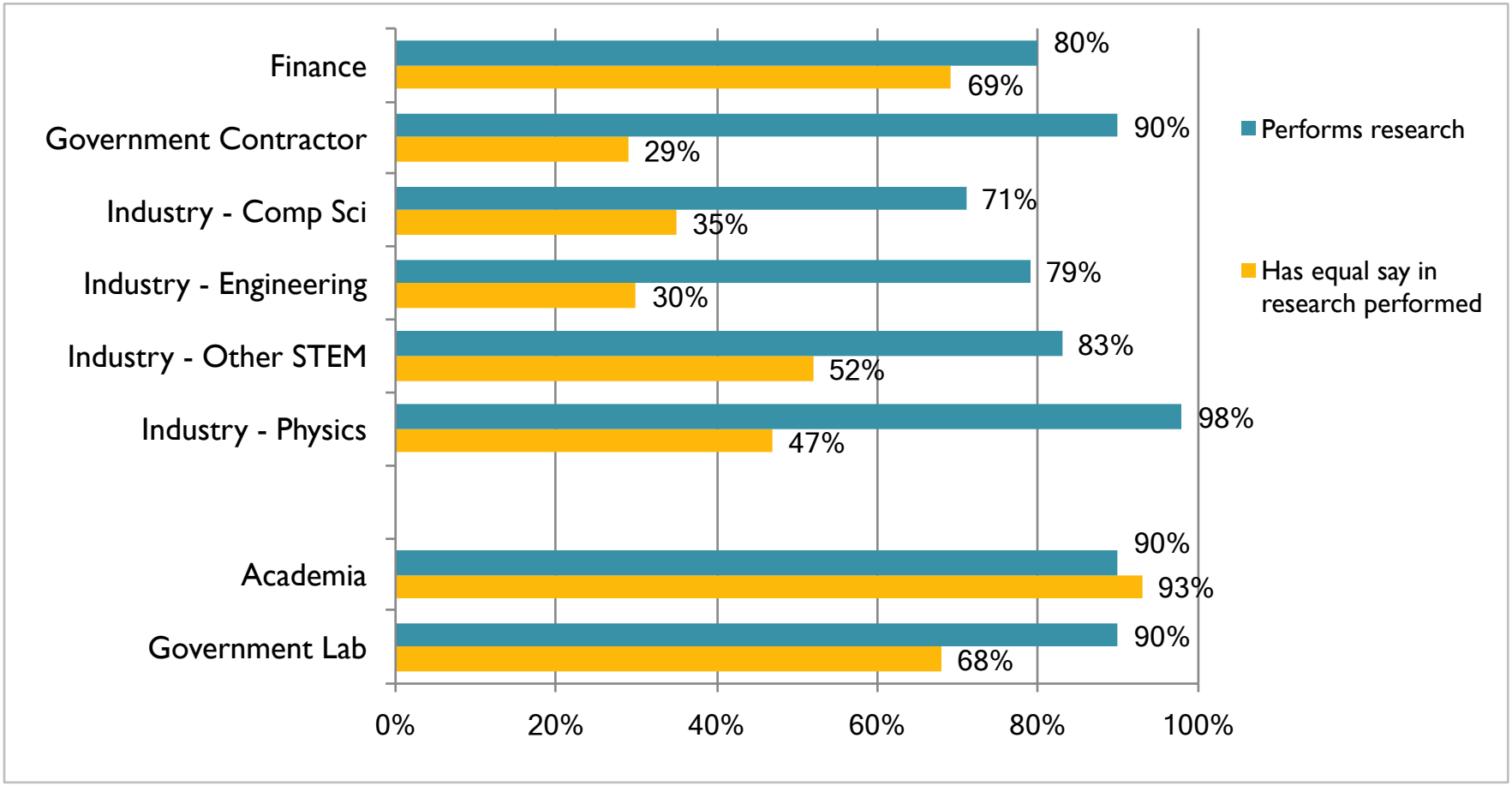
But Won't I Lose My Soul if I Go Into Industry?

