Advising Students About Non-Academic Career Paths

National Mentoring Community Conference
February 7, 2020
Orlando, FL

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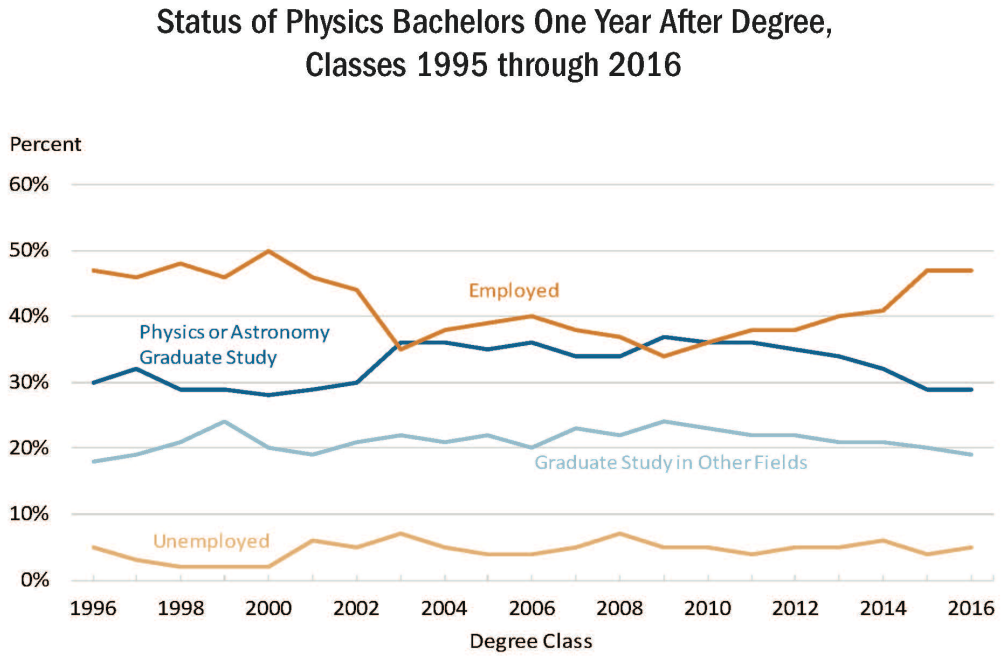
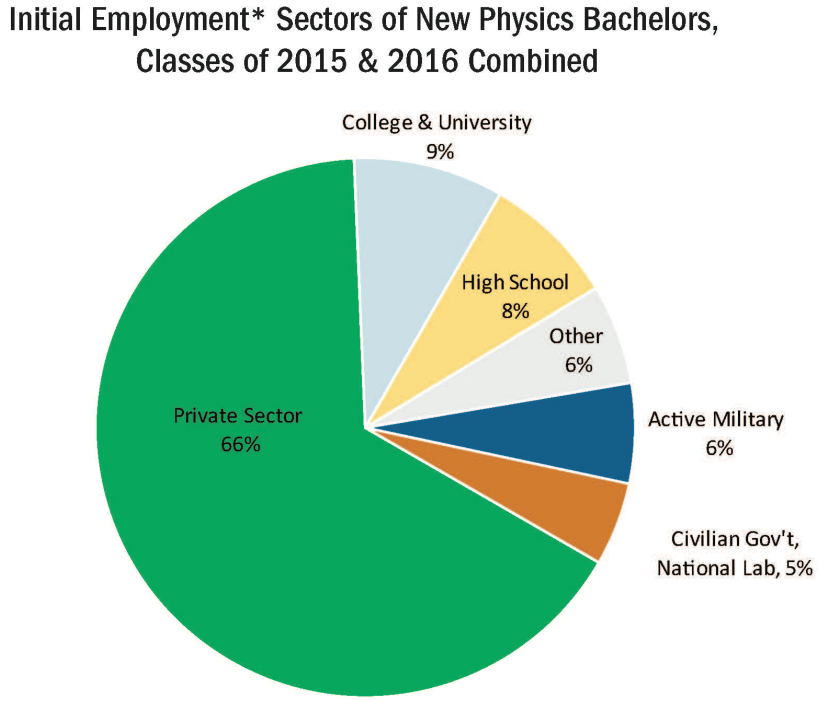
Where Physics Graduates Go



AIP Statistics aip.org/statistics

Around 50% of graduating physics bachelors will enter the workforce after graduation.



