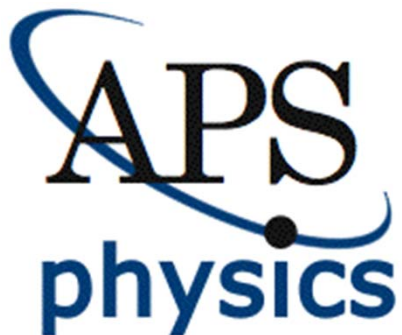


28 October 2016

A Career in Physics Education and Diversity



Monica Plisch

Director of Education and Diversity
American Physical Society

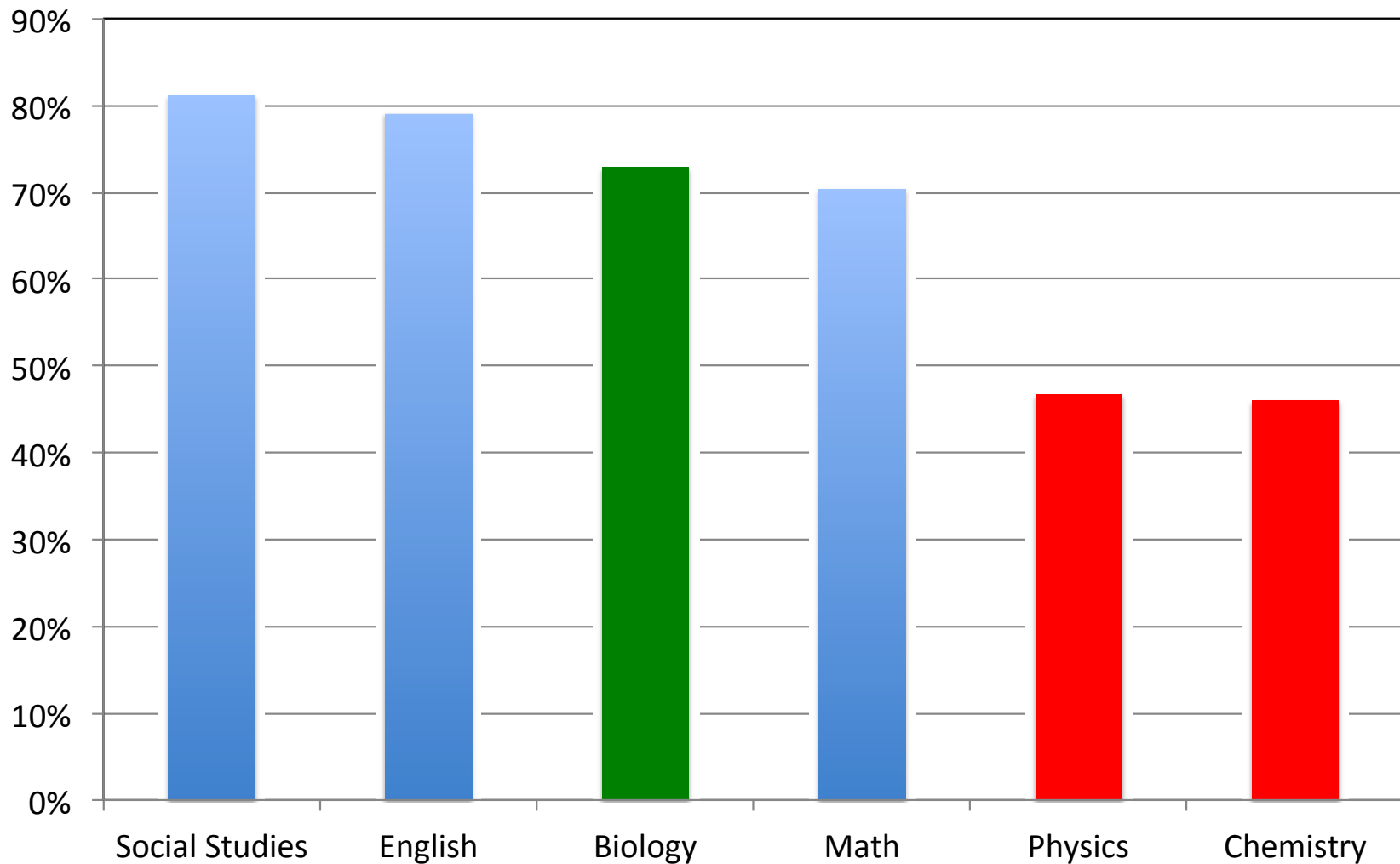
- B.S. Engineering physics, UIUC (1990-1994)
- Ph.D. Physics, Cornell (1994-2001)
- Visiting Instructor, Wells College (2001-2002)
- Director of Education, Center for Nanoscale Systems, Cornell (2002-2007)
- Assistant Director of Education, APS (2007-2011)
- Associate Director of Education and Diversity, APS (2011-2016)
- Director of Education and Diversity, APS (2016-present)

Project: Physics Teacher Education Coalition

Curriculum: Physics Research Mentor Training

Report: LGBT Climate in Physics

High school classes led by a teacher with a degree in the subject



Source: 2007-08 Schools and Staffing Survey

Demand for New Teachers

Universities were asked to evaluate demand for educators by rating 59 fields of study as having considerable shortage of qualified applicants (5), some shortage (4), balanced between applicants and positions (3), some surplus (2), or considerable surplus (1).

