Departments That Excel in Equity, Diversity, and Inclusion at Ohio University and Across the Nation

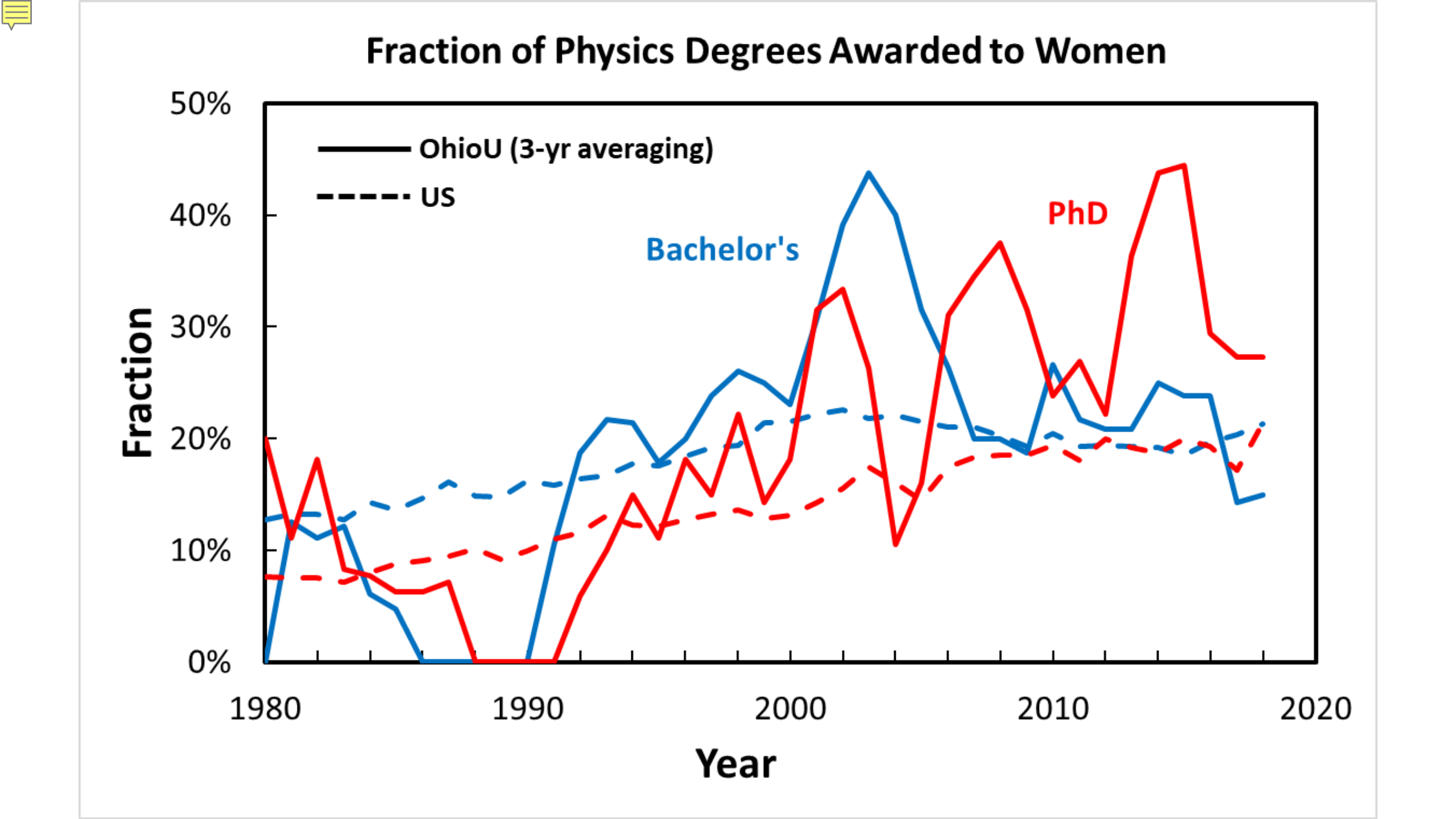
Edmund Bertschinger,

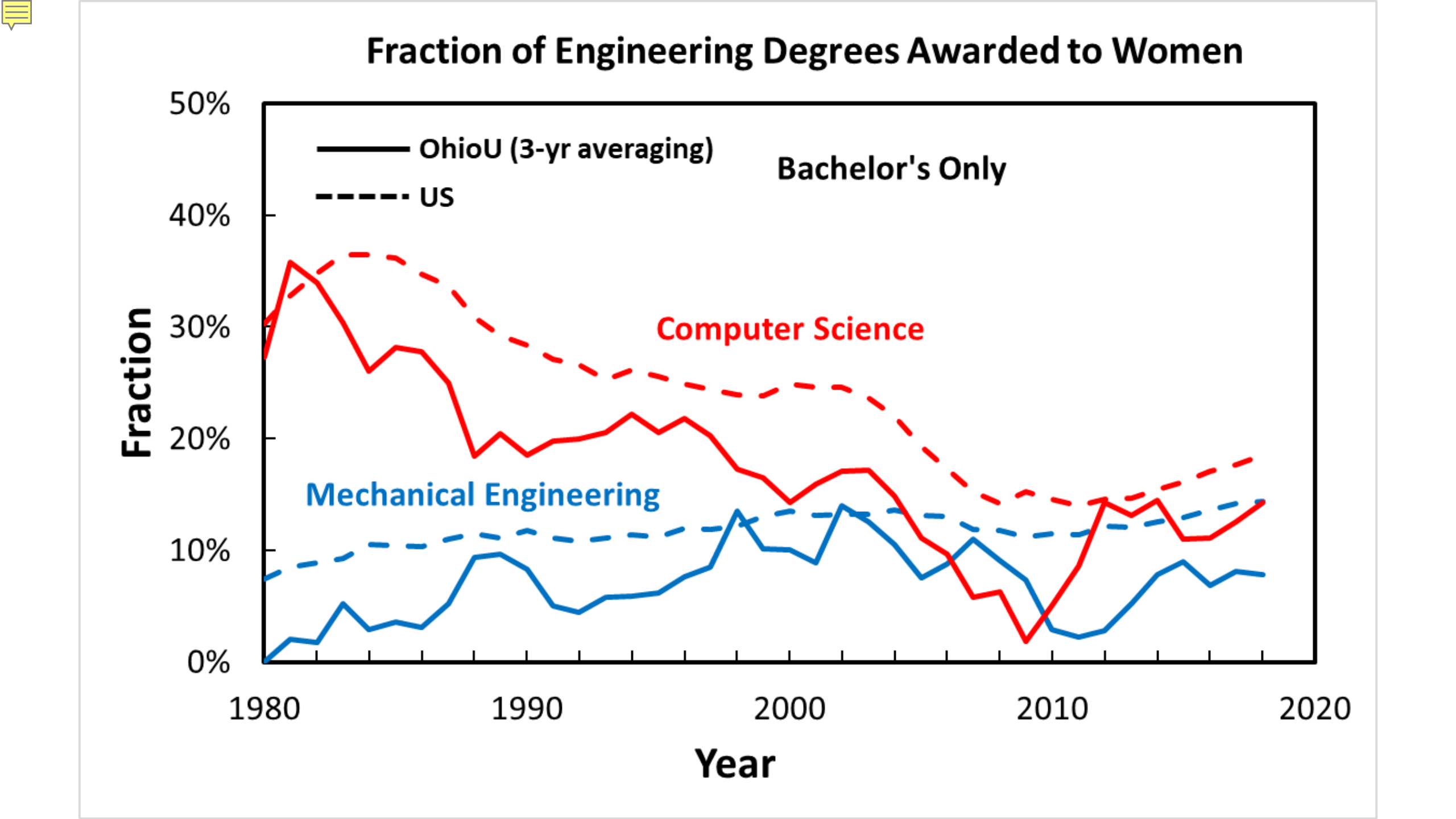
MIT Physics and Program in Women's and Gender Studies

OhioU Physics & Astronomy Colloquium

February 28, 2020

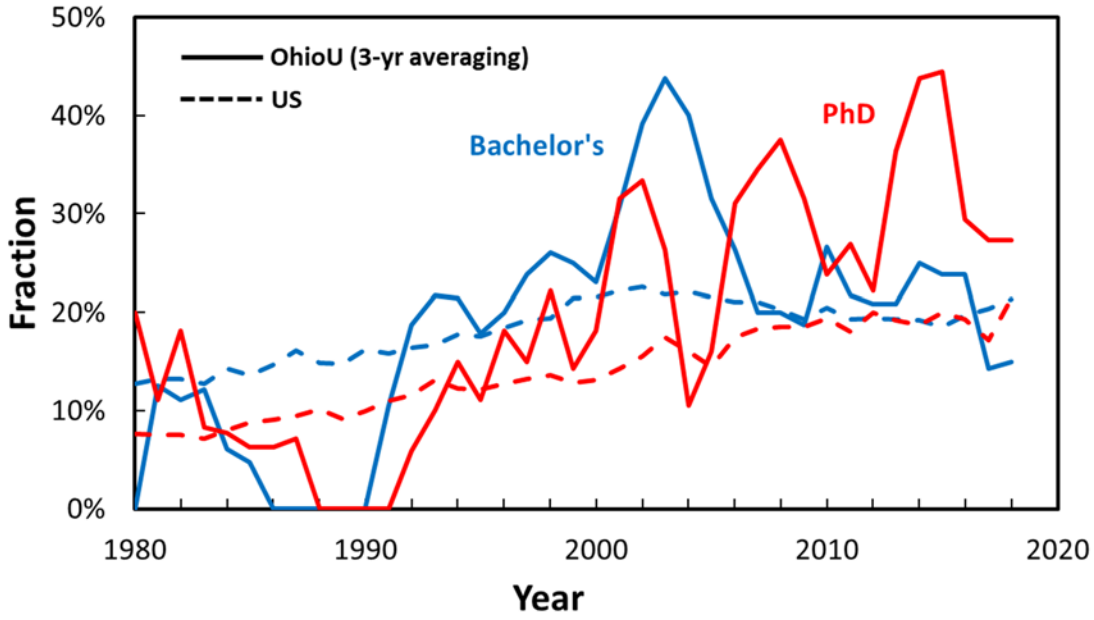
Are universities creating ideal spaces to inspire, support, and educate all students?


