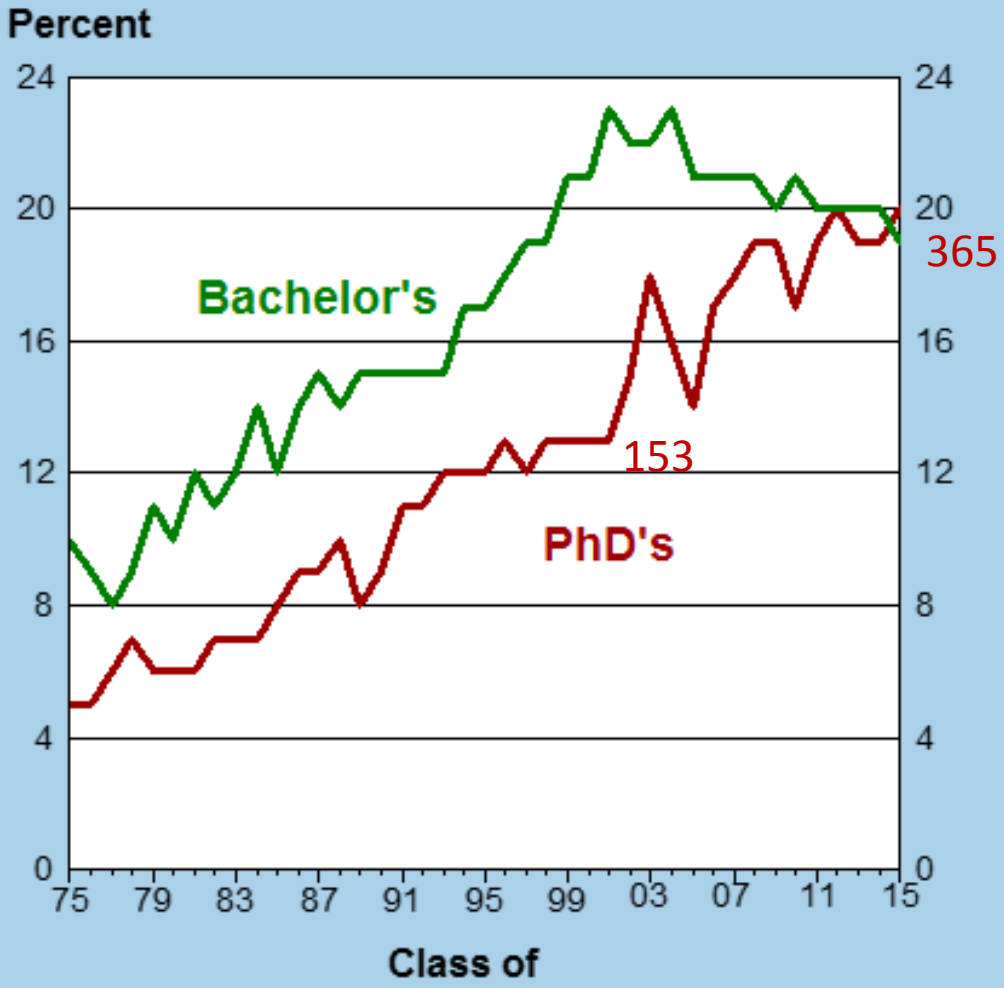
BEYOND REPRESENTATION: DATA ON WOMEN AND UNDER-REPRESENTED MINORITIES IN PHYSICS

Rachel Ivie

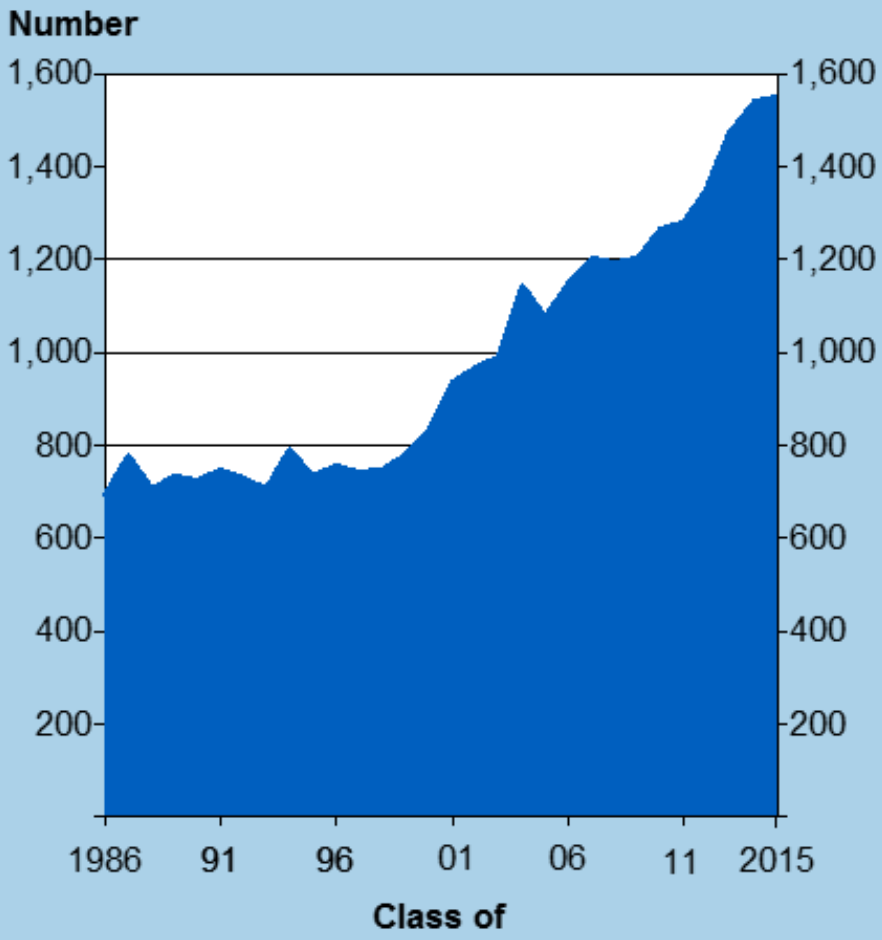
Statistical Research Center

REPRESENTATION OF WOMEN

Percent of Physics Bachelor's and PhDs Earned by Women, Classes 1975 through 2015