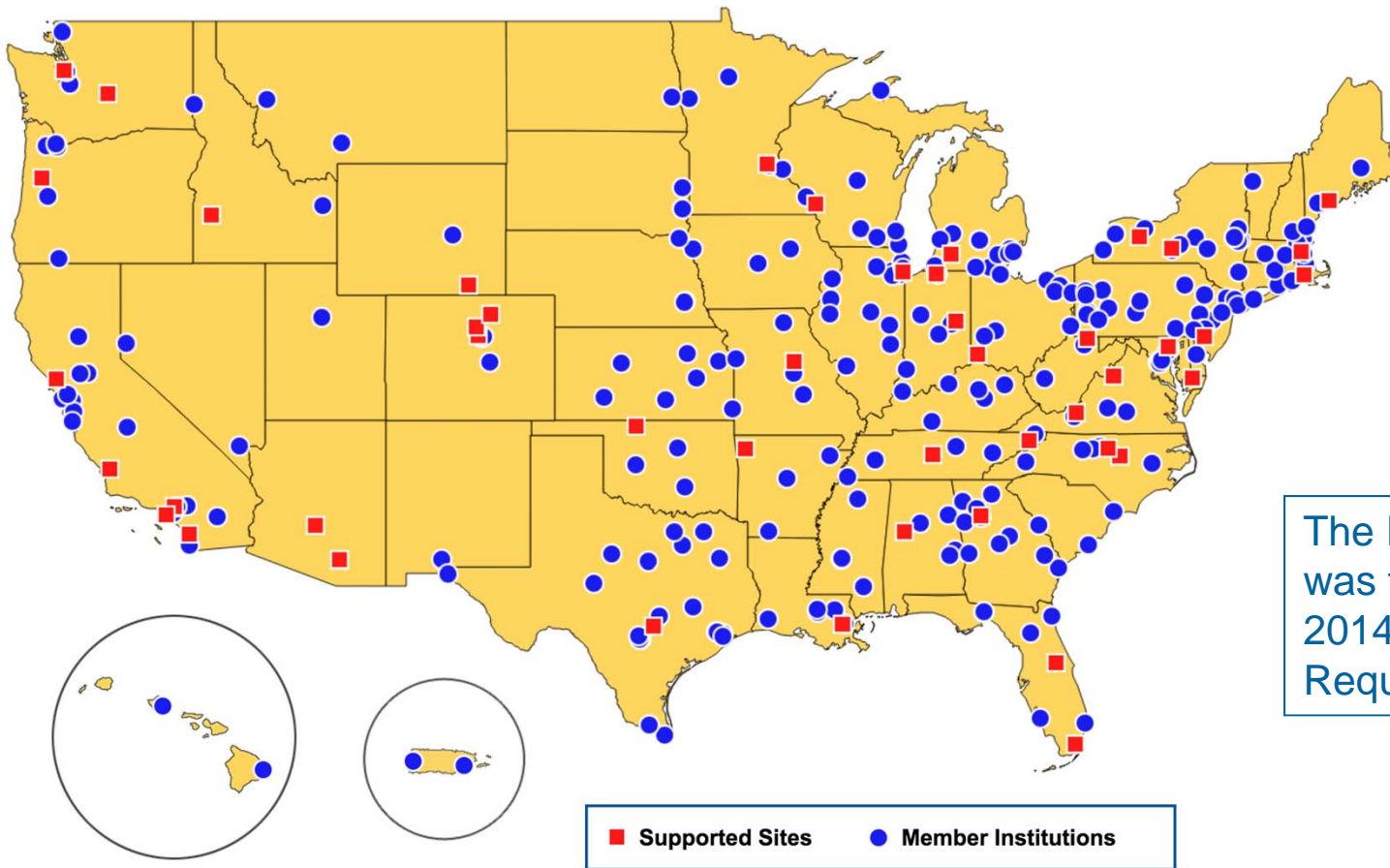
Top 5 education fields (greatest demand)

Physics	4.52
Spec. Ed. – Severe/Profound Disability	4.36
Spec. Ed. – Visually Impaired	4.33
Mathematics	4.23
Chemistry	4.21

Bottom 5 education fields (least demand)

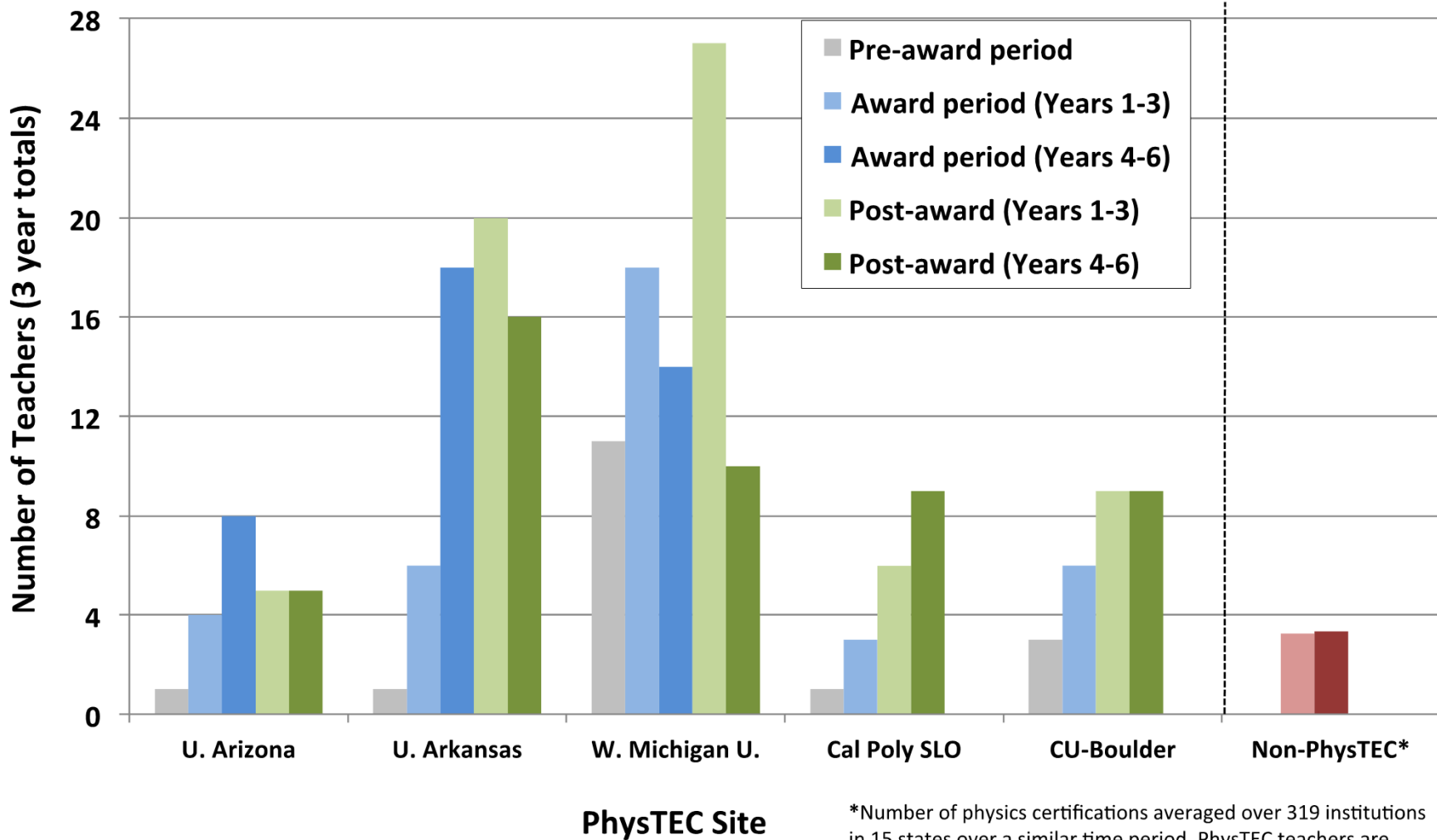
Intermediate education	2.38
Health education	2.29
Kindergarten/Primary Education	2.24
Physical education	1.91
Social studies education	1.81