Fraction of Physics Degrees Awarded to Women
50%
40%
30%
20%
10%
0%
Fraction
OhioU (3-yr averaging)
US
Bachelor's
PhD
1980
1990
2000
2010
2020
Year


Fraction of Engineering Degrees Awarded to Women
OhioU (3-yr averaging)
US
Bachelor's Only
Computer Science
Mechanical Engineering
Fraction
50%
40%
30%
20%
10%
0%
1980
1990
2000
2010
2020
Year

Discuss with a neighbor what you find interesting about these graphs.

What is your interpretation of the trends?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OhioU (3-yr averaging)
US
Bachelor's
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Fraction
50%
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1980
1990
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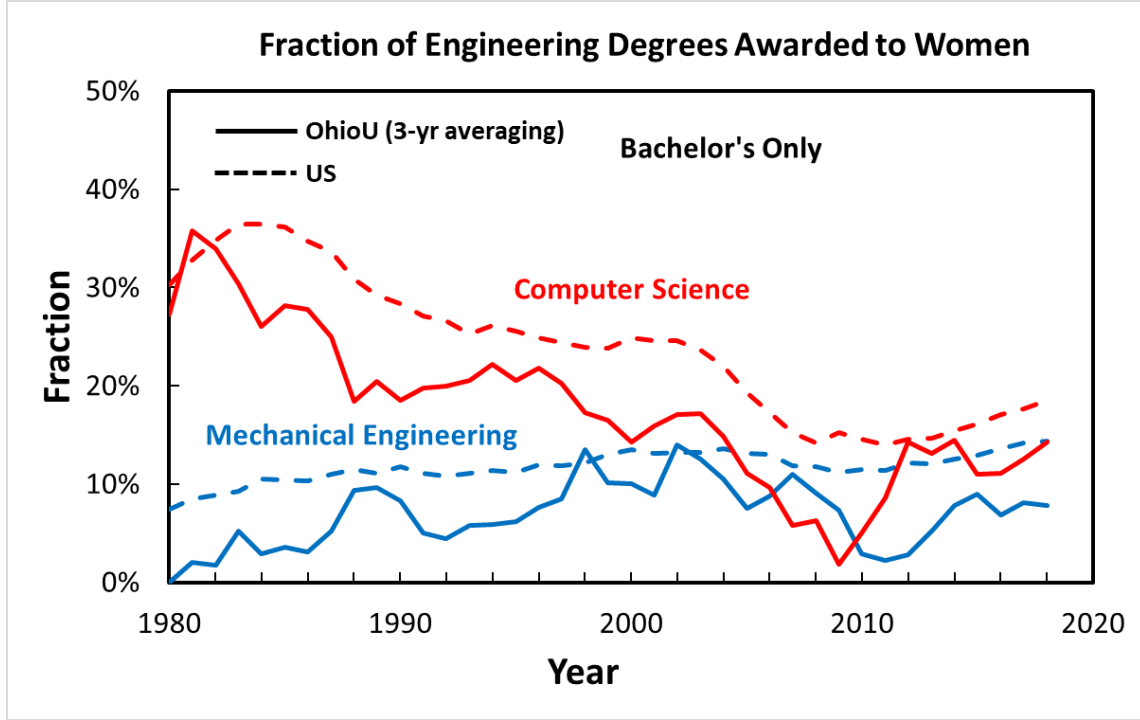
Year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OhioU (3-yr averaging)
US
Bachelor's Only
Computer Science
Mechanical Engineering
Fraction
50%
40%
30%
20%
10%
0%
1980
1990
2000
2010
2020
Year

Two different local contexts: OhioU and MIT

	Ohio University (main campus)	MIT
Women undergraduates	60%	46%
White undergraduates	82%	31%
In-state undergraduates	86%	7%
Undergraduates receiving federal student loans	65%	10%
Undergraduates receiving Pell grants	28%	20%
First generation undergraduates	33%	18%
Largest on-campus majors	Journalism, Radio and Television, Finance, Zoology	Computer Science, Mechanical Engineering, Math, Physics

Source: College Navigator (except first generation undergraduates). Data for fall, 2018

National context: equity, diversity, and inclusion in STEM

LGBT Climate in Physics

AAS Task Force on Diversity and Inclusion in Astronomy Graduate Education

The AAS Task Force on Diversity and Inclusion in Astronomy Graduate Education has completed its **final report**, and the AAS Board of Trustees has voted to endorse it. The Task Force presented its findings at a plenary held at the **AAS 233rd meeting** in Seattle.

AAAS SEA CHANGE

AIP American Institute of Physics

THE TIME IS NOW | Systemic Changes to Increase African Americans with Bachelor's Degrees in Physics and Astronomy

Theme for this talk:

Find the stories in the data;
Recognize the data in the stories.

Who am I?

Born in Oakland, California.
Second half of childhood: only white family in Latino neighborhood.

SISU

Proud son of a Finnish mother.