*47% of new physics bachelors were employed in the winter following the year in which they received their degree.

AIP Statistics aip.org/statistics

The majority (66%) of these jobs will be in the private sector, and 70% of those will be in STEM fields.

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AIP Statistical Research Center, *Focus On Physics Bachelor's Initial Employment (2019)*

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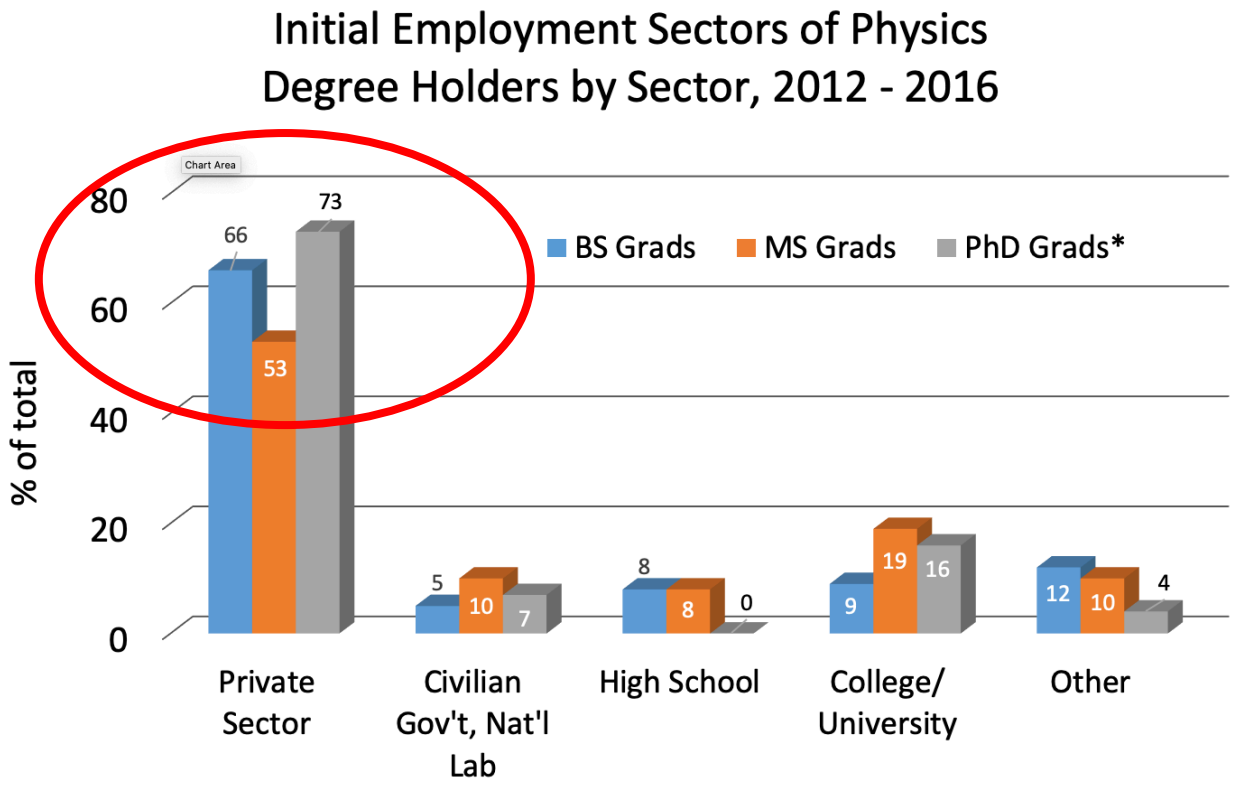

*only includes potentially permanent positions. Temporary faculty and postdoctoral positions excluded.
Source: AIP Statistical Research Center, Focus on Initial Employment Reports, 2012 - 2016.