Physics Teacher Education Coalition (PhysTEC)



The PhysTEC project was featured in the 2014 NSF Budget Request to Congress

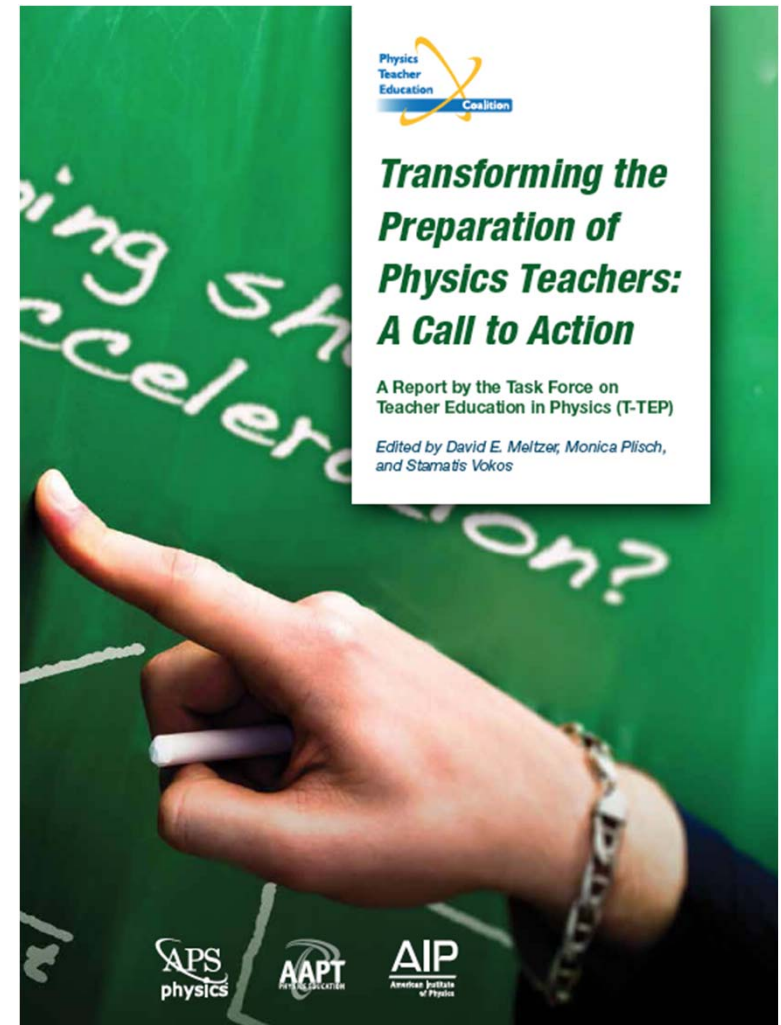
Increase in physics teachers educated at PhysTEC sites



*Number of physics certifications averaged over 319 institutions in 15 states over a similar time period. PhysTEC teachers are more highly qualified than the minimum standard in most states.

Dissemination and Engagement

- National conference
- Topical workshops
- Pedagogical resources
- Peer-reviewed publications
- Reports
- Digital Library
- Advocacy