NO!



Source: AIP Statistical Research Center Report Common Careers of Physics PhDs in the Private Sector, June 2015

Besides "physics," typical areas of employment for PhDs in the private sector included Engineering, Computer Science, Business, Finance, Education, or Medical Services.

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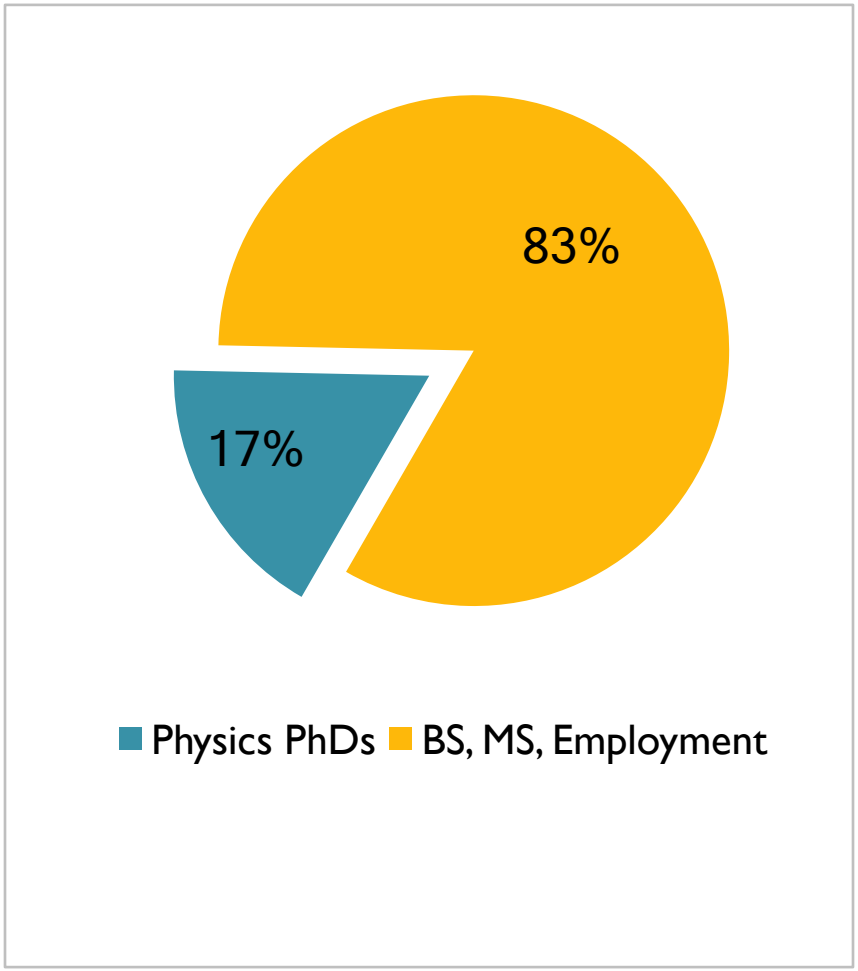
What about the non-PhD physicists?

According to the AIP Statistical Research Center, 83% of physics bachelors will not earn a Physics PhD.



- Roughly one-third to one-half of Physics Bachelors will go straight into the workforce, mostly in STEM fields.
- Another third will go into graduate study in Physics and Astronomy.
- And the remainder will go into graduate study in other fields—including finance, law, and Medical Physics.

What types of employment are possible for these degree paths?