- A similar pattern holds for master's graduates, where over 50% of employed graduates work in the private sector.[1]
- And nearly 70% of PhDs permanently employed after graduation are also in the private sector, and also mostly in STEM fields.[1]

According to the NSF Survey of Doctoral Recipients, about 30% of physics PhD graduates will become permanent academic faculty[2]. And only about 18% of physics bachelors will complete a PhD in *physics*[3].

By these statistics and others, about 5 out of 100 physics bachelors will become permanent physics faculty…

…and 73 of them will end up working in a private sector job with a physics BS, MS or PhD.

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[1]AIP Statistical Research Center, Physics Masters One Year After Degree Report, 2015, Physics PhDs Initial Employment Report, 2019
[2]*NSF Survey of College Graduates*, *NSF Survey of Doctoral Recipients*, 2017 data.
[3]AIP Statistical Research Center, *Focus on Roster of Physics Departments with Enrollment and Degree Data, 2013.*

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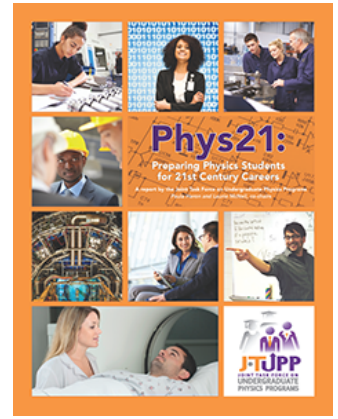
Getting the Message



Phys21 Report, Kettering University ABET Survey, and others conclude for physics:

- Some content/knowledge overlap with other STEM disciplines.
- Some characteristics which are distinct from other STEM disciplines.
  - ability to grasp wider context of problem, *fearlessly* pursue solutions from first principles, ability to direct the process rather than "put the period on the sentence".

BUT! Important content is missing from physics classrooms which has been present in other STEM disciplines (particularly engineering) for at least two decades...

Opportunity to be intentional in how we prepare students for the careers they are going to have – and even the minority who are also bound for academia!

Attract more – and more diverse[4] – physics majors.

[4]G. L. Cohen, J. Garcia, V. Purdie-Vaughns, N. Apfel, P. Brzustoski, "Recursive Processes in Self-Affirmation: Intervening to Close the Minority Achievement Gap." Science, vol. 324, pp. 400 – 403, 2009.

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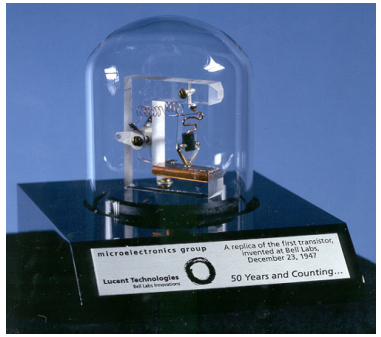
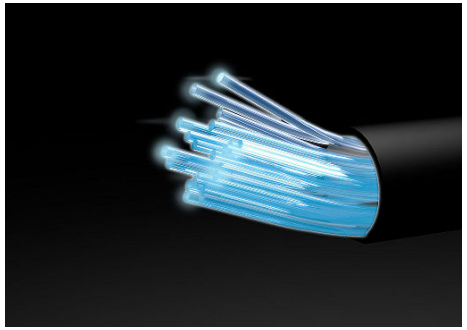
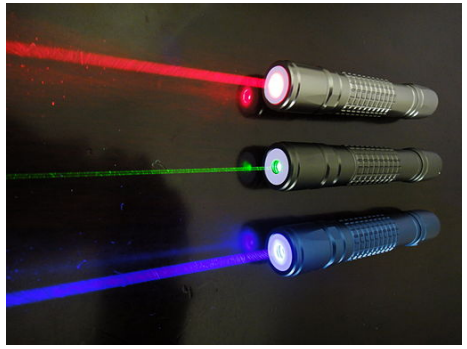
Physicists as Innovators, Problem Solvers







Images: Wikimedia Commons

Deep scientific knowledge, technical skill, mathematical ability

Discover new solutions to challenging global problems.

We should broaden our view of the role which physicists play in the workforce and world.