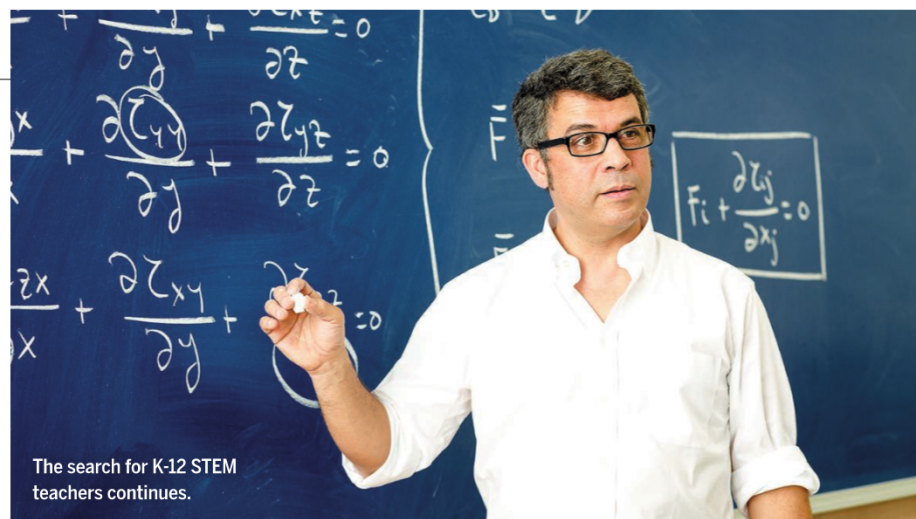
LETTERS

Edited by Jennifer Sills

A path to recruiting more STEM teachers

I STRONGLY DISAGREE with the implication in the News Feature “A classroom experiment” (J. Mervis, 6 February, p. 602) that recruiting new K-12 teachers in science, technology, engineering, and mathematics (STEM) is futile and that efforts to improve education should instead focus on in-service teachers. For disciplines such as physics and chemistry, fewer than half of all classrooms are led by a teacher with a degree in the subject (1). Without efforts to improve recruitment, we cannot effectively address the severe shortage of physical science teachers with deep content knowledge. Teachers with deep content knowledge in their subject, along with mastery of content-specific pedagogical skills, are the most important factor in ensuring excellence in STEM education (2).

The American Physical Society, American Association of Physics Teachers, and dozens of universities across the country have worked during the past 15 years to address the severe shortage of physics teachers through the Physics Teacher Education Coalition (PhysTEC) project. PhysTEC sites



The search for K-12 STEM teachers continues.

Diversity, American Physical Society, College Park, MD 20740, USA. E-mail: plisch@aps.org

REFERENCES

1. J. G. Hill, “Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Core Subjects: Evidence from the 2007–08 Schools and Staffing Survey” (U.S. Department of Education, National Center for Education Statistics, Washington, DC, NCES 2011-317, 2011).
2. President’s Council of Advisors on Science and Technology, “Prepare and Inspire: K-12 Education in Science, Technology, Engineering, and Math (STEM) for America’s Future” (Executive Office of the President, Washington, DC, 2010); www.whitehouse.gov/administration/eop/ostp/pcast/docsreports.
3. R. Goldring, S. Taie, M. Riddles, “Teacher Attrition and Mobility: Results from the 2012–13 Teacher Follow-up Survey” (U.S. Department of Education, National Center for Education Statistics, Washington, DC, NCES 2014-077, 2014).
4. Physics Teacher Education Coalition, *PhysTEC News* 8.1 (2014); www.phystec.org/publicity/files/fall14.pdf.

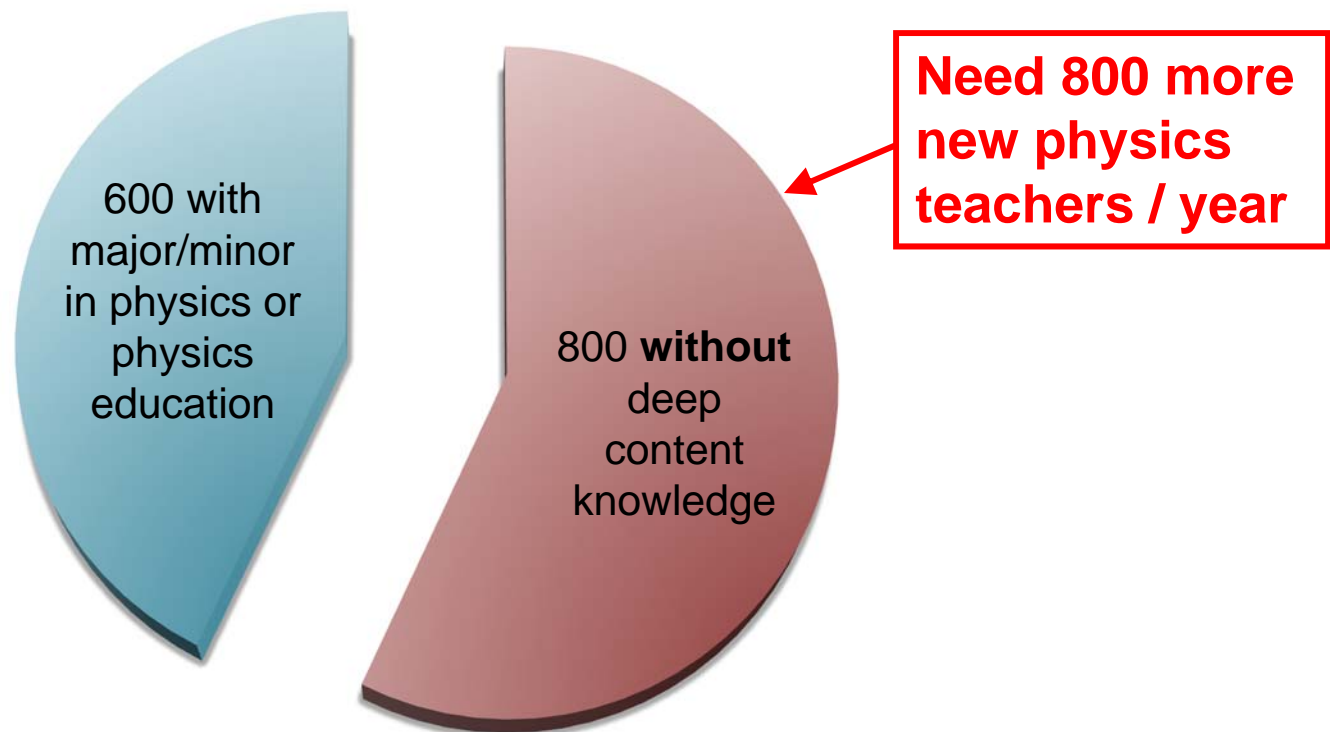
Editor’s note

Science does not endorse them. We regret any implication to the contrary.