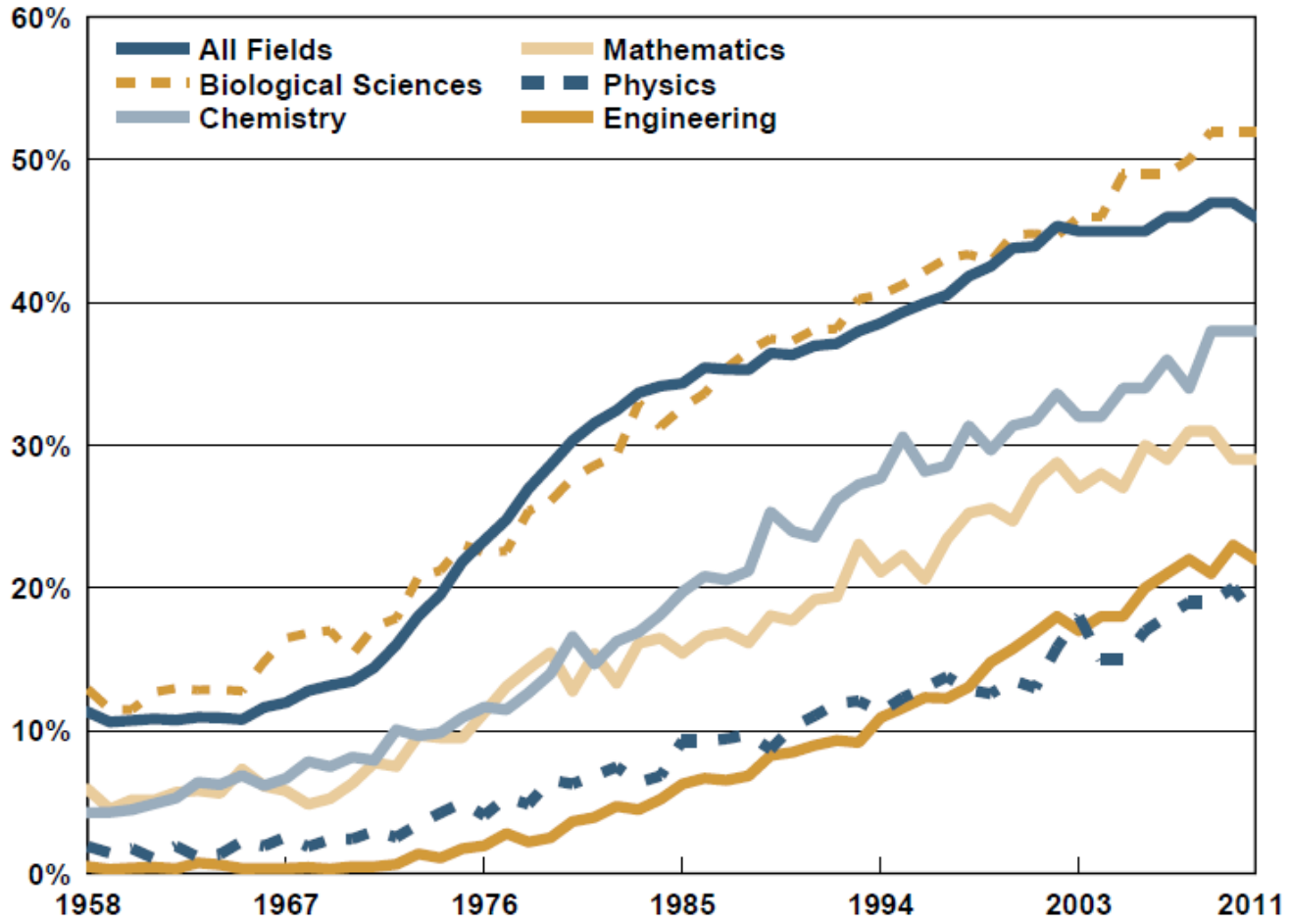


Number of Physics Bachelor's Earned by Women, Classes 1986 through 2015



http://www.aip.org/statistics

Percent of PhDs Earned by Women in Selected Fields, 1958-2011.



Source: National Science Foundation. Compiled by AIP Statistical Research Center.

PERCENTAGE OF PHYSICS FACULTY MEMBERS WHO ARE WOMEN

	2002	2006	2010	2014
RANK				
FULL PROFESSOR	5	6	8	10
ASSOCIATE PROF	11	14	15	18
ASSISTANT PROF	16	17	22	23
INSTRUCTOR/ADJUNCT	16	19	21	23
OTHER RANKS	15	12	18	20
HIGHEST DEGREE OFFERED				
PHD	7	10	12	14
MASTER'S	13	15	15	18
BACHELOR'S	14	15	17	20
OVERALL	**10**	**12**	**14**	**16**

UNDER-REPRESENTED MINORITIES

Minority and Ethnic Profile of Physics Bachelor's, Classes of 2012 through 2014. (3-Year Average)