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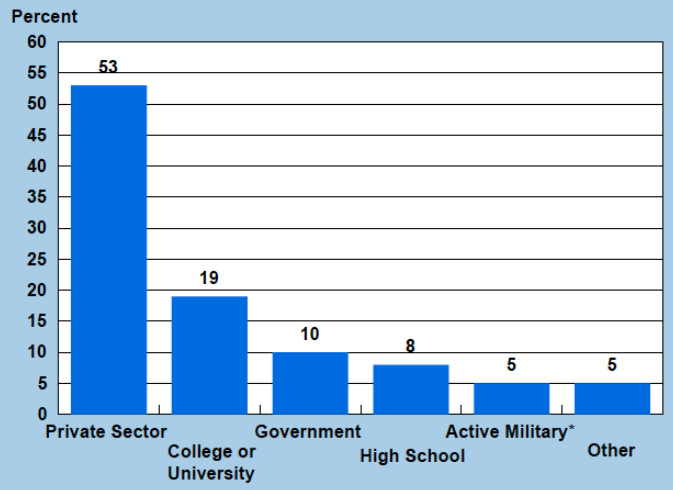
Initial Employment of Master's Degrees

Between 2012 - 2014, about 44% of physics masters recipients entered or remained in the workforce.

Employer Distribution of Exiting Physics Masters One Year After Degree, Classes of 2012, 2013, & 2014 Combined.



Exiting masters are individuals who, upon receiving their master's degrees, leave their current physics departments.

Figure includes US employed physics masters, including those who were employed part-time and not enrolled in a degree program and masters continuing in positions they held while pursuing their degrees. Other includes elementary and middle schools, health care facilities, and non-profit organizations. Figure based on responses from 323 individuals.

*Active military excludes masters receiving their degrees from military academies.

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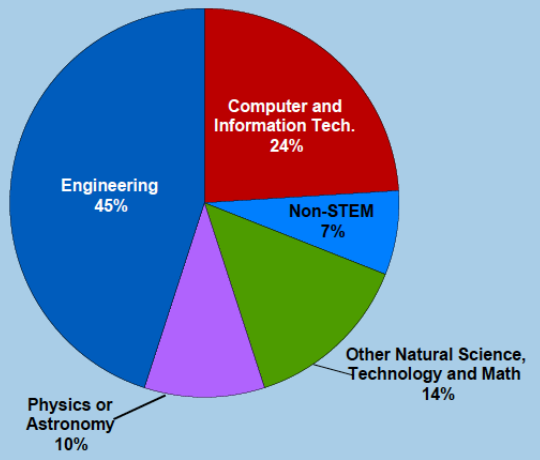
Field of Employment of Exiting Physics Masters Working in the Private Sector One Year After Degree, Classes of 2012, 2013, & 2014 Combined.



Exiting masters are individuals who, upon receiving their master's degrees, leave their current physics departments.

Figure includes US employed physics masters, including those who were employed part-time and masters continuing in positions they held while pursuing their degrees. Figure is based on responses of 164 individuals.

STEM refers to science, technology, engineering and math.

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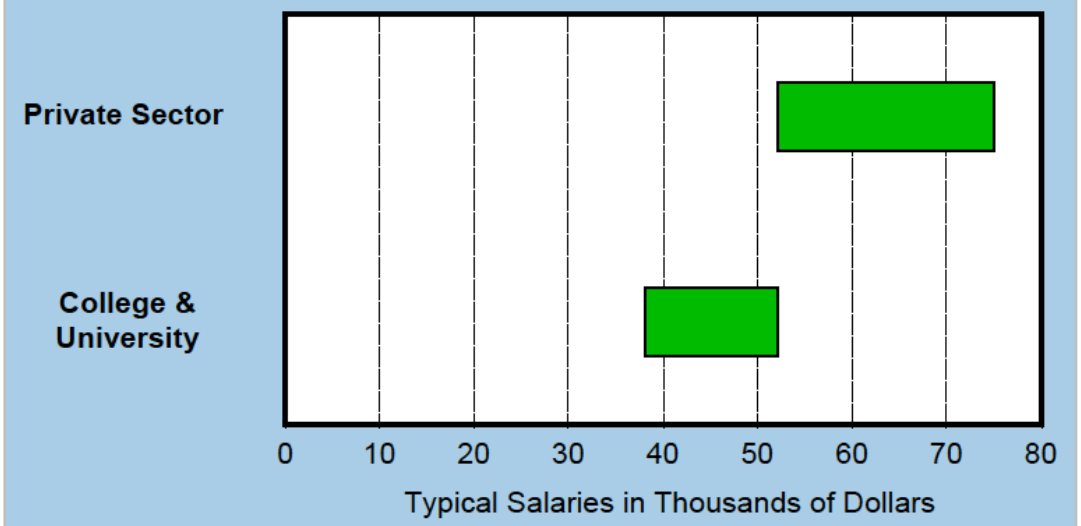
Not surprisingly, physics master's degree holders working in the private sector earned considerable more than their colleagues at colleges and universities.