Diversity, Equity, and Inclusion are not synonyms

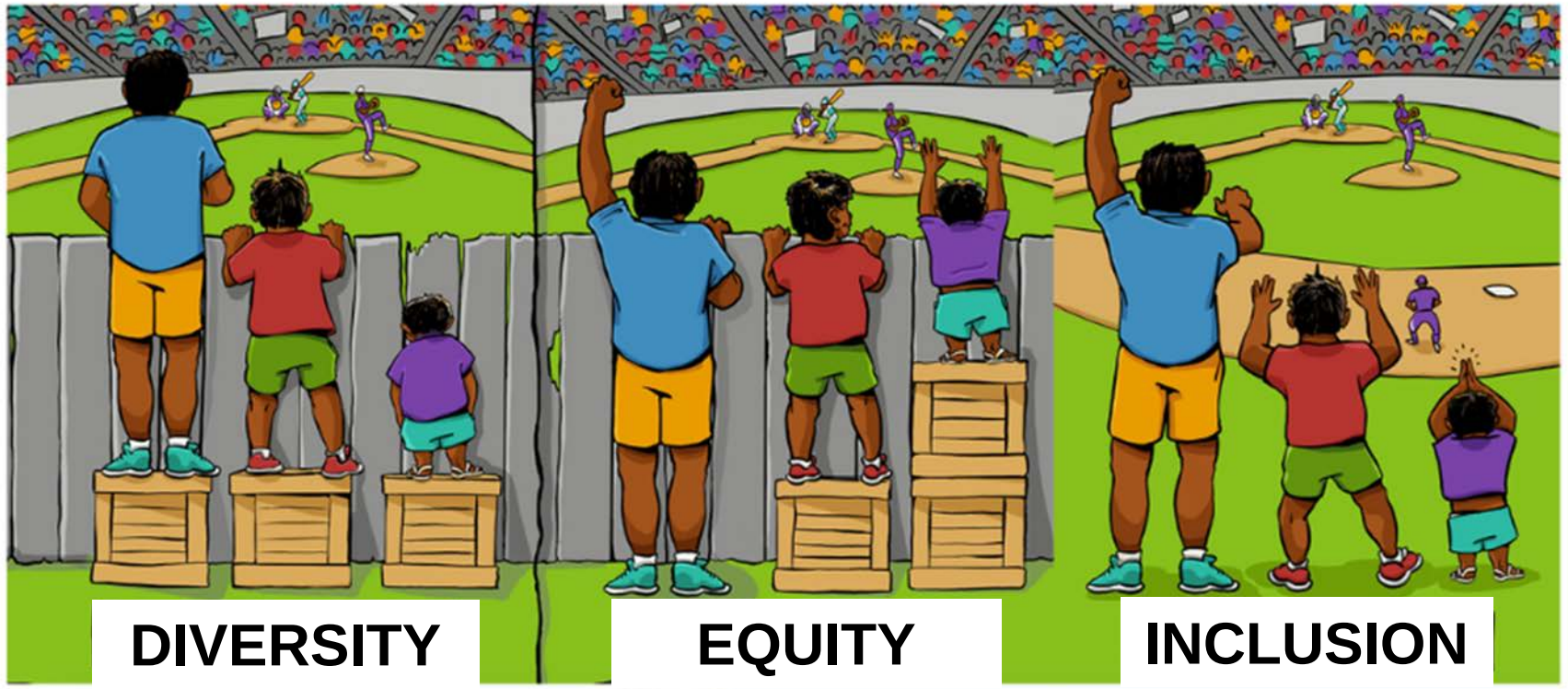


image credit: Angus Maguire/IISC
Labels added by E. Bertschinger

Outline

A success story: MIT Mechanical Engineering

Ups and downs: MIT and OhioU Physics

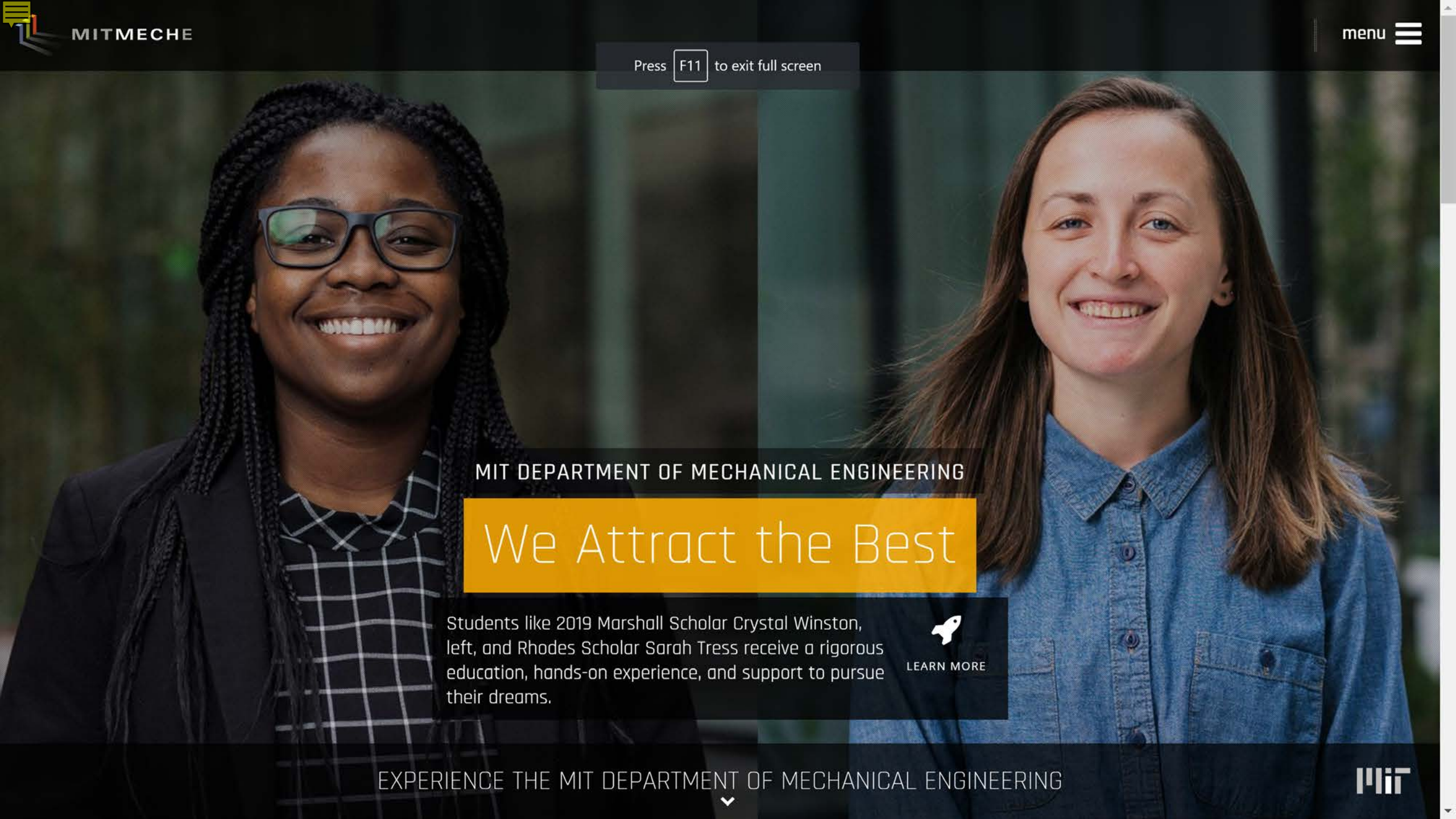
The role of professional societies, departments, and individuals

PEOPLE @ MIT MECHE

We're People First

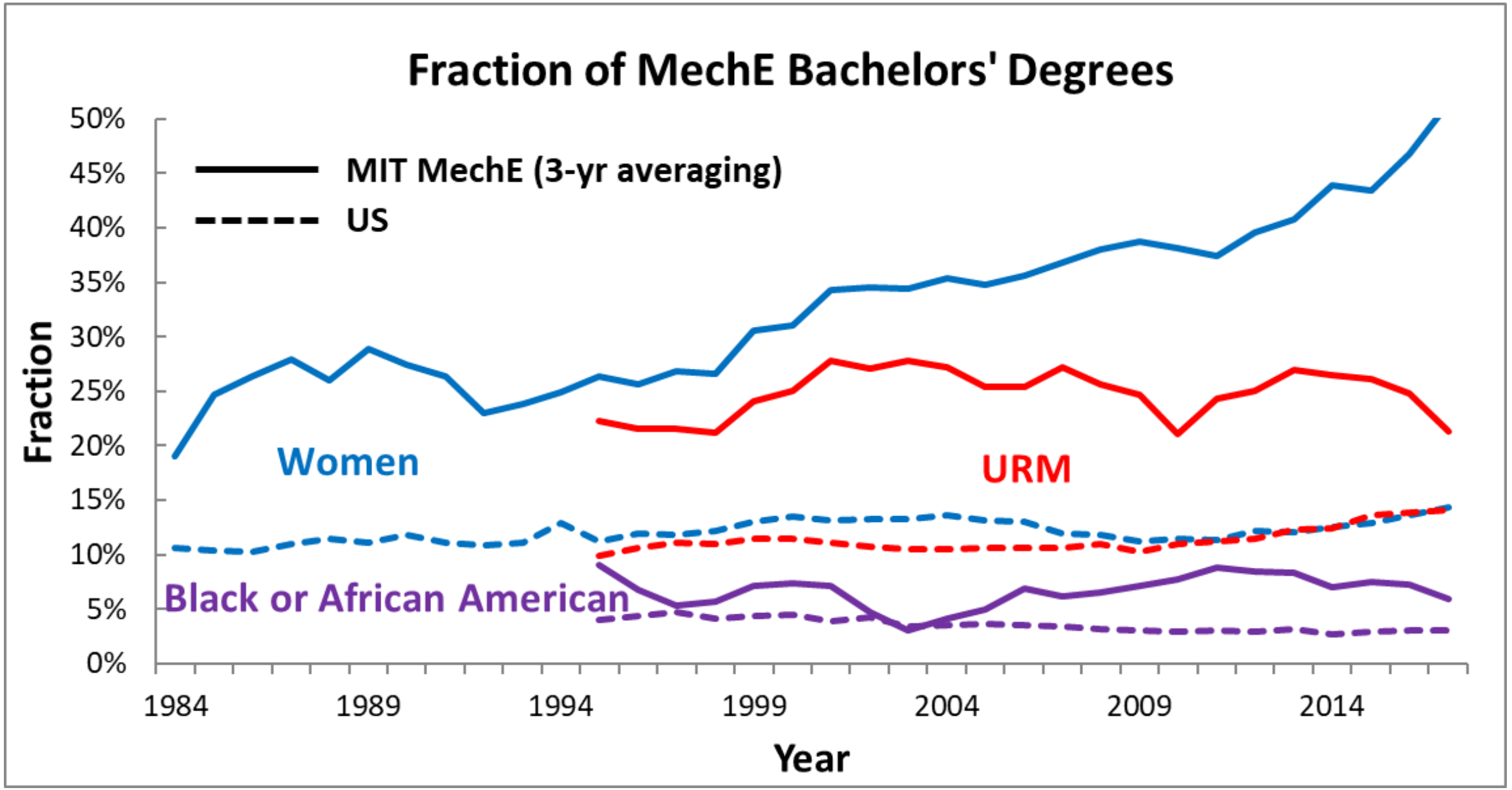
MIT MechE is first and foremost a strong community of faculty, researchers, teachers, post-docs, and staff, dedicated to our students and passionate about our research.