	Number	Percent of all Physics Bachelor's
White	5,568	77
Asian American	468	6
Hispanic American	375	5
African American	201	3
Other US citizens	121	2
Non-US citizens	477	7
Total	7,210	100%

http://www.aip.org/statistics

Race and Ethnicity of Physics PhDs, Classes of 2013 through 2015. (3-Year Average)

	3-Year Average Number	Percent of all Physics PhDs	Percent of U.S. Physics PhDs*
White	817	45	87
Asian American	57	3	6
Hispanic American	36	2	4
African American	15	1	2
Other U.S. Citizens	12	1	1
Non-U.S. Citizens	865	48	-
Total	1,802	100%	100%

***Based on a 3-year average of 937 US citizens.**

http://www.aip.org/statistics

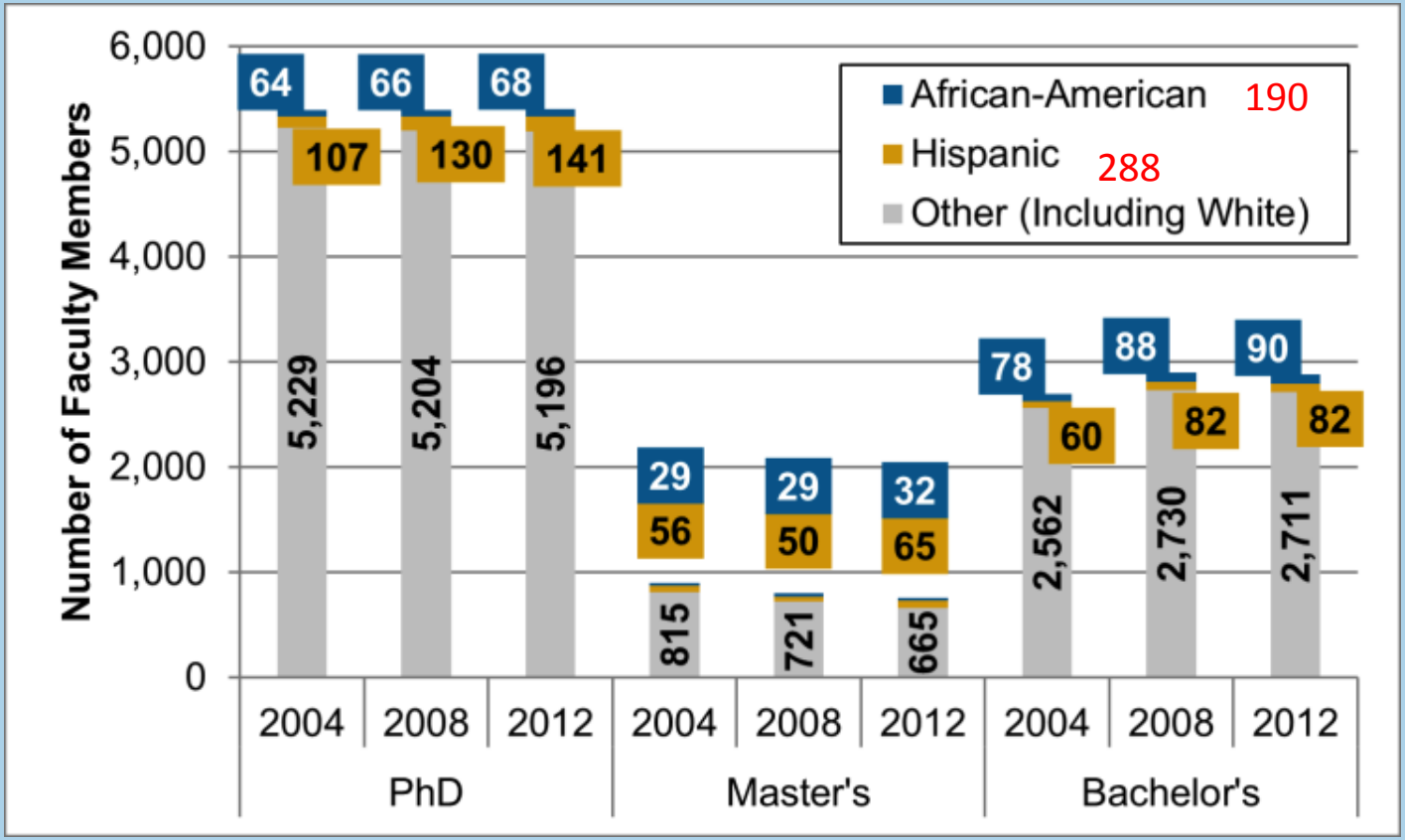
Race and Ethnicity of Physics Faculty

	Physics			All Disciplines*
	2004 (%)	2008 (%)	2012 (%)	2009 (%)
African-American	2.0	2.2	2.1	6.6
Asian	10.6	13.2	14.3	6.0
Hispanic	2.7	3.1	3.2	4.0
White	82.2	80.0	79.2	74.9
Other	2.2	1.5	1.2	0.5

* **Data for all disciplines (which includes non-science disciplines) found at** http://nces.ed.gov/fastfacts/display.asp?id=61