MS grads who earned their degree while working in the private sector earned considerably more (~$83K).

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

Typical Starting Salaries of Exiting Physics Masters One Year after Degree, Classes 2012, 2013, & 2014 Combined.



Exiting masters are individuals who, upon receiving their master's degrees, leave their current physics departments.

The graphic represents the middle 50% of reported salaries, i.e., between the 25th and 75th percentiles. Figure does not include salaries for masters holding part-time positions or salaries for respondents who reported starting their employment more than a year prior to earning their master's degree. The College & University category includes two-year colleges, four-year colleges, universities, and university affiliated research institutes. Data are based on 71 private sector salaries and 19 college and university salaries.

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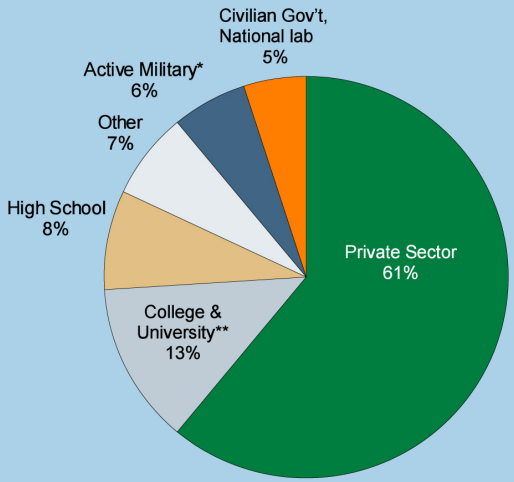
Initial Employment of Physics Bachelors

On average between 1995 and 2012, about 40% of physics bachelors went directly into the workforce after graduation.

Initial Employment Sectors of Physics Bachelor's, Classes of 2011 & 2012 Combined.



*Data does not include degree recipients from the three military academies (US Naval Academy, US Military Academy, US Air Force Academy).

** Data include two- and four-year colleges, universities, and university affiliated research institutes.

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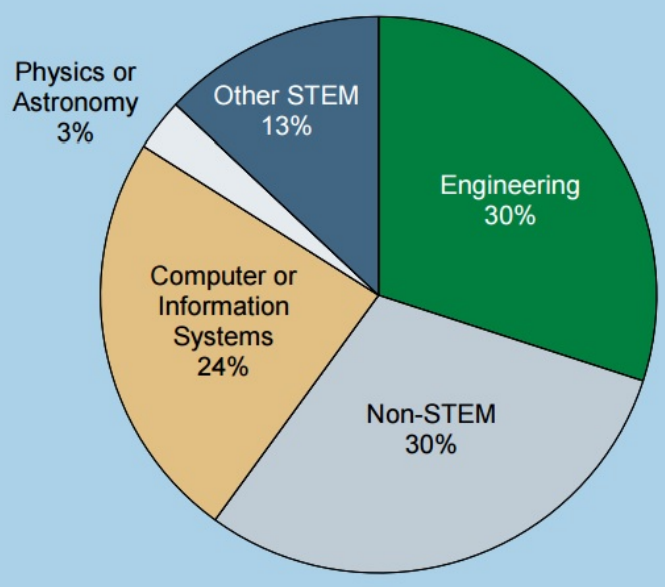
Field of Employment for Physics Bachelor's in the Private Sector, Classes of 2011 & 2012 Combined.



STEM refers to natural science, technology, engineering, and mathematics.

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Bottom line: at all degree paths, the largest initial employment sector for physics graduates is the private sector.