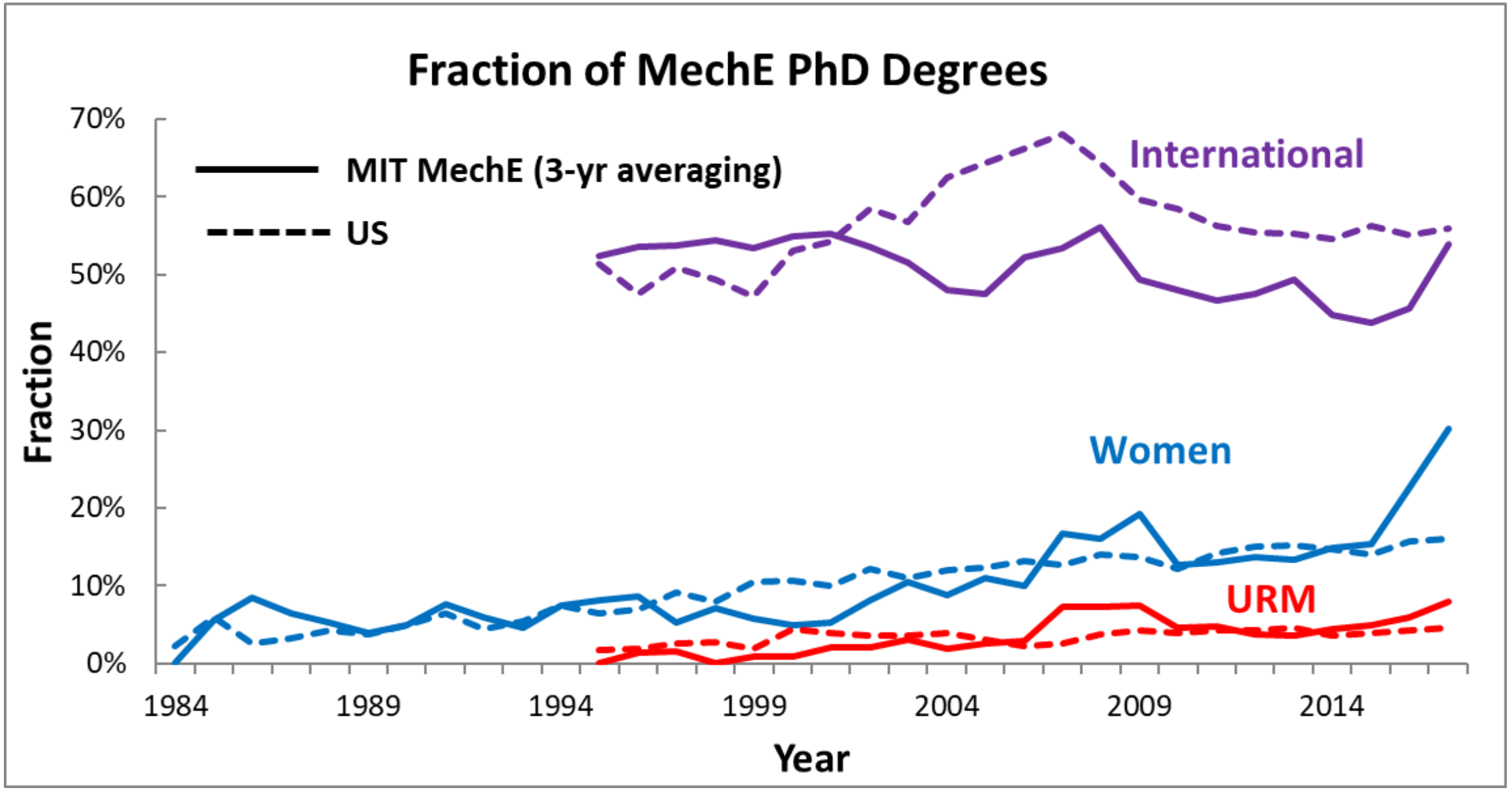
SCROLL TO EXPLORE


MITMECHE
menu
Press F11 to exit full screen
MIT DEPARTMENT OF MECHANICAL ENGINEERING
We Attract the Best
Students like 2019 Marshall Scholar Crystal Winston, left, and Rhodes Scholar Sarah Tress receive a rigorous education, hands-on experience, and support to pursue their dreams.
LEARN MORE
EXPERIENCE THE MIT DEPARTMENT OF MECHANICAL ENGINEERING

MIT Mechanical Engineering

MIT MechE has reached undergraduate gender parity in a field where only 14% of bachelors degrees go to women. URM students are almost twice the national average percentage.


Fraction of MechE Bachelors' Degrees
MIT MechE (3-yr averaging)
US
Women
URM
Black or African American
Fraction
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1984
1989
1994
1999
2004
2009
2014
Year


Fraction of MechE PhD Degrees
70%
60%
50%
40%
30%
20%
10%
0%
Fraction
MIT MechE (3-yr averaging)
US
International
Women
URM
1984
1989
1994
1999
2004
2009
2014
Year

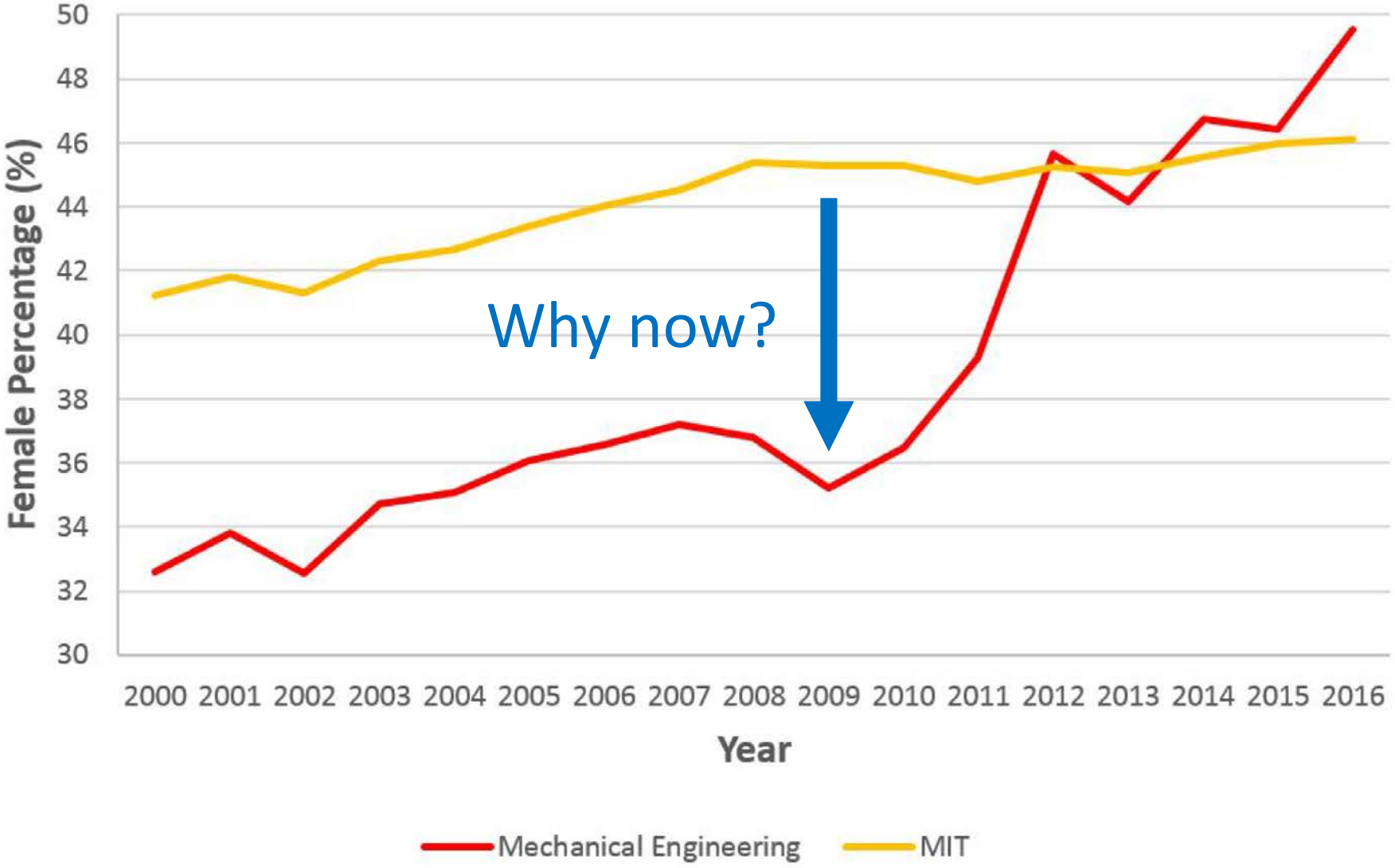
What worked to diversify MechE

- Aggressive recruiting of women faculty: broad searches, proactive calls, cluster hires, male department head and dean committed to increasing the number of women faculty (from 1 of more than 50) – 4 women hired in 2002, 2 more in 2003
- Influential faculty (of all genders) promote gender equity in the department
- A female senior lecturer teaches popular design and manufacturing classes and gives strong encouragement to women and URM.
- Students support and recruit each other. This is especially important for groups that haven't yet reached critical mass (e.g., URM).

Note: Women and URM students still face a more challenging environment than white males, but they have support and encouragement to persist.

At the PhD level, MechE is now almost double the national average for women and URM.

Undergraduate admissions helped, but department-level efforts are the most important factor.



A key enabler: faculty diversity

Large increase in women faculty starting 2002: both recruitment and retention succeeded.

MechE Department Head Rohan Abeyaratne and Engineering Dean Tom Magnanti made faculty diversity a priority.

Full impact of faculty diversity took 8 to 10 years to show up.

Self-assessments from this time:

http://web.mit.edu/fnl/vol/144/lienhard.htm

http://facultygovernance.mit.edu/sites/default/files/reports/2002-03_Status_of_Women_Faculty-All_Reports.pdf

Conclusions from this example:

Diversity succeeds with Inclusion.

Striving for Equity is both motivation and metric.

Find the stories in the data;
Recognize the data in the stories.