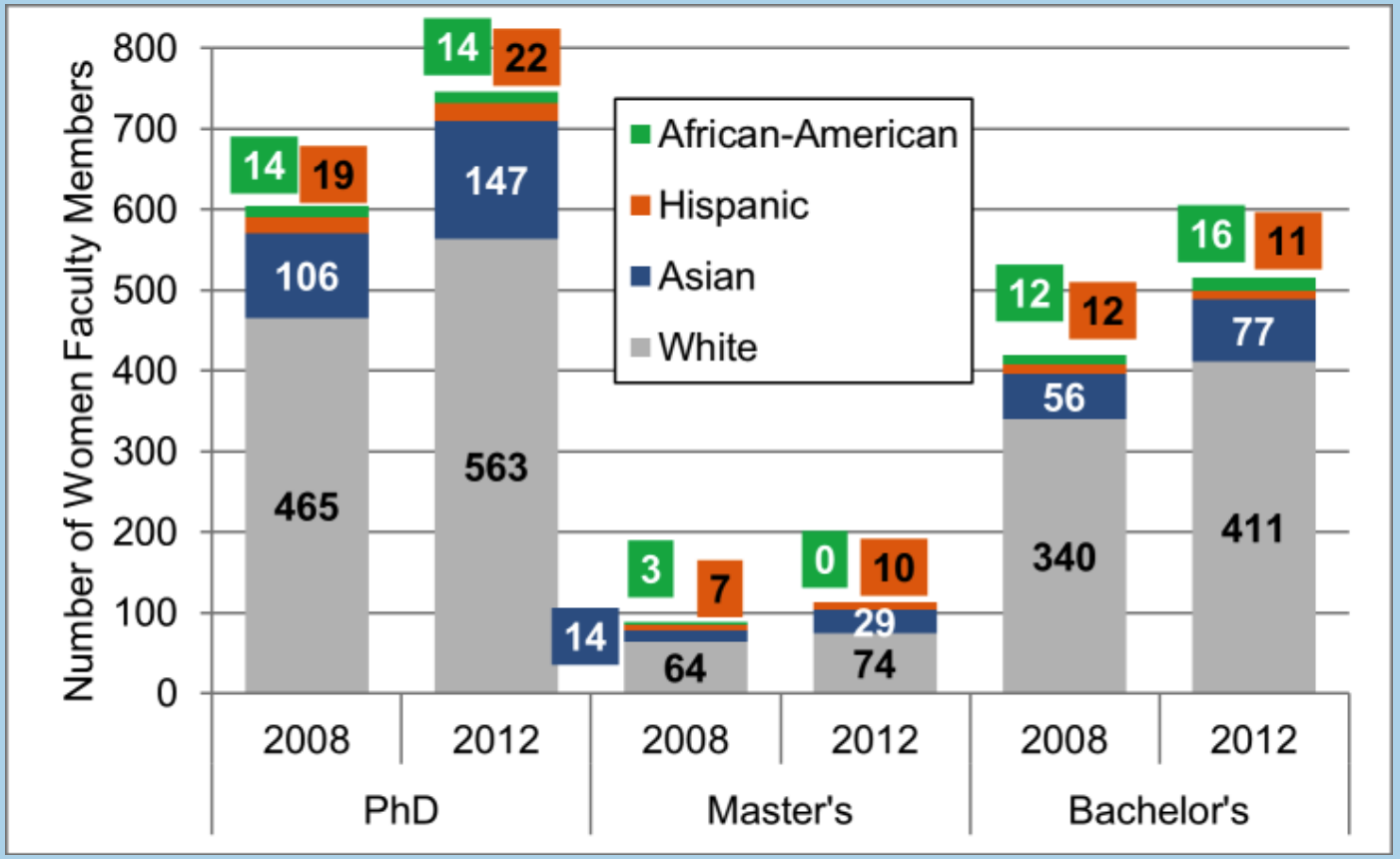
www.aip.org/statistics

Number of African-American and Hispanic Physics Faculty by Highest Degree Awarded by Department, 2012



www.aip.org/statistics

Number of Women in Physics and Astronomy Departments, 2012
by Race and Highest Degree Awarded



www.aip.org/statistics

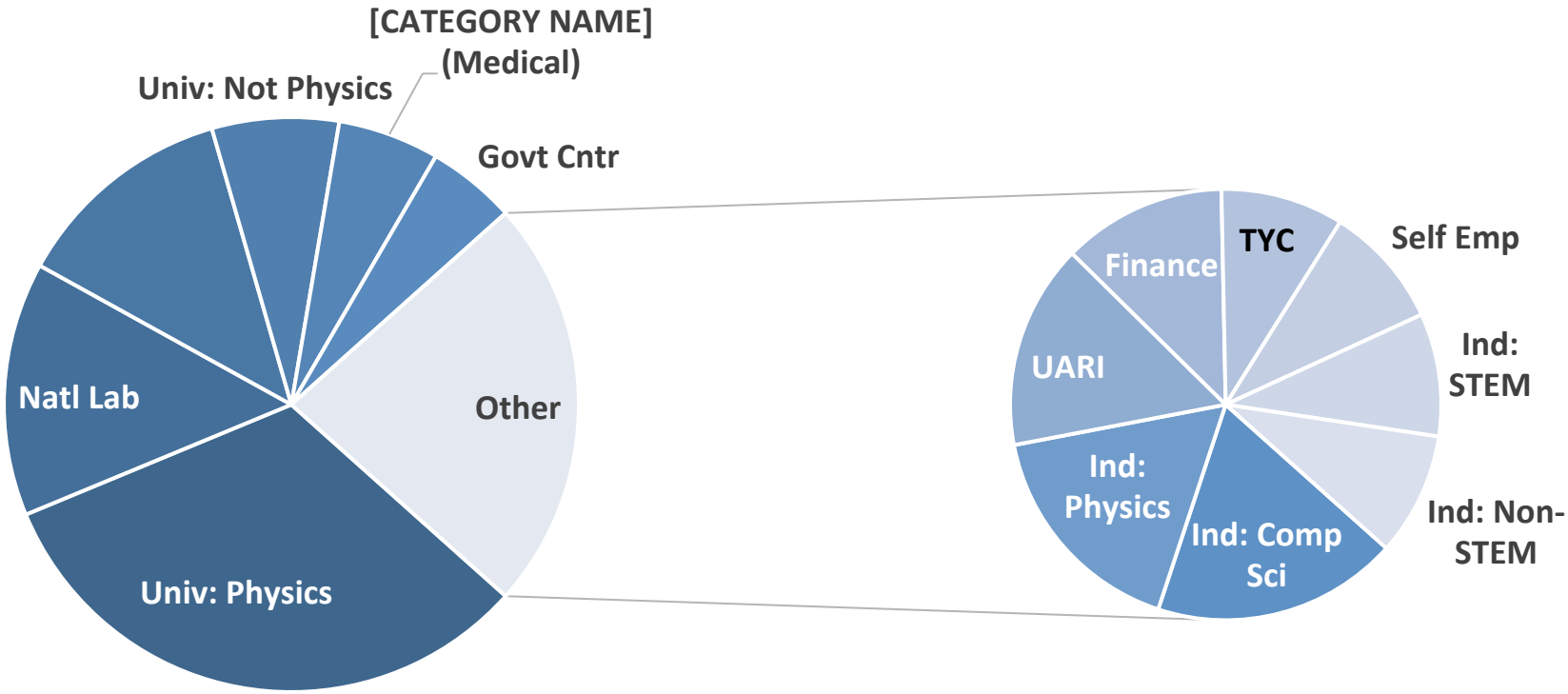
Will increasing representation fix everything?