Since the article appeared, we have learned that it contains several minor inaccuracies concerning the timing of events and the details of the grants and contracts. We have corrected these in the online version of the story. We have also clarified other language and removed an illustration that was open to misinterpretation. Since publishing the story, we have learned that before Leonhardt arrived in China, he received a draft of a presentation describing research planned for the Guangdong Leading Talent project. Leonhardt also took part in an oral defense in Beijing on March 21st, 2012, for the Guangdong Leading Talent project application. He and COER continue to disagree about how much advance

Vision: That every high school physics student has the opportunity to learn from a highly qualified teacher

**New physics teachers hired each year
(1400 total)**



Source: AIP Statistical Research Center

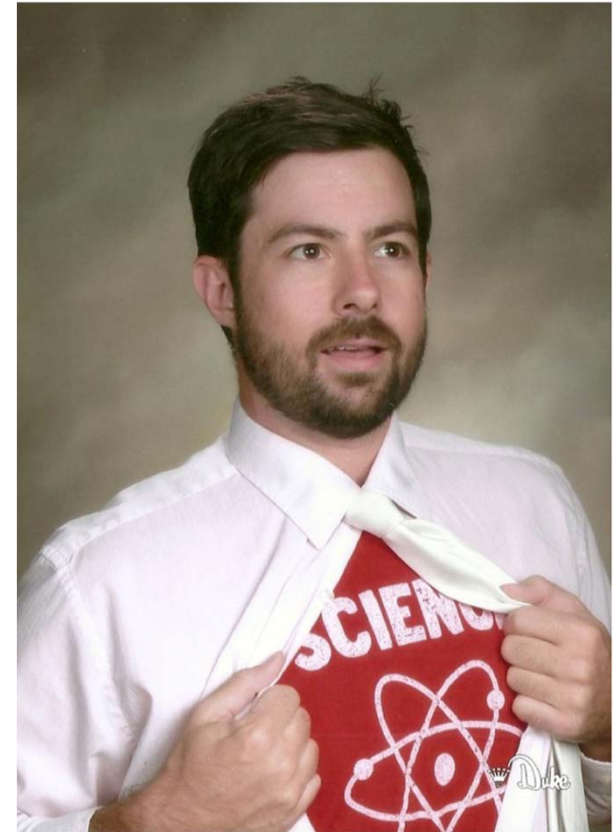
Recruiting One More Teacher

“Physics teacher candidates are in your program: They just need the opportunity to discover how rewarding teaching can be.”

– *Alma Robinson, Virginia Tech*

“I’ve been generally surprised how many physics students were interested once they knew that teaching is an option.”

– *Brian Thoms, Georgia State*



Zachary Kovach,
La Joya Community High School

Physics Research Mentor Training Seminar

Developers of the original training materials:

Jo Handelsman
Christine Pfund
Sarah Miller Lauffer
Christine Maidl Pribbenow

Developers of the physics training materials:

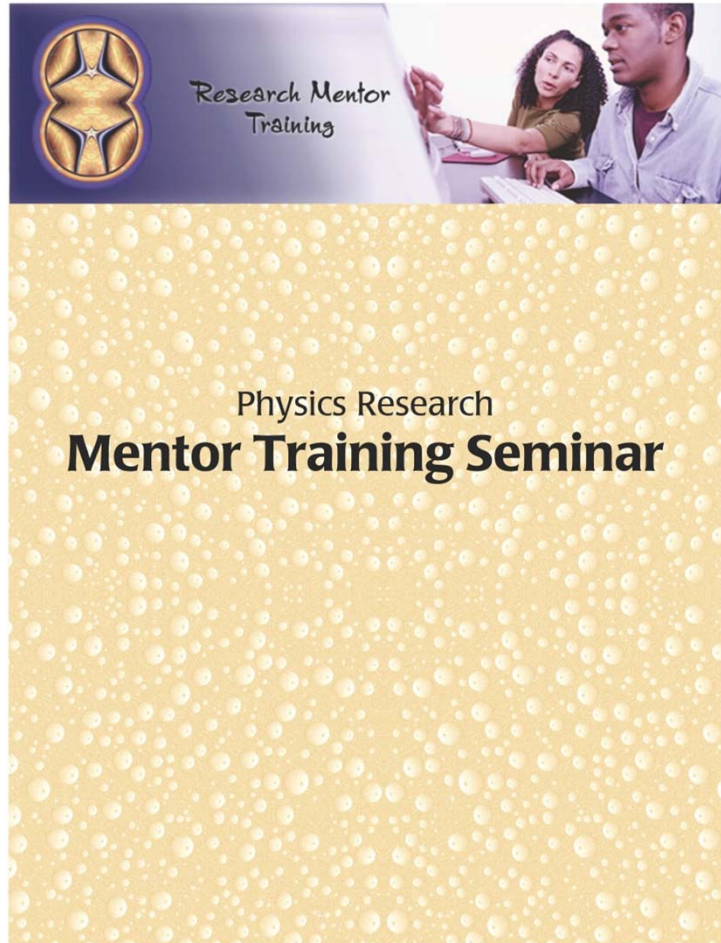
David Ernst
Eric Hooper
Catherine Mader
Christine Pfund
Monica Plisch
Alejandro Rodriguez-Wong
Chandra Turpen