Outline

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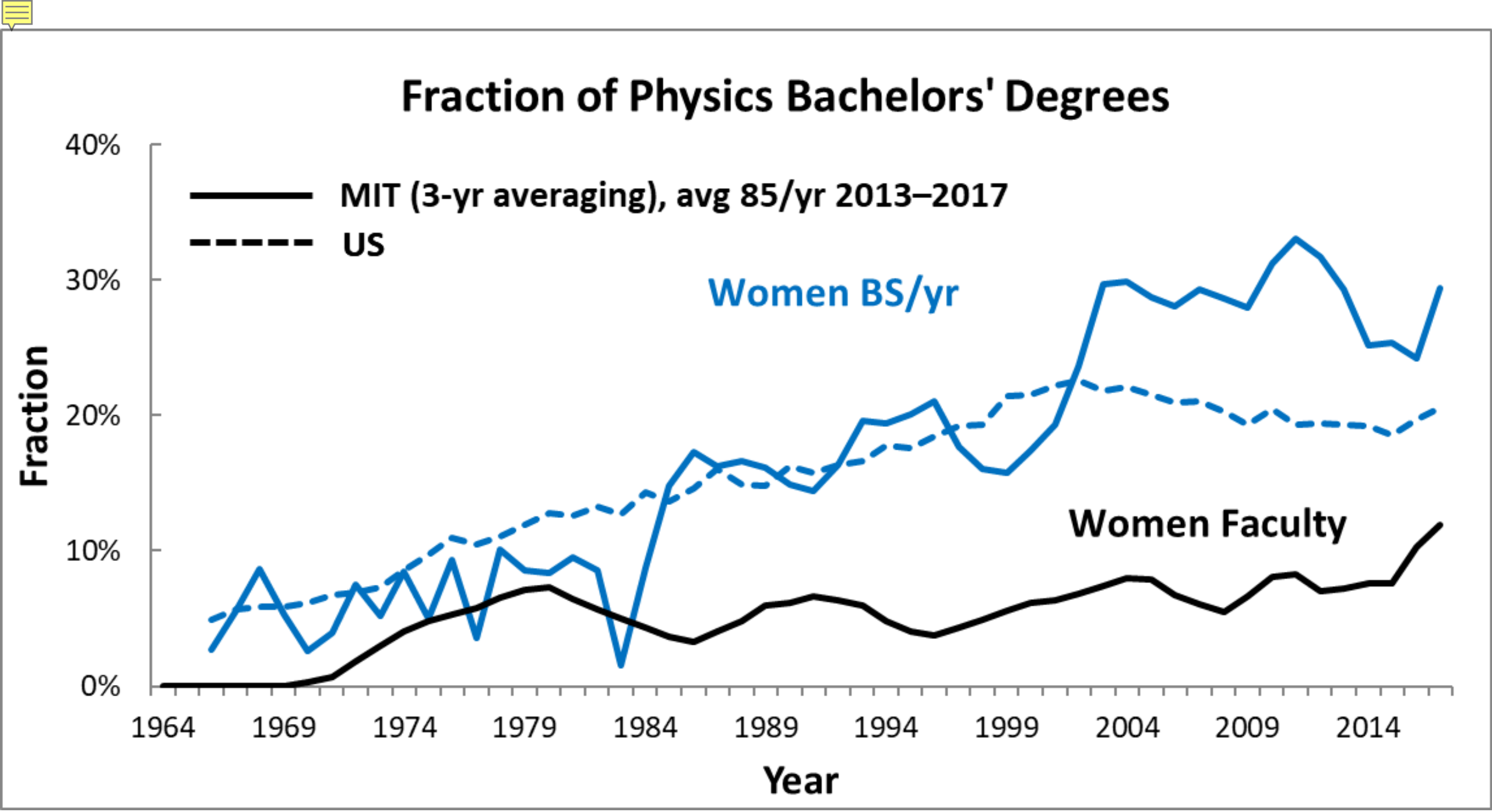
Ups and downs: MIT and OhioU Physics

The role of professional societies, departments, and individuals


Fraction of Physics Bachelors' Degrees
MIT (3-yr averaging), avg 85/yr 2013–2017
US
Women BS/yr
Women Faculty
Fraction
40%
30%
20%
10%
0%
1964
1969
1974
1979
1984
1989
1994
1999
2004
2009
2014
Year

Women in physics: unnecessary, injurious and out of place?

Despite eight years of affirmative action more changes are necessary to create an atmosphere where women are equally accepted in the field of physics.

1980 Physics Today

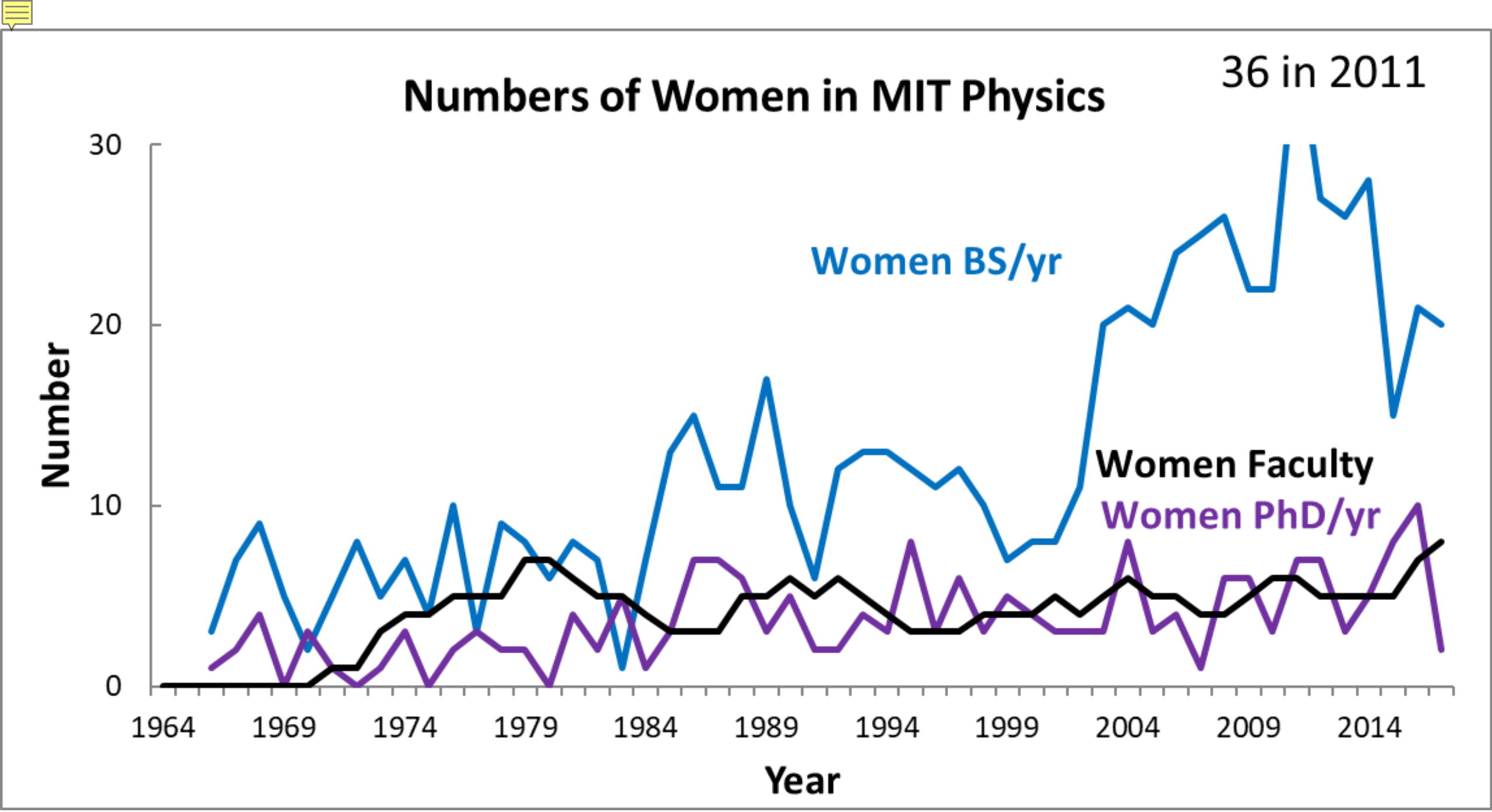
Vera Kistiakowsky

The subtitle for this article is taken from a Strindberg essay written at the end of the 19th century opposing the appointment of the mathematician, Sonia Kovalevsky, to a professorship at the University of Stockholm, in which he attempts to prove "as decidedly as that two and two make four, what a monstrosity is a woman who is a professor of mathematics, and how unnecessary, injurious and out of place she is".[1] It is certainly a much more

with a pre-history of science, that of the Greek natural philosophers, in which women were conspicuous by their absence, I can not resist remarking that there is evidence that women natural philosophers did exist. Arate of Cyrene was supposedly a contemporary of Socrates (5th century BC) who taught and wrote on natural philosophy in Attica.[1] She was, however, not the first; women were equal members of the Pythagorean

self-educated over the opposition of their families. This situation remained about the same until the end of the 19th century.

In the US the situation of women improved somewhat more rapidly than it did elsewhere. The Boston public schools were started in 1642, and although they did not admit girls until 1789, this occurred considerably earlier than was the case in Europe and Great Britain. Many