- Data should be collected on other important areas
  - Workplace environment
  - Salary
- Even with equal representation, some groups could have limited access to resources and opportunities

PHD+10 (TO 15) STUDY

- PhD classes of 1996, 1997, 2000, & 2001
  - Who lived in the US during 2011
- Contacted during 2011
- 3,419 potential respondents
  - 1,544 actual respondents
  - 45% response rate

Where do our respondents work?



Salary Regression

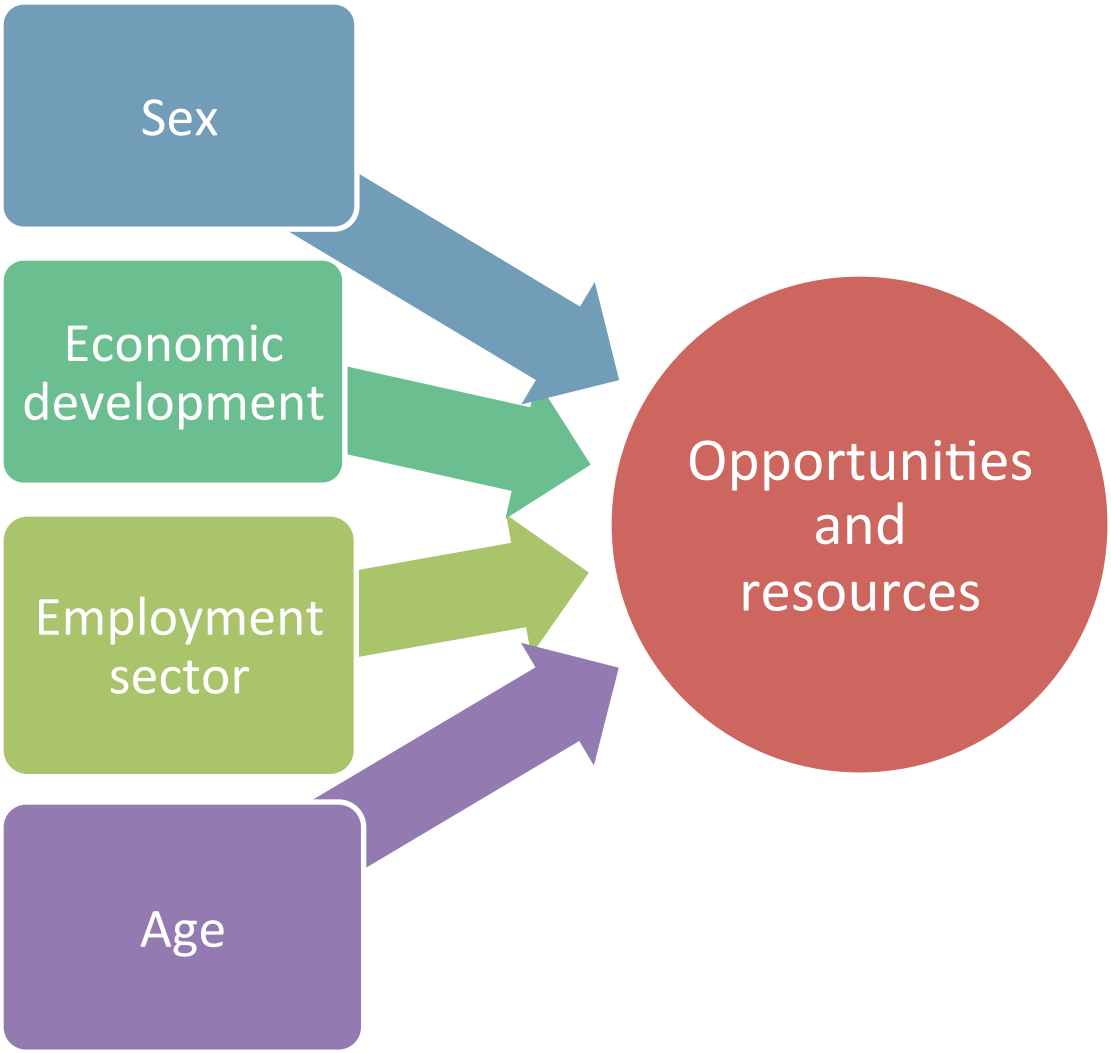
- Ran a regression model using
  - Employment sector
  - Time since degree
  - Whether respondent had stayed with same employer
  - Whether or not respondent had take a postdoc
  - Highest degree the department offers (academic only)
  - Respondent's sex