Research on the Importance of Good Mentoring Relationships

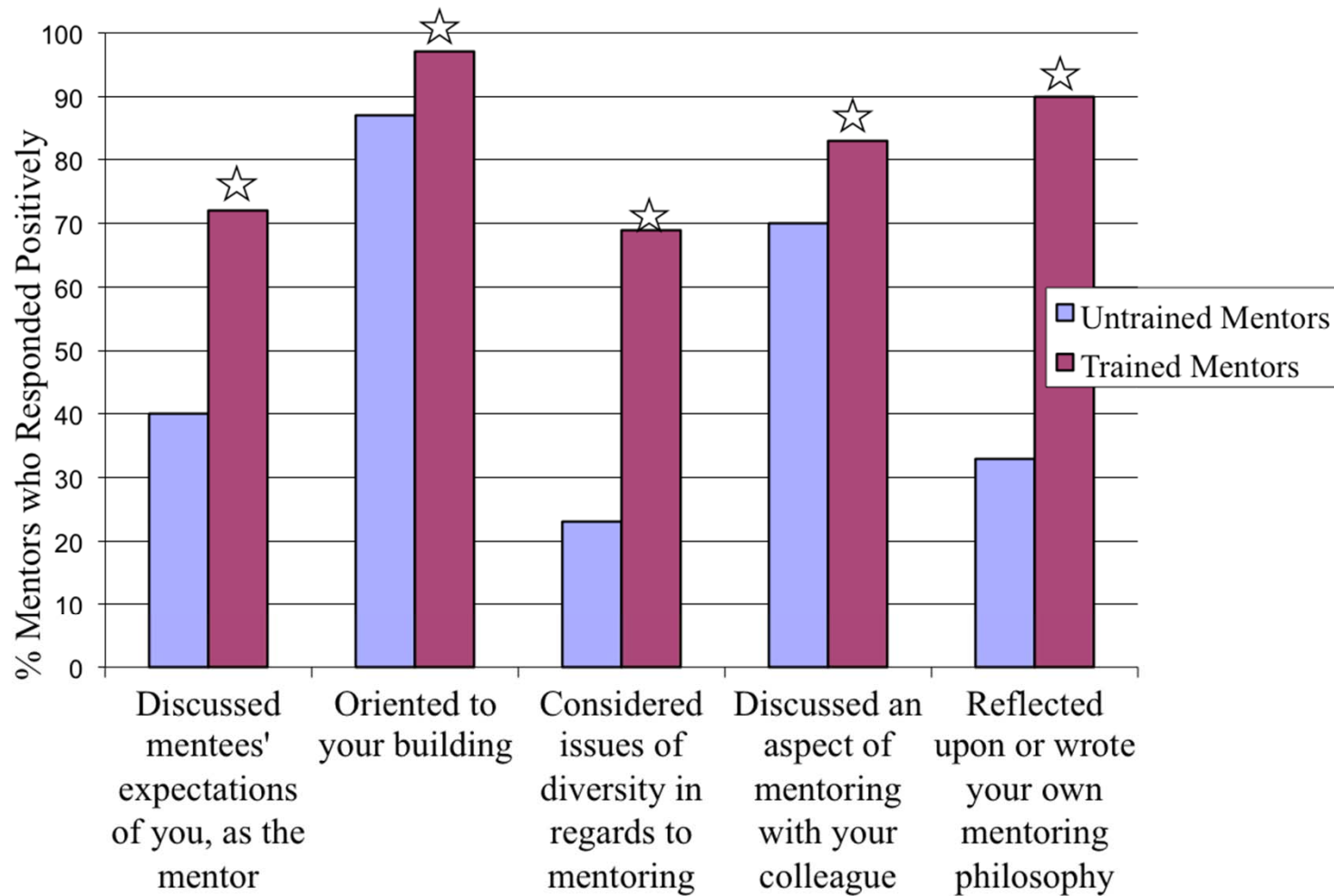
- Students being mentored report fewer non-persistence decisions (Gloria & Robinson Kurpius, 2001)
- Most important factor in degree attainment was positive mentoring experience (Solorzano, 1993)
- Mentoring increases persistence in science, career satisfaction and productivity (reviewed in Sambunjak, Straus and Marusic, 2010)
- The desire to pursue a PhD or MD/ PhD is influenced by a strong mentee-mentor relationship (McGee and Keller, 2007)
- Mentoring and research training cannot be separated from scientific research for anyone in postdoctoral or graduate student positions and should not be considered as separate objectives (National Academy of Sciences, 2005)

Physics Research Mentor Training Curriculum



Sessions	Topics
Week 1	Getting Started and Project Design
Week 2	Establishing Expectations
Week 3	Maintaining Effective Communication
Week 4	Assessing Understanding
Week 5	Fostering Independence
Week 6	Mentoring Challenges and Solutions
Week 7	Addressing Diversity
Week 8	Dealing with Ethics
Week 9	The Elements of Effective Mentoring
Week 10	Developing a Mentoring Philosophy