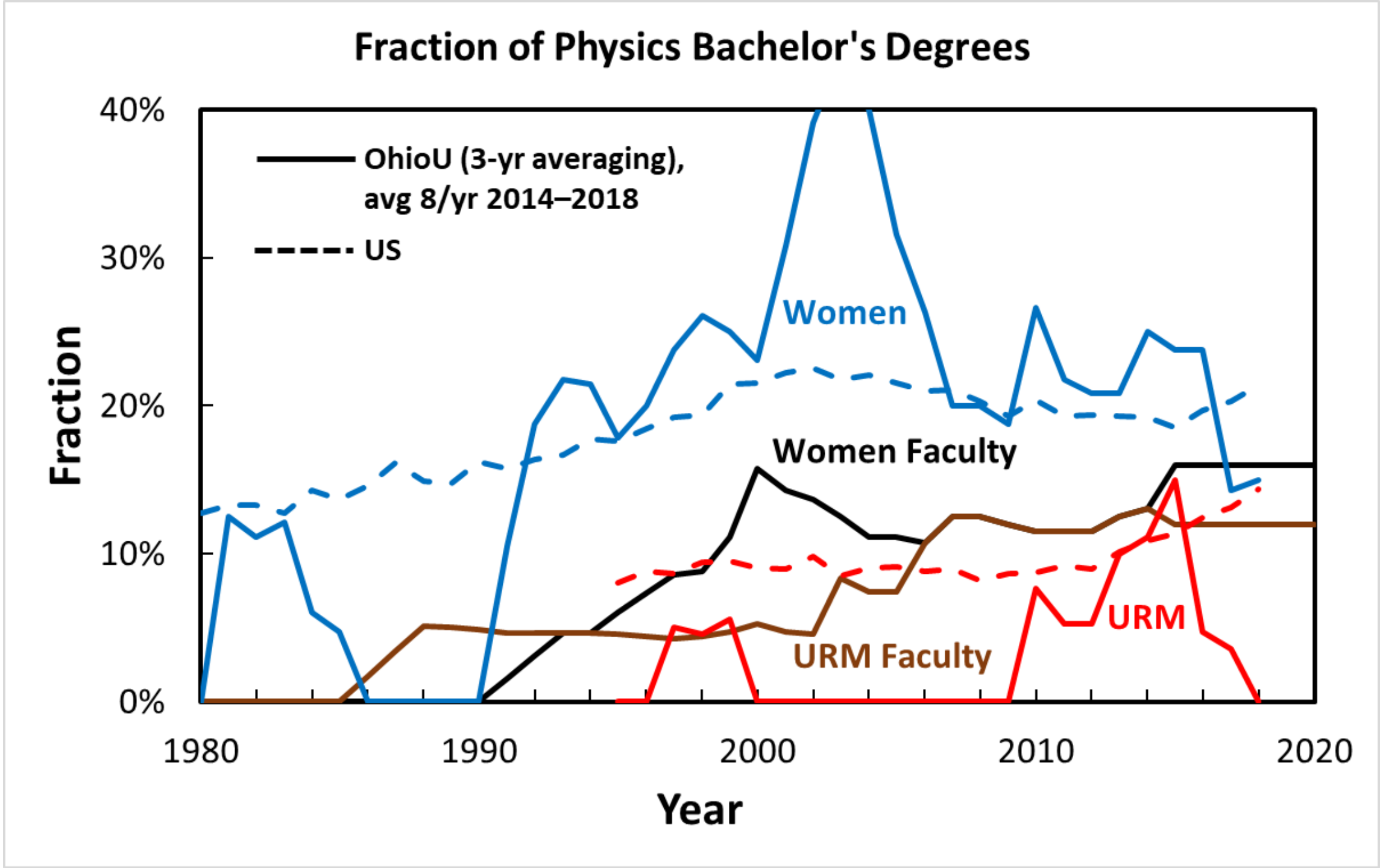

Numbers of Women in MIT Physics
36 in 2011
Women BS/yr
Women Faculty
Women PhD/yr
Number
Year
0
10
20
30
1964
1969
1974
1979
1984
1989
1994
1999
2004
2009
2014

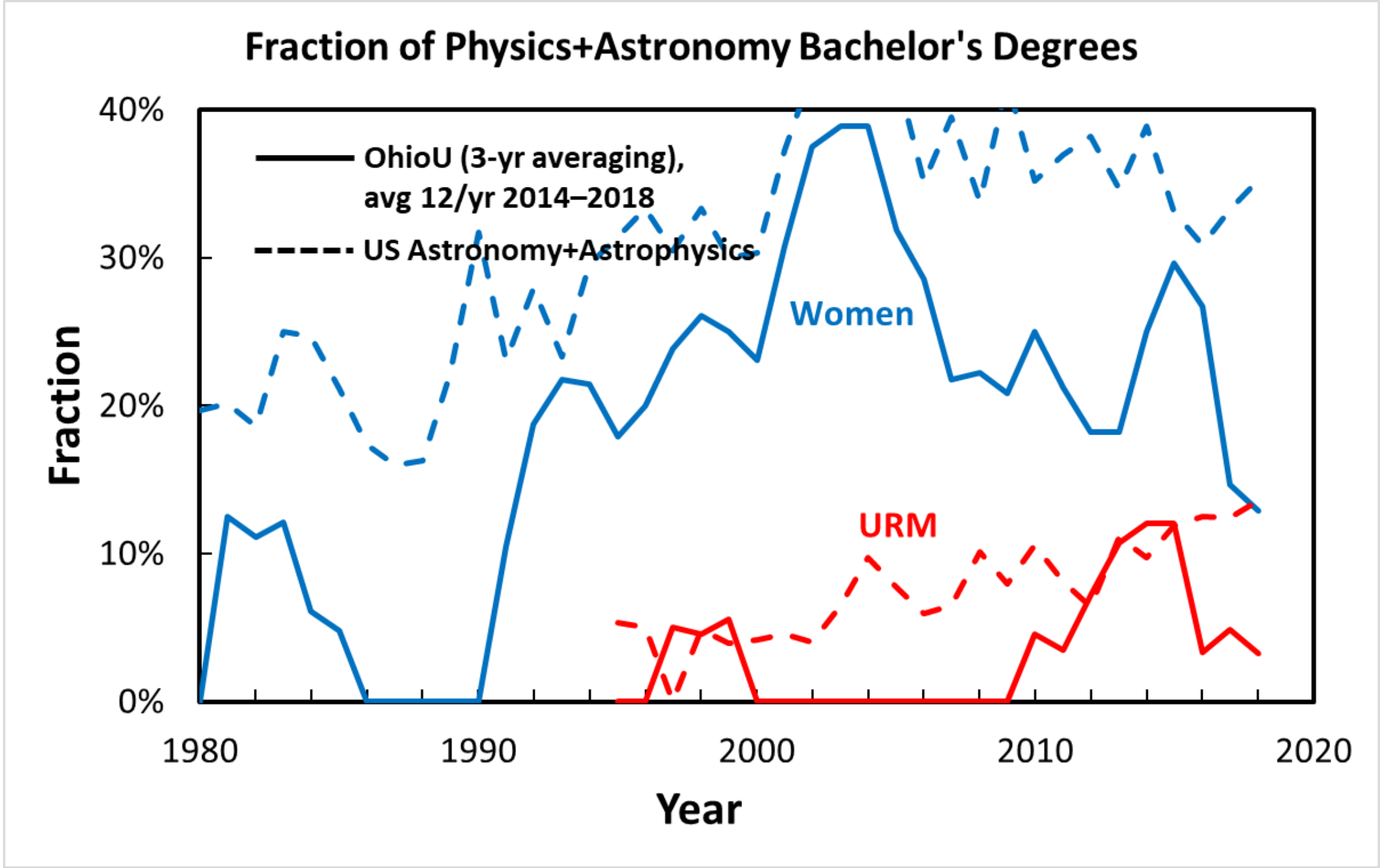
What happened in 1984?

Hypothesis: department leadership and women faculty

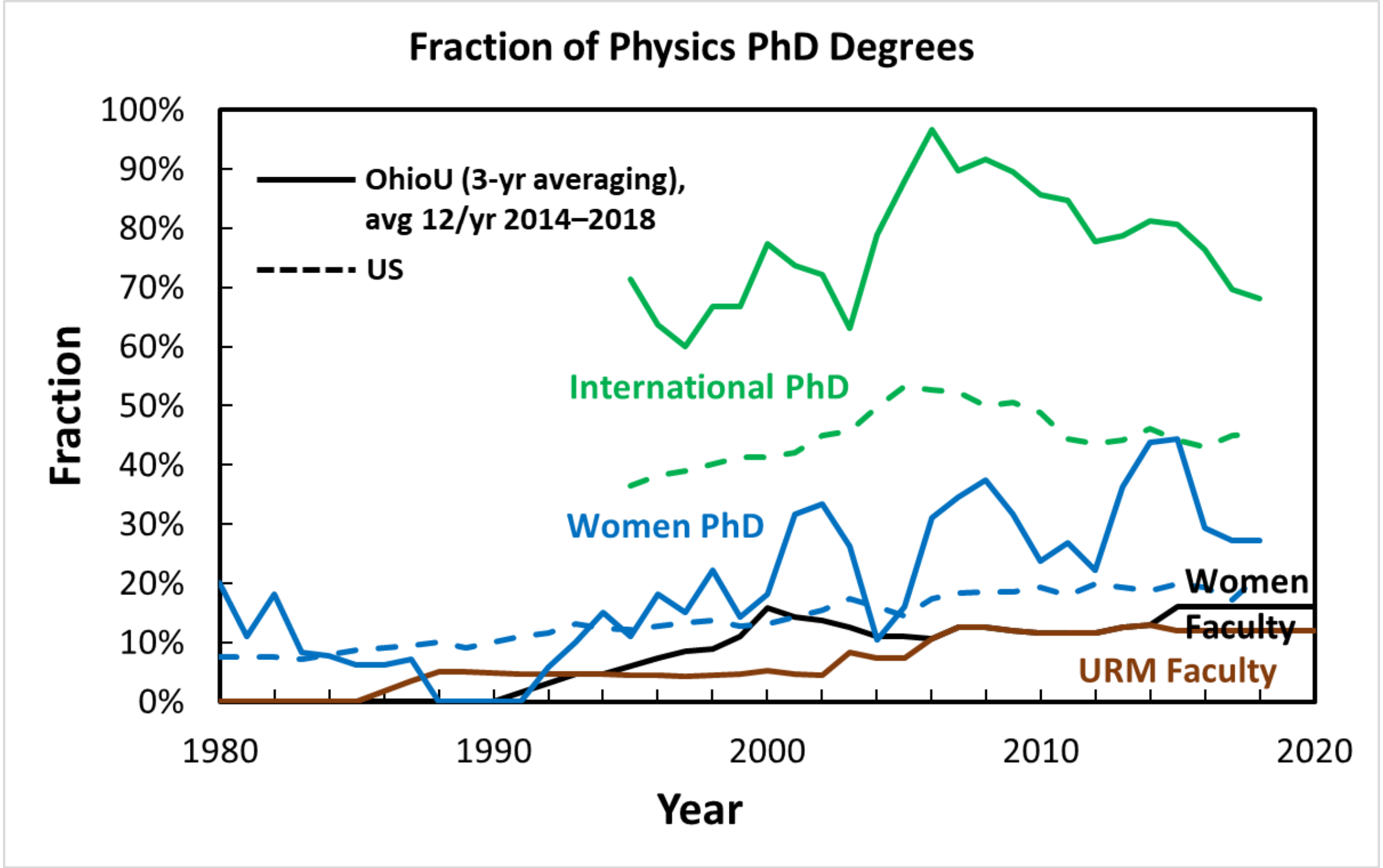
- Herman Feshbach (Department Head 1972-83) made diversity a strategic priority
- Margaret MacVicar became Dean for Undergraduate Education 1985 (previously UROP Director and Assistant Professor of Physics starting 1970)
- Vera Kistiakowsky first MIT woman Full Professor of Physics, in 1973. She founded the APS Committee on the Status of Women in Physics in 1971
- June Matthews first MIT woman promoted to Full Professor of Physics, in 1982 (started Assistant Professor 1972)
- Millie Dresselhaus received secondary appointment as Professor of Physics in 1982 (started Full Professor 1968 in EECS)
- 7 women faculty hired in Physics 1970-78. In 1979, the top 10 physics departments had, between them, 11 women faculty. MIT was a singularity.