Regression Results

- Men make more than women
  - ~6% more (p = 0.025)

GLOBAL SURVEY OF PHYSICISTS, 2009-2010

- About 15,000 respondents from 130 countries
- Conducted in 8 languages


Sex
Economic development
Employment sector
Age
Opportunities and resources

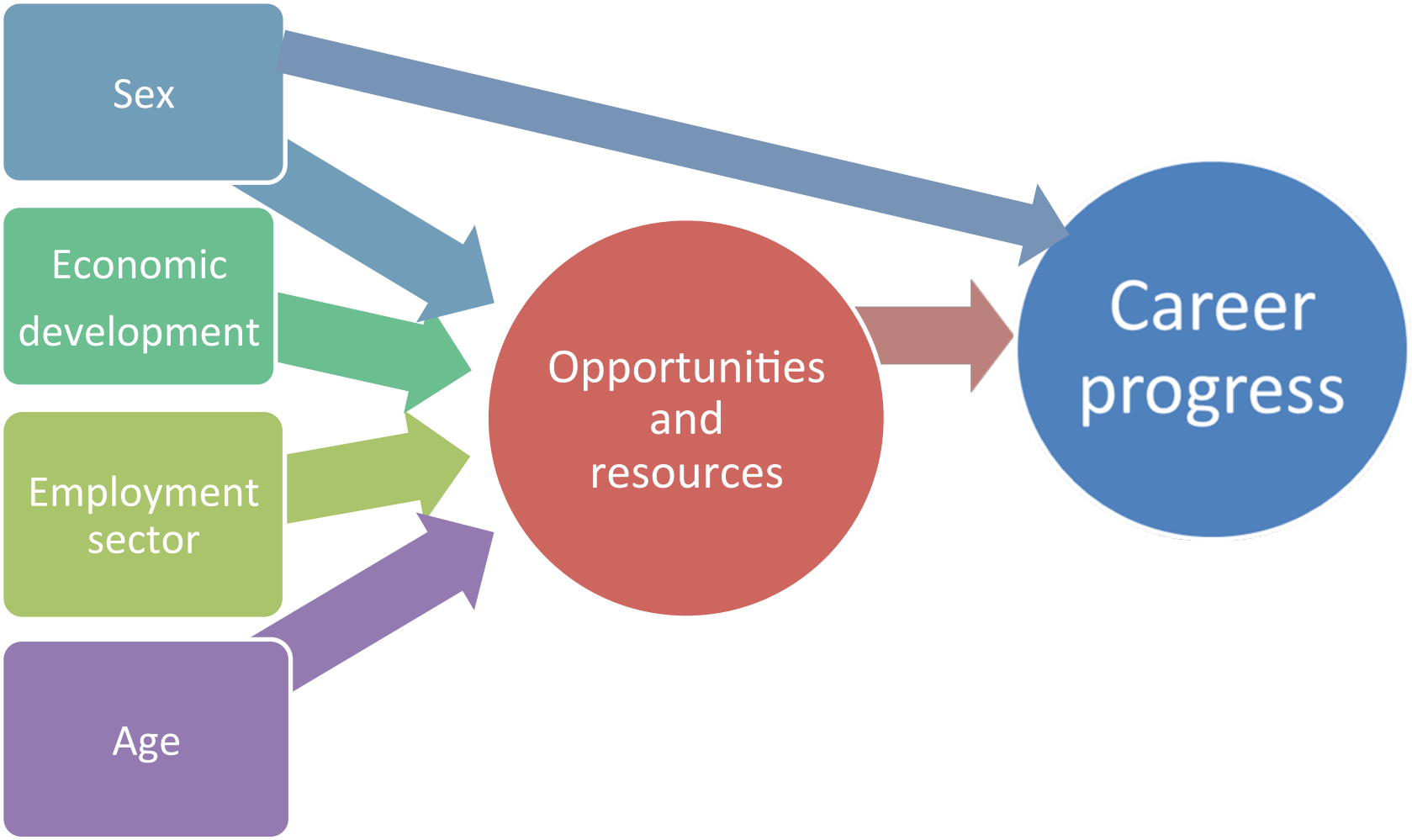
Percentage of respondents with access to key resources

	Less Developed		Very Highly Developed	
	Women	Men	Women	Men
Funding	34	51	52	60
Office space	64	74	72	77
Lab space	42	47	46	52
Equipment	42	49	58	64
Travel money	31	47	57	64
Clerical support	22	38	30	43
Employees or students	42	53	33	43