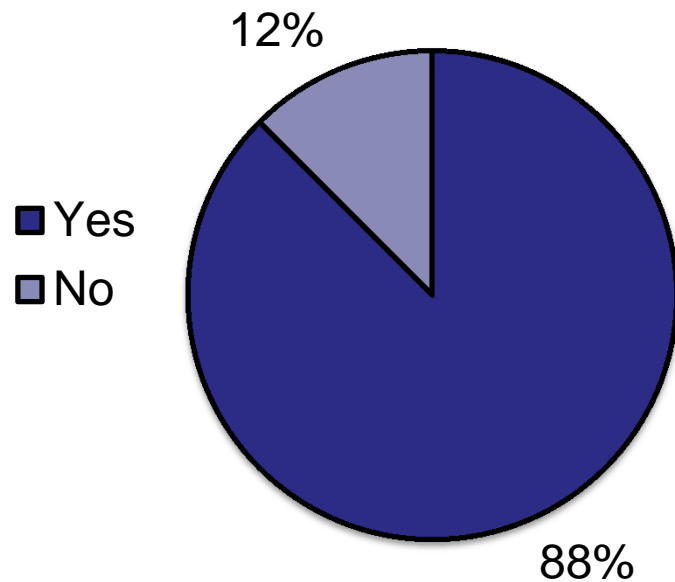
Changes in Behavior of Mentors



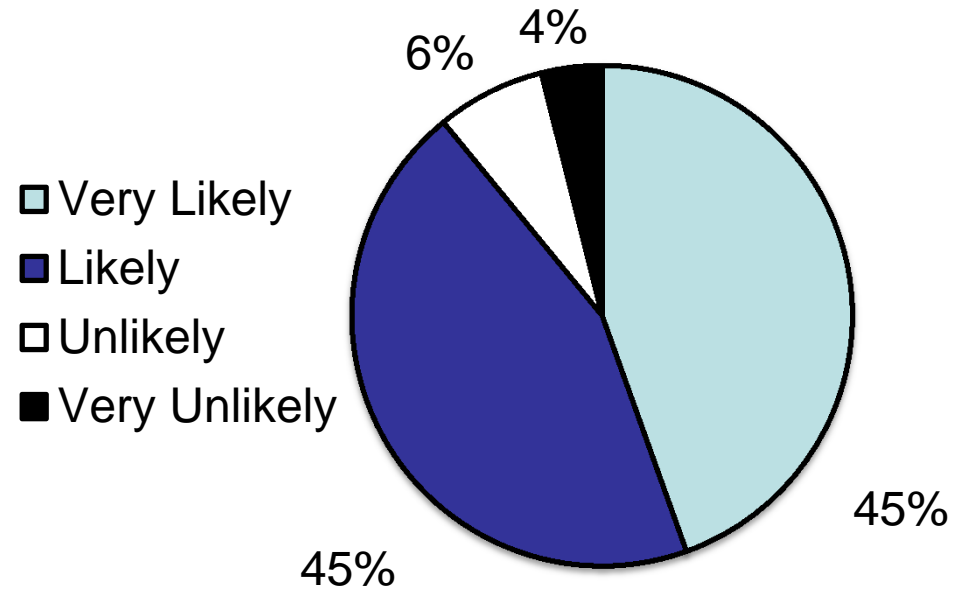
Pfund *et al.* Science 311, 473 (2006)

Mentor Satisfaction with Training

Was the 8 hour training a valuable use of your time?



Would you recommend the sessions to a colleague?



Pfund C, *et al.* 2013. A Research Mentor Training Curriculum for Clinical and Translational Researchers. *Clinical Translational Science* 2013; 6:26-33

Sources of self-efficacy

- Mastery experience
- Vicarious experience
- Social persuasion
- Emotional/physiological states