Find the stories in the data;
Recognize the data in the stories.


Fraction of Physics Bachelor's Degrees
40%
30%
20%
10%
0%
Fraction
OhioU (3-yr averaging),
avg 8/yr 2014–2018
US
Women
Women Faculty
URM
URM Faculty
1980
1990
2000
2010
2020
Year


Fraction of Physics+Astronomy Bachelor's Degrees
40%
30%
20%
10%
0%
Fraction
OhioU (3-yr averaging),
avg 12/yr 2014–2018
US Astronomy+Astrophysics
Women
URM
1980
1990
2000
2010
2020
Year

Why the peak in women earning bachelor’s degrees around 2003?


Fraction of Physics PhD Degrees
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Fraction
OhioU (3-yr averaging),
avg 12/yr 2014–2018
US
International PhD
Women PhD
Women
Faculty
URM Faculty
1980
1990
2000
2010
2020
Year

Why the ups and downs for women PhDs since 2000?

Find the stories in the data;
Recognize the data in the stories.

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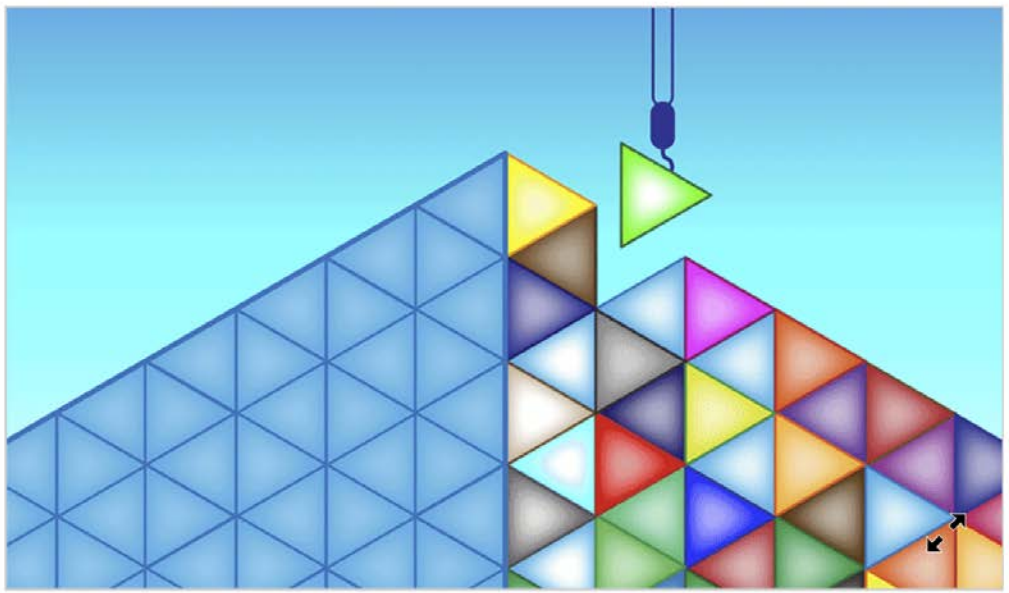
The role of professional societies, departments, and individuals

Opinion: Seeking Symmetry Among Physicists

February 3, 2020 • *Physics* 13, 13

Those looking to make their academic departments more diverse, equitable, and inclusive can learn from previous wins and setbacks.



APS/Alan Stonebraker

Achieving equity, diversity, and inclusion is a popular mantra—but is it important for the future of physics? A

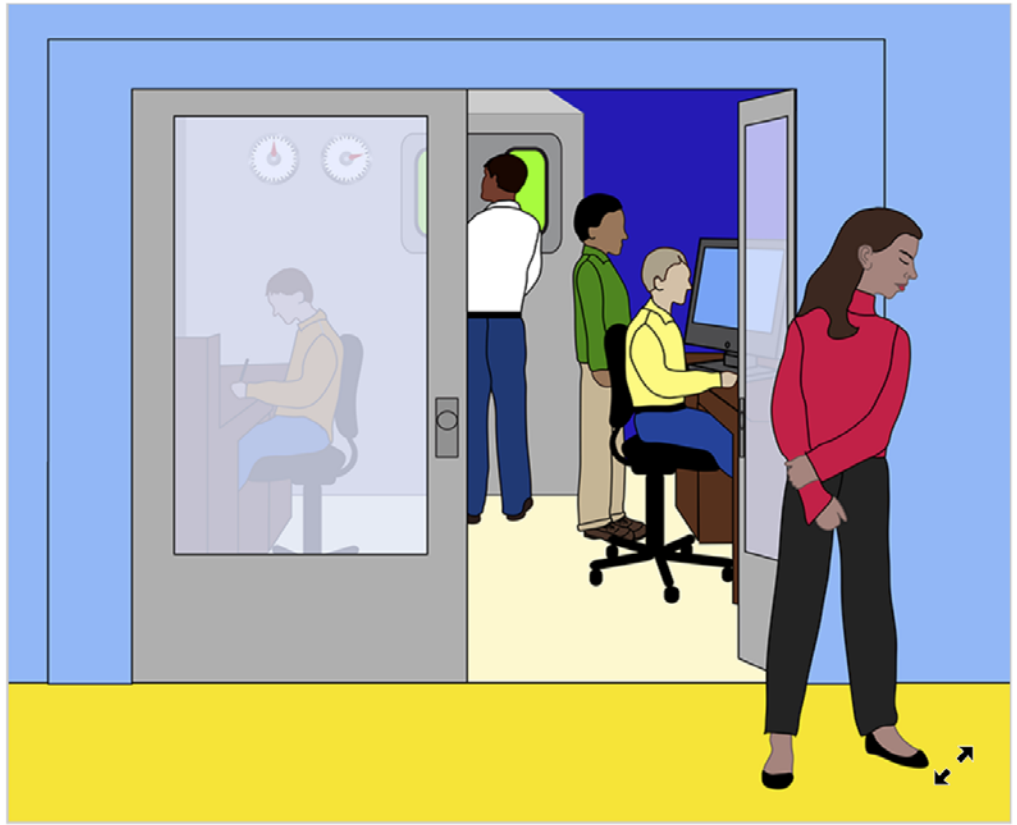
"If those in power cannot drive effective change, then individuals within the department might initiate it with social-movement tactics. "

Viewpoint: Yes, Sexual Harassment Still Drives Women Out of Physics

Julie Libarkin, Department of Earth and Environmental Sciences, Michigan State University, Michigan, USA

April 22, 2019 • *Physics* 12, 43

A survey of female undergraduates in physics found that three quarters of them experience some form of sexual harassment, leaving them alienated from the field.



Joan Tycko/APS

[Sexual harassment reported by undergraduate female physicists]
Lauren M. Aycock, Zahra Hazari, Eric Brewe, Kathryn B. H. Clancy, Theodore Hodapp, and Renee Michelle Goertzen
[Phys. Rev. Phys. Educ. Res. 15, 010121 (2019)]
Published April 22, 2019

To understand some of the behaviors, I recommend this article:

[Work as a Masculinity Contest]
J. L. Berdahl, M. Cooper, P. Glick, R. W. Livingston, and J. C Williams
Journal of Social Issues, Vol. 74, No. 3, 2018, pp. 422–448

Departments can make a big difference!

PHYSICS TODAY

DOI:10.1063/PT.6.2.20190912a

12 Sep 2019 in Politics & Policy

A physics department fosters an inclusive environment

The faculty at St Mary's College of Maryland has introduced measures to prevent exclusionary and harassing behaviors toward women and minority students.

Heather Hill

Some lessons from the AIP TEAM-UP Study

ISSUES & EVENTS Physics Today, February, 2020

Goal: Double the number of African Americans in physics and astronomy

The recommendations of a new AIP report aim to catalyze and guide a huge cultural shift.

Over the past two decades, the numbers of bachelor's recipients in physics and astronomy in the US have rocketed to record highs. Yet even as the increase in African Americans earning bachelor's degrees across all fields has outpaced the overall population, the percentage of physics and astronomy bachelor's degrees earned by African Americans has stalled at around 4%, according to data from the Statistical Research Center at the American Institute of Physics (AIP, publisher of PHYSICS TODAY).

Other underrepresented groups have made larger gains. For example, from 1995 to 2018 the percentage of physics bachelor's degrees earned by women grew from 17% to 21%; for Hispanics that percentage rose from 2.7% to 8.8%. Across

JEDIDAH ISLER (LECTERN), EDMUND BERTSCHINGER, and other members of the task force to elevate African American representation in undergraduate physics and astronomy unveiled their roughly 200-page report at the American Astronomical Society's January meeting in Honolulu. (Courtesy of AIP.)