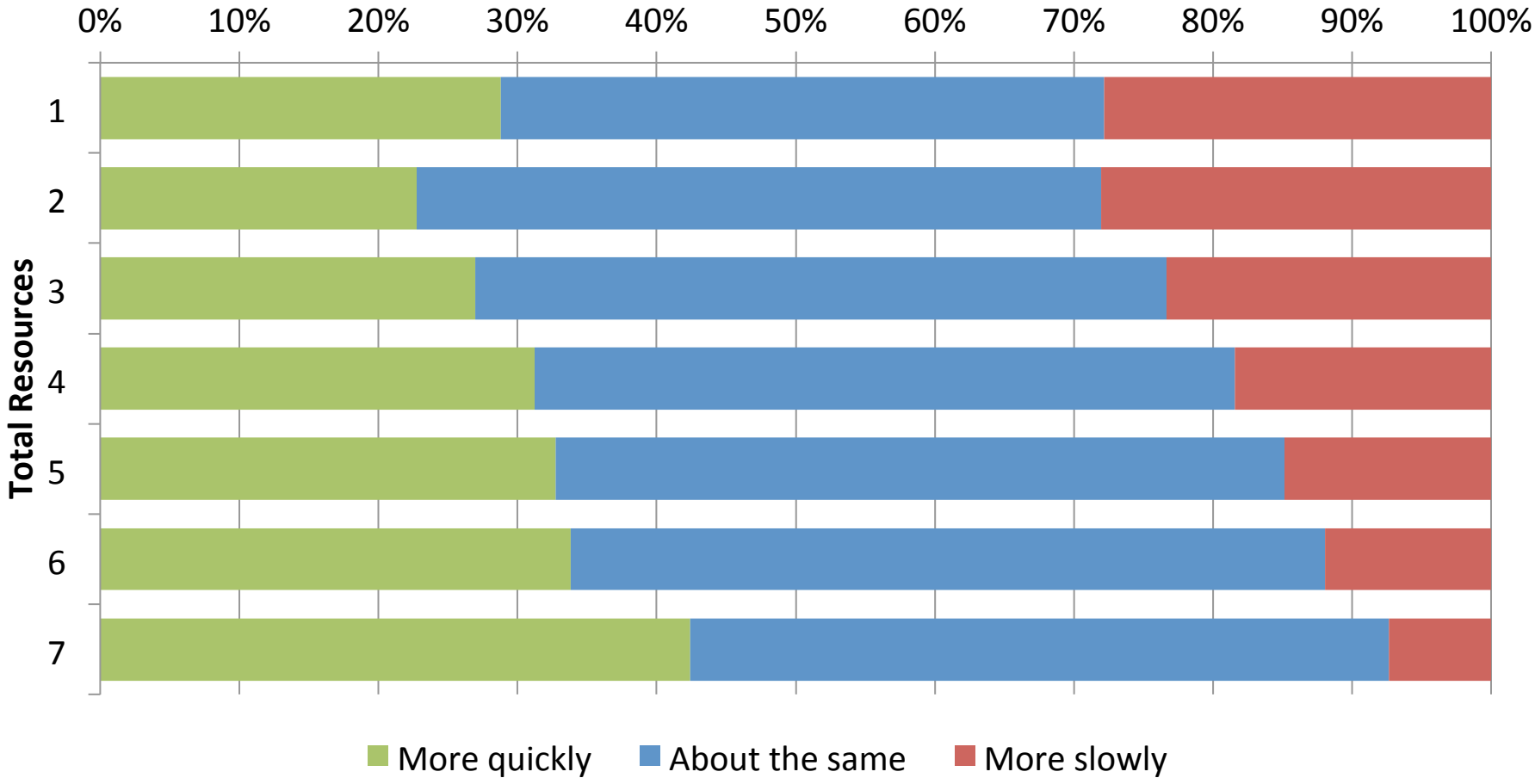
% of R's w/ career-advancing opportunities

% Yes	Less Developed		Very Highly Developed	
	Women	Men	Women	Men
Given a talk at a conference as an invited speaker	51	67	58	73
Attended a conference abroad	75	81	83	87
Conducted research abroad	54	71	61	69
Acted as a boss or manager	38	53	46	61
Served as editor of a journal	16	24	11	19
Served on committees for grant agencies	22	37	26	36
Served on important committees at your institute or company	50	62	48	60
Served on an organizing committee for a conference in your field	48	59	48	55
Advised undergraduate students	82	84	69	74
Advised graduate students	63	77	58	70
Served on thesis or dissertation committees (not as an advisor)	52	66	37	52