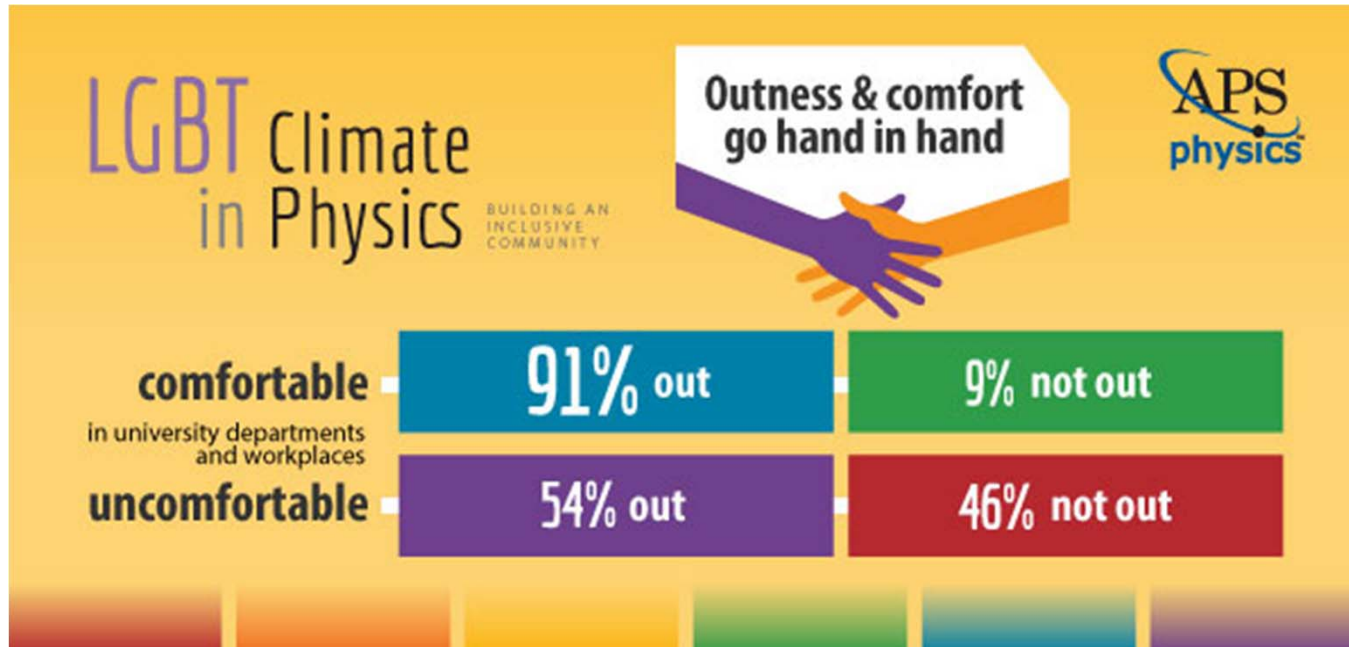
LGBT Climate in Physics

BUILDING AN
INCLUSIVE
COMMUNITY



AMERICAN PHYSICAL SOCIETY

C-LGBT Finding: Variable Climate for LGBT Physicists

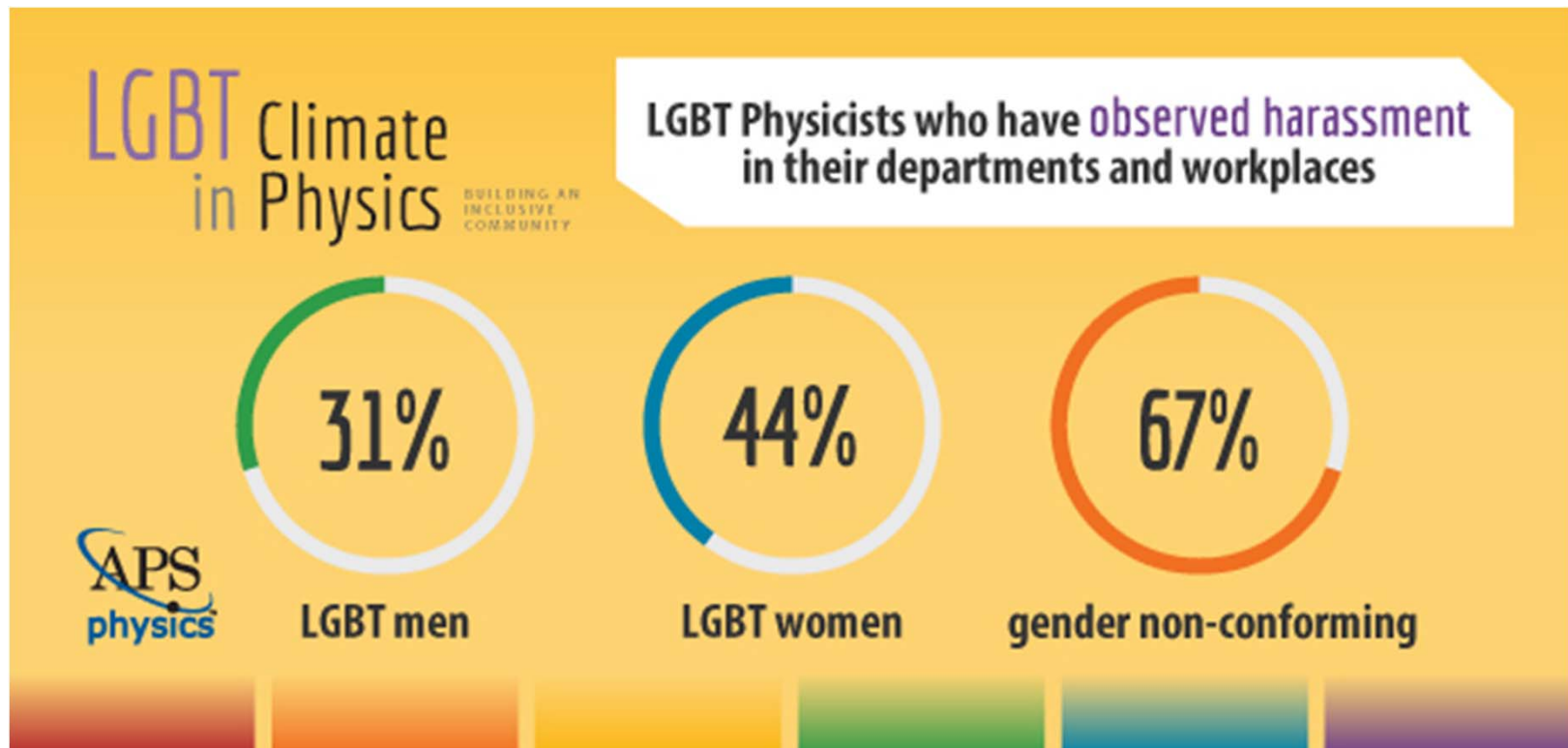


“I don’t know of any other ‘out’ physics grad students. I know that a lot of them are very conservative. And I feel like they respect me right now. But I don’t know that they would respect me if I came out to them.”

“It’s ‘don’t ask don’t tell,’ [which leads to a] hard time networking because [my] mostly male colleagues [are] uncomfortable to invite [a] gay couple for outings etc. It’s a subtle form of discrimination. Inability to network makes it difficult to join group grant proposals.”

“It was mostly just exclusionary discrimination. I don’t know if it was based on my gender or my sexual orientation. But I was very out [as an undergraduate].... I know that all of the other students, literally all of them, studied together and did their homework together and all of that. And I tried to participate in these things and was often, you know, given the run around on the times, and I just stopped trying after a while and stopped interacting with them socially.”

C-LGBT Finding: LGBT Physicists at Risk for Leaving



- 36% of climate survey respondents considered leaving their campus or workplace in the last year
- Reporting adverse climate or observing exclusionary behavior strongly correlated strongly with considering leaving

1. Ensure a safe and welcoming environment at APS meetings.
2. Address the need to systematically address name changes in publications.
3. Develop advocacy efforts that support LGBT equity and inclusion.
4. Promote LGBT-inclusive practices in academia, national labs, and industry.
5. Implement LGBT-inclusive mentoring programs.
6. Support the establishment of a Forum on Diversity and Inclusion.

 **APS Physics**
Mar 15 at 11:00am • 

At a press conference at the APS March Meeting today, the APS Committee on LGBT Issues released the first ever report on the status of LGBT+ physicists. LGBT physicists face issues of isolation and harassment in their departments and workplaces. Trans physicists experience much higher rates of exclusion and isolation. The report gives specific recommendations to make the physics community more inclusive and safe for the LGBT+ community.





Ken  **Richard Lane**



Filippo Catalfamo

Such a disgusting article which is



Maciej Łukasiewicz

The only rainbows I want in my lab are the ones light makes in a prism. Get that crap out of here. Sexuality should be a private matter and not flaunted liek that, especially in such an environment where qualifications are all that matter. I find it hard to believe quality physicists who happen to be gay have a more difficult time than others.

Dear Diversity
group.

I just wanted to
express a heartfelt
thank you for all your
hard work. APS has
become a place where
I can be myself

confident in the
belief that my career
trajectory will be
determined by my
professional work, and
not ~~predetermined~~ by my
personal characteristics.
~~Thank you.~~
Thank you.