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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 opportunities to be found—in a lot of places!

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Preparing For Your Future

Career Planning – Broaden Your Focus

Perform a detailed self-assessment

- Understand what you love doing.
- Understand what you're good at doing.
- Take advantage of existing tools to help you understand your strengths.
  - Strong Interest Inventory®
  - ISEEK
- Think beyond job specifics.
  - Location? Hours? Benefits?

Attend Informational Interviews

- Not a "job interview," but an opportunity to learn about a specific company or industry. You get to ask questions, so be thorough.
- Use connections (LinkedIn® and alumni networks are especially helpful) to reach out to a company or industry you're interested in.
- Not only builds connections in the company, but gives you an "insider education" about that industry.

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Use Career Resources Creatively

- Many university career services departments are not used to dealing with PhD physicists—guide the interaction to fit your needs.
- Learn about areas unfamiliar to your mentors and academic colleagues:
  - Business?
  - Finance?
  - Law?
  - Medicine?

Keep a Career Journal and Document Skills

- Every experience gives you valuable transferrable skills. Try to sit and write down every single one (don't just focus on "hard science").
- This list is a set of "building blocks" for every resume you will ever write.
- Revisit and expand this list over time—even if you are not actively searching for a new job or career.

This will save you loads of time, and will also help focus your job search!

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Build Your Network

"Networking" does not mean drinking a martini and talking to this guy:

- Networking simply means speaking to as many people as you can about:
  - who you are, and
  - what you want.
- There is no designated place in which to do it.

Understand What You Want

- You've done the groundwork during the self-assessment process—use what you've learned.
- Develop a "pitch"—be able to describe your background and what types of career paths you're interested in a few sentences.
- Talk to EVERYONE!!

Take Advantage of Existing Resources/Opportunities

- Networking events at scientific meetings (e.g. APS Annual and Division meetings)
- APS Job Fairs and Exhibits
- Scientific sessions
- Student-organized events
- Social events (happy hours, etc.)
- LinkedIn®
- APS Job Board and Job Fairs

More Contacts = More Connections

More Connections = More Opportunities

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Lost in Translation: Communicating your Skills Effectively

#1 Mistake Made by Physicists: Focusing on Labels Rather than Skills

Resume Writing: Three Step Process

1) Understand the skills the job requires
   - *Hint: this means actually reading the job description!*
2) Assess honestly whether or not you have those skills, or whether you are genuinely interested in building them.
3) Connect the dots in your resume—focus on SKILLS, NOT ON LABELS!
   - **Skills Based Resume**
   - **Cover Letter**

CVs versus Resumes

- NOT interchangeable!!!
- Resumes no longer than **one page**.
- Expect to write a unique resume for **every single position you apply for.**

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Jane Q. Public

1234 Maple Lan
Anywhere, OH 9

Research Objective

To understand the basic principles behind e
importantly, get a job.

Education

- BS, Physics, Greenleaf University, 1995
- MS, Physics, University of South Whales
- PhD, Physics, University of South Wh , 2001

Work Experience

- Postdoctoral Fellow, Department of Physics, U. of New South
  2008-present
- Postdoctoral Fellow, Department of Physics, U. of New South Wha
  2006-2008
- Postdoctoral Fellow, Department of Physics, New South Whales,
  2004-2006
- Research Assistant, Department of Physics, New South Whales, 1998-
  2004

Publications

- A Measurement of Optical Scattering of Light Waves from Atmospheric Molecules (Journal of Obvious Science, Volume 6012, 2002.)

Presentations

- My bologna has a first name, it's OSCAR (44th Annual Meeting of the American Association of Physics of Food Service Society, 2003)
- My bologna has a second name, it's MAYER (Section Meeting of the Society for

Instrument Design Engineer/Scientist

Job Description:

The successful applicant will lead a new instrument team,
and will have experience in microcontrollers, data
nd
tes
nication
ills, and should be comfortable in a leadership position
and working with a team.

Not to mention developing and leading a highly successful outreach program to local high schools, in her spare time.