- Better diversity and inclusiveness
- Better solutions to human problems
- Better career outcomes for students

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Physicists can do anything (really!)

Law School Entry exam (LSAT)[1]

Applicants	LSAT score
Statistics	164.14
Mathematics	162.8
Physics, General	161.58
Astronomy	161.33
Computer Science, General	161.24
Nuclear Engineering	161.2
Physics, Specialization	161
Bio/Biomedical Engineering	160.45
Classics	160.38
Environmental Engineering	160.32
Political Science	153.62

← 85th %tile

Medical School Entry Exam (MCAT)[2]

Matriculants	MCAT score
Math and Statistics	514.1
Physical Sciences	512.6
Humanities	512.1
Social Sciences	511.2
All Matriculants	511.2
Biological Sciences	511
Other	510.8
Specialized Health Sciences	509.7

← 90th %tile

Business School Entry exam (GMAT)[3]

Applicants	GMAT score
Physics	608
Mathematics	605
Engineering	595
Philosophy	588
Computer Science	586

← 64th %tile

[1] https://www.lsac.org/sites/default/files/media/2017-18_applicants-major_0.pdf
[2] https://www.aamc.org/data/facts Table A-17 2018-19
[3] http://blog.prep4gmat.com/majors-with-the-highest-and-lowest-gmat-scores/

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Let's Meet Our Panelists

Crystal Bailey
Head of Career Programs, American Physical Society

Myriam Newman
Manager Systems Engineering, Northrop Grumman

Jami Valentine-Miller
Primary Patent Examiner, Electrical Engineer, US Patent Office
Founder and CEO, African American Women in Physics (AAWP)

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Physics Innovation and Entrepreneurship (PIE) Education

Wikipedia/Joe Hakim

Experiences, courses, and research opportunities which:

- Explicitly connect physics concepts with their real world applications.
- Utilize physics principles to create innovative solutions to real world problems.
- Include content relevant for careers in the private sector, such as communicating to audience, intellectual property, private and public funding sources, business models, budgeting, commercialization, etc.

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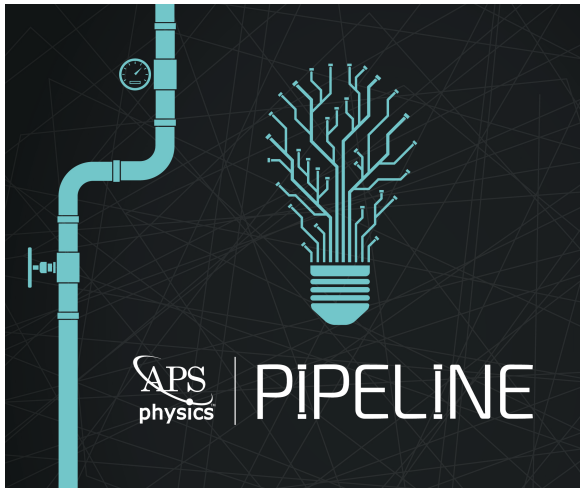
APS PIPELINE Project



- Collaborative project, six member institutions: Loyola University Maryland, Rochester Institute of Technology, Wright State, UC Denver, George Washington University, and William & Mary.
- Advised by experts from established physics entrepreneurship programs (e.g. Carthage College, Case Western, Kettering University)

Goals are:

- to **deliver tested PIE curriculum** to a wider cohort of practitioners.
- to **assess of effects of PIE implementation** on student and faculty attitudes towards innovation and entrepreneurship, and **discover barriers** to PIE implementation
- to **build a community** of expert practitioners who can mentor other institutions.

go.aps.org/innovation

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Support for this work was provided by the National Science Foundation's Improving Undergraduate STEM Education (IUSE) program under Award No. 1624882

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Attending the March Meeting?

Come Meet Google at the Diversity Reception!

Representatives from Google AI Quantum will be present at the APS Diversity Reception to network with students about career opportunities in their company. They are looking for young talent just like you!

Google AI Quantum

What: APS Diversity & Networking Reception
When: Wednesday, March 4, 7:00 - 8:30 pm
Where: Hyatt Regency Denver, Centennial C

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march.aps.org/program/diversity-reception/

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