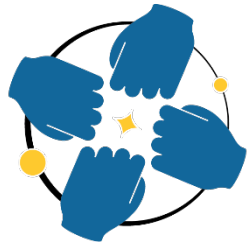
AIP American Institute of Physics

THE TIME IS NOW | Systemic Changes to Increase African Americans with Bachelor's Degrees in Physics and Astronomy

TEAM-UP Findings & Recommendations by Theme

	1	2	3	4	5	6
	Belonging	**Identity**	**Academic Support**	**Personal Support**	**Leadership and Structures**	**Change Management**
a	Faculty role	Faculty role	Faculty preparation	Financial	Department chairs	Theory of change
b	Student role	Co-curriculum	Faculty commitment	Paid work	McNair and similar programs	Alignment with related efforts
c	Counterspaces	Faculty diversity	Advising	Mental health	Campus resources	Faculty preparation and training
d	Climate	Prosocial behaviors	Curriculum	Intersectional identity	Incentives and rewards	Rewards and incentives
e	Harassment response	Career options	Resource guide for students	$50M endowment for financial aid	Professional societies support	Ongoing data collection, assessment, and accountability

Items in blue cells describe **both key findings** and **recommendations**.
Items in gray cells describe **recommendations only**.



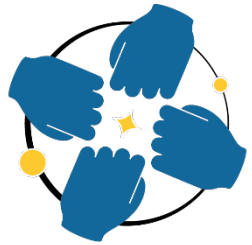
Example 1a: Belonging, Faculty Role

Key finding

- Faculty interactions have a powerful effect on student retention in, or departure from, the major. Students' sense of belonging increases with the number of faculty who get to know them as individuals and demonstrate support for their success.

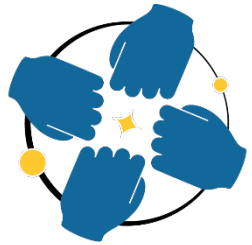
Recommendation

- With the encouragement and support of their chairs, faculty should learn, practice, and improve skills that foster student belonging in their interactions with African American undergraduates.



Example 1a: Belonging, Faculty Role

“There is a tension in many departments concerning the relative importance of research and education. Developing the habit of seeking student perspectives, showing interest in and concern for events and topics relevant to their culture, and providing encouragement to those who may not feel they belong requires minimal financing, yet offers substantial benefits in terms of improved student outcomes. Actors with social power must demonstrate inclusive actions in order to increase students’ sense of belonging.”



Faculty Voices from a top-performing department

“You have to set high expectations of students, be realistic about where they are, then take them [to] where they can be.”

“Building community takes a lot of sweat equity.”

“These are the most talented students anyone could want.”

“Our students are our strength.”

Professional societies are taking steps to advance equity in education and work

Final Report
of the
2018 AAS Task Force on Diversity and Inclusion
in Astronomy Graduate Education

Task Force Co-Chairs:
Alexander Rudolph, Cal Poly Pomona (co-Chair)
Gibor Basri, UC Berkeley (co-Chair)

Task Force Members:
Marcel Agüeros, Columbia Univ. (AAS Board liaison)
Ed Bertschinger, MIT
Kim Coble, San Francisco State Univ. (CSMA representative)
Megan Donahue, Michigan State Univ., ex-officio (President, AAS)
Jackie Monkiewicz, Arizona State Univ. (WGAD representative)
Angela Speck, Univ. of Missouri (CSWA representative)
Keivan Stassun, Vanderbilt Univ. (SGMA representative)

Advisors to the Task Force:
Rachel Ivie, AIP
Christine Pfund, Univ. of Wisconsin-Madison
Julie Posselt, Univ. of Southern California (Senior advisor)

AAS Staff Liaison to the Task Force:
Michelle Farmer, AAS

From the report:

"Underlying the Task Force's recommendations is current **organizational and social theory about why and how large, distributed organizations change**.... To summarize, we believe the best way for astronomy to make progress as a field toward diversity and inclusion is through a combination of **top-down actions by AAS and bottom up actions by departments**."

What can you and your department do?

Self-Assessment Rubrics!

AAS Graduate Education report (left)

AIP TEAM-UP report (right)

Departmental climate	Stage 1: Emerging	Stage 2: Developing	Stage 3: Transforming
Communications	Department website provides information on policies and procedures and points to university-wide resources. Departmental communications use minimal language around equity and inclusion	Department chair communicates the importance of equity and inclusion in person and in writing shared with all department members. The department website provides details on family-friendly policies, mentorship, inclusive teaching, and responding to harassment and bullying	The department has adopted a values statement and a code of conduct. The department chair advises other departments on how to improve the climate for all people. The department chair periodically hosts colloquia on topics related to diversity, equity, and inclusion in academia
Training	Department members participated in mandatory university trainings on lab safety, Title IX, etc.	New faculty receive training on teaching, mentoring, and on university resources to support the success of all people. Faculty search committee members receive training on implicit bias and best practices for inclusive searches	Department chairs receive training on diversity, equity, and inclusion, and on mediation and conflict management. They receive regular coaching. The department hosts trainings for all members on topics such as "being an ally", responding to microaggressions and harassment, and inclusive teaching practices. The majority of faculty attend these trainings

Physics Identity

	Stage 1: Emerging	Stage 2: Developing	Stage 3: Transforming
Faculty role	When asked to describe the ideal physics student, most faculty reply, "someone like me." Most believe that success in physics requires only talent and hard work.	Most faculty understand the benefits of recognizing student success and giving encouragement. They send congratulatory notes to marginalized students for achievements and milestones.	The department tracks academic progress and analyzes differences by race, ethnicity, and gender. Faculty utilize evidence-based practices to strengthen students' sense of physics identity, including encouragement and recognition. The department funds student travel for physics-related career opportunities.
Student Role	Black students do not view themselves as part of the department, and often isolate themselves (e.g., they come to the department only to attend classes).	Black students come to departmental seminars and seek opportunities to participate in undergraduate research.	When asked to describe the ideal physics student, marginalized students respond that it could be someone like them.
Curriculum and Co-curriculum	Faculty encourage undergraduates to join their research group and select the "strongest" students.	The department has a Learning Assistant program and supports undergraduate attendance to identity based conferences (such as CU2MiP and the NSBP Conference).	The department utilizes physics education research methods, disaggregating by social identities, to assess whether their current activities foster physics identity. Working with students, faculty seek continuous improvement in their co-curricular support for physics identity development.
Faculty diversity	Faculty recruitment seeks the "best" hires based on letters of recommendation and who presents most strongly in their interview.	Faculty search committees are aware of implicit bias and utilize recommended search practices. They invite a diverse set of candidates to interview, but have not been able to retain faculty of color.	The department raised funds for an endowed chair designated to support equity and inclusion. Cluster hiring is utilized to recruit additional faculty of color, who join White faculty to mentor a growing number of underrepresented students.
Prosocial behaviors	Faculty are unaware of students' interests and activities related to outreach and community service. Academic success is what matters.	Faculty recognize and validate students' interests in outreach because it helps with recruitment. They invite successful alumni of color to speak to students.	Faculty communicate the ways in which a physics degree empowers graduates to improve society with particular benefit to marginalized groups. They volunteer alongside students in events that serve minoritized communities.
Career options	Career advising is left to a central campus office; faculty discuss graduate school options with students whom they think will succeed.	The department highlights the AIP/SPS Careers Toolbox during the departmental open house for recruitment and during a students' third year when advisers discuss career options with their advisees.	Every year the departmental colloquium series includes a physics alum working outside the profession. Faculty speak with equal pride about alumni working for non-profits, government, industry, and academia.

Join a movement to catalyze cultural change in Physics

APS Inclusion, Diversity, and Equity Alliance (APS-IDEA)

Two-year pilot project funded by APS Innovation Fund (10/19–9/21)

Addresses multiple levels of change: individual, organization, society

30 Physics Departments or Labs will be recruited to join a national network

- **Vision:** As a result of collective efforts, physics and related fields will become more inclusive of all social identities, with a diversity reflective of the nation, and with an equitable distribution of opportunities and resources.

- **Mission:** APS-IDEA seeks to empower and support physics departments, laboratories, and other organizations to identify and enact strategies for improving equity, diversity, and inclusion. It will do so by establishing a community of transformation.

If there is no struggle, there is no progress.
—Frederick Douglass

Basics of APS-IDEA

- **Guiding principles:**
- Center people whose identities are marginalized
- Utilize sensemaking, including creating brave spaces supporting learning from mistakes
- Start with research-based change-management methods
- Shared leadership: departmental teams should span the range of social power from students to faculty

Complementary with related efforts

- AIP TEAM-UP recommendations
- AAS Diversity and Inclusion in Astronomy Graduate Education recommendations
- AAS Climate Site Visits Program
- TaMIA: Towards a More Inclusive Astronomy
- The Access Network

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Ups and downs: MIT and OhioU Physics

The role of professional societies, departments, and individuals

Discuss with a neighbor one thing you learned in this presentation.

For further information:

1. https://www.aps.org/programs/innovation/fund/idea.cfm – APS IDEA
2. https://aip.org/teamup – AIP TEAM-UP report
3. https://physicstoday.scitation.org/do/10.1063/PT.6.2.20190912a/full/ – St. Mary's College of Maryland is fostering an inclusive environment
4. https://www.aip.org/statistics/reports/women-physics-and-astronomy-2019 – a great source of national information
5. https://www.cimerproject.org/ – learning to become an excellent research mentor
6. https://aas.org/education/aas-task-force-diversity-and-inclusion-graduate-astronomy-education – the Astronomy report
7. https://seachange.aaas.org/ – the SEA Change initiative
8. https://web.mit.edu/fnl/vol/archives/Fnl144.pdf – The Status of Women Faculty at MIT, 2002 (still very relevant today)
9. http://web.mit.edu/edbert/DEI.html – the speaker's writings, etc.