She also designed and coded the software that runs the data acquisition system used to this day.

Jane devised signal processing techniques to remove background effects in her experiment.

Jane Q. Public
1234 Maple Lane
Anywhere, OH 99934

Data Acquisition Experience

- Designed and built sensors and electronic data acquisition system for light level measurement (Research Assistant, University of S. Whales, 1998-2001).
- Devised used signal-processing techniques to isolate and remove background (Research Assistant, University of S. Whales, 1998-2001).

Algorithm Design Experience

- Wrote analysis software using C++ and IDL, still in use by the research group (Postdoctoral Fellow, University of S. Whales, 2004-2006).

Leadership Experience

- Developed and led a science outreach effort to local high schools. (Postdoctoral Fellow, University of S. Whales, 2006-present).

Education

- BS, Physics, Greenleaf University, 1995
- MS, Physics, University of South Whales, 1997
- PhD, Physics, University of South Whales, 2001

Leadership/Service
Teaching Experience
Etc.

Instrument Design Engineer/Scientist

Location: California
Salary: 60K – 120K

Job Description:

The successful applicant will lead a new instrument team, and will have experience in microcontrollers, data acquisition, analog and digital signal processing, and algorithm design.

Ability to read schematics is also a plus. Candidates should also have strong written and oral communication skills, and should be comfortable in a leadership position and working with a team.

Sounds like a great fit! Let's get her in for an interview.

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What's Next?

If your resume does *its* job, you'll soon be faced with other questions like:

- Interviewing
  - How do I prepare myself? What can I expect?
- Negotiation
  - Should I negotiate my offer? What strategies can I use?
- Following Up
  - What are the standard practices? What if I don't receive an offer?

APS Online Professional Guidebook

- 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
- Topics include self-assessment, networking, interviewing and negotiation strategies, and more.

http://go.aps.org/physicspdguide

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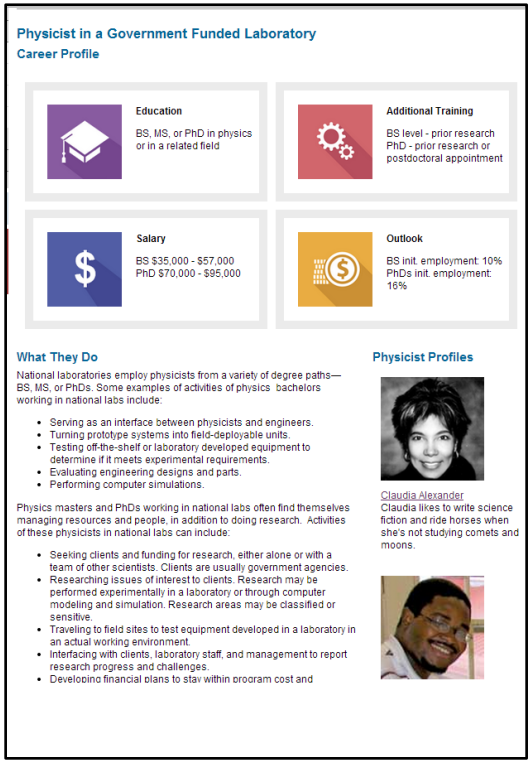
APS Careers Website

- 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

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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 non-academic careers, and promote recruitment of student and postdocs into industries.
- Current sites include:
  - Austin
  - Ann Arbor
  - Boston
  - DC - Baltimore
  - Denver - Boulder
  - Silicon Valley
  - St. Louis
  - The Triangle

http://go.aps.org/local_links

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Remember:

- Plan Effectively by Broadening Your Focus
  - Use your resources to learn about career paths outside of academic physics
- Build Your Network
  - Be able to express who you are, and what you want, and tell absolutely everyone you meet.
- Focus on Skills, Not on Labels
  - Use skills-based resumes and cover letters to connect the dots between the job description and your skill set.

Visit the APS Online Professional Development Guide and the Careers Website

Questions? Comments?

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