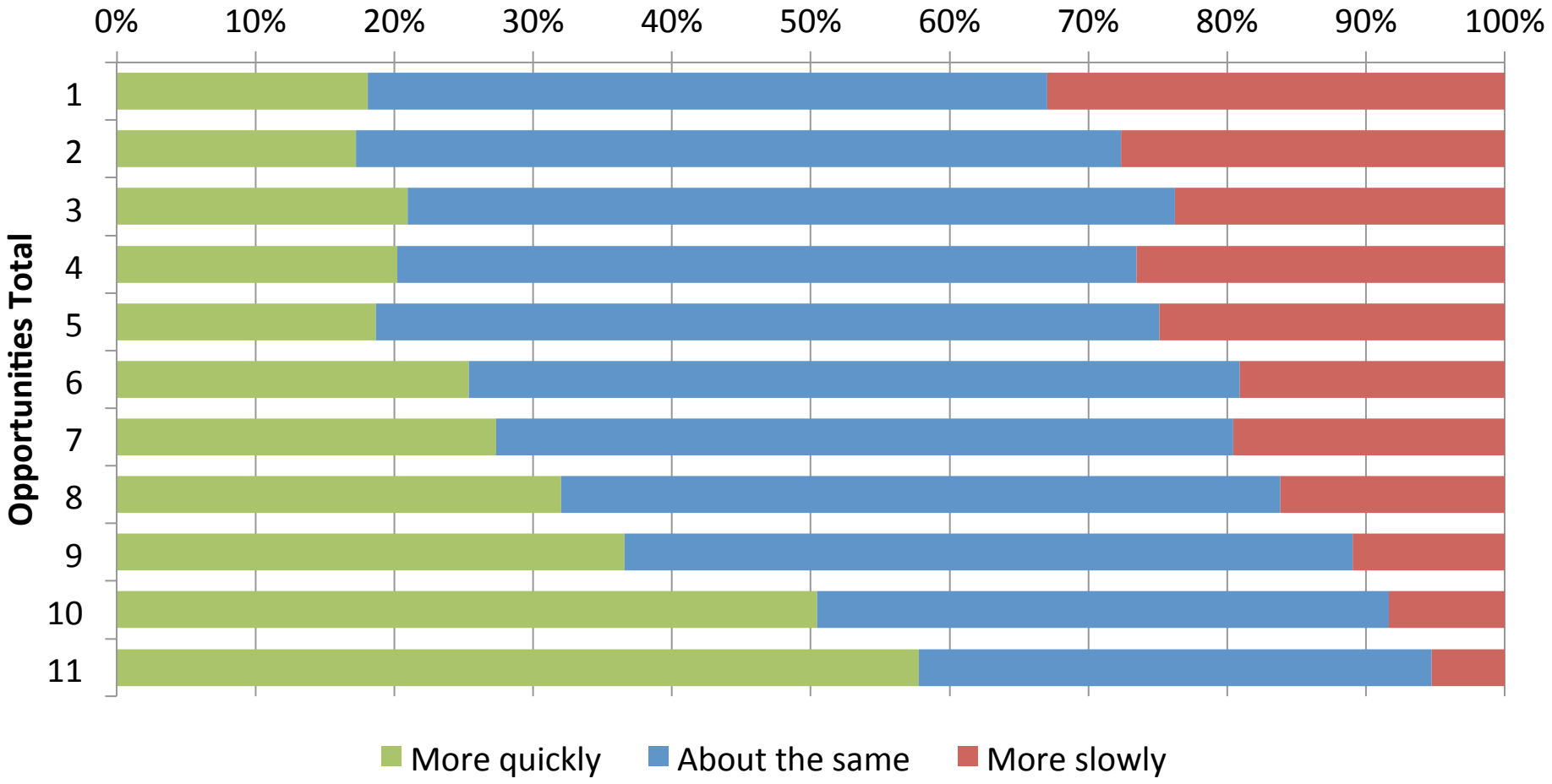
Global Survey of Physicists

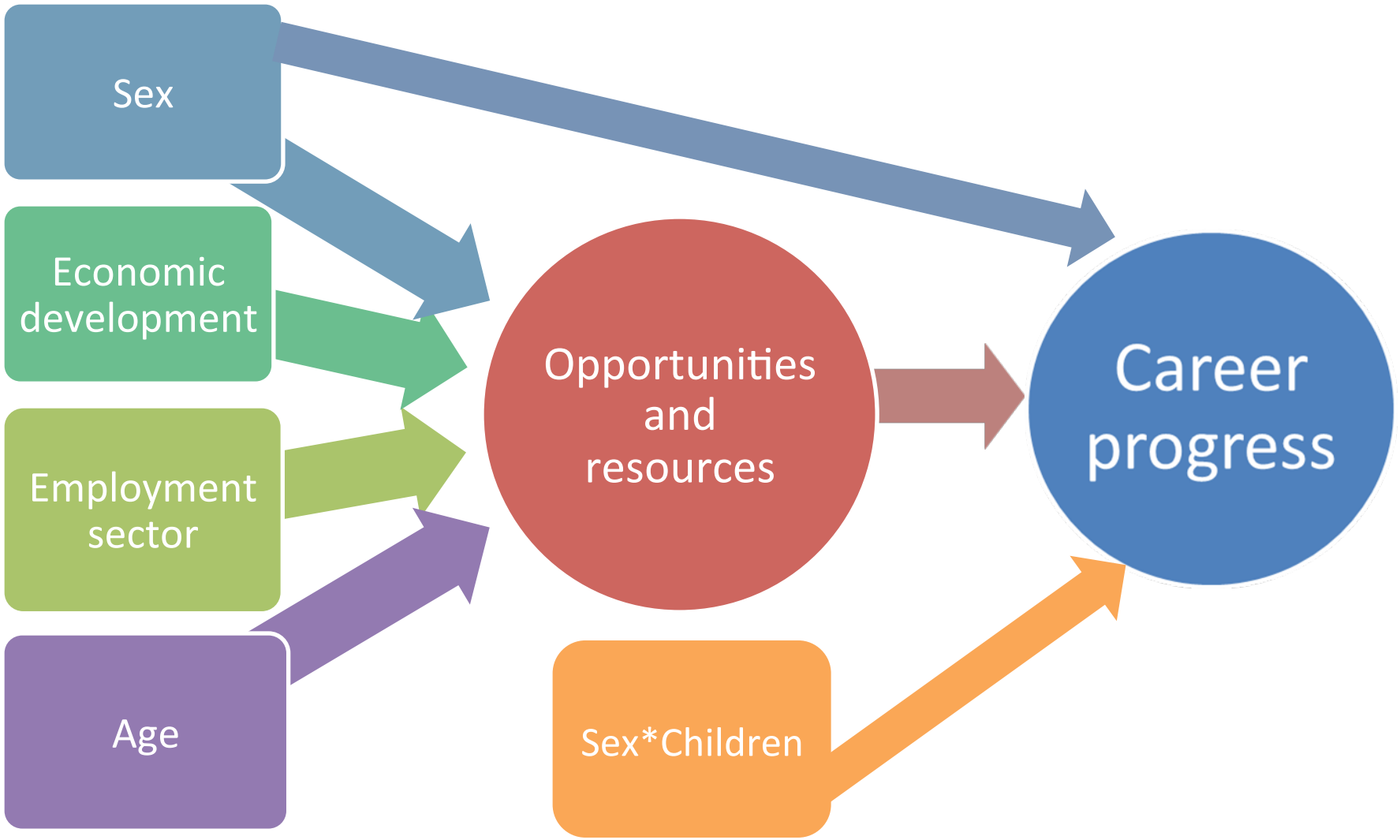


Relationship between career progress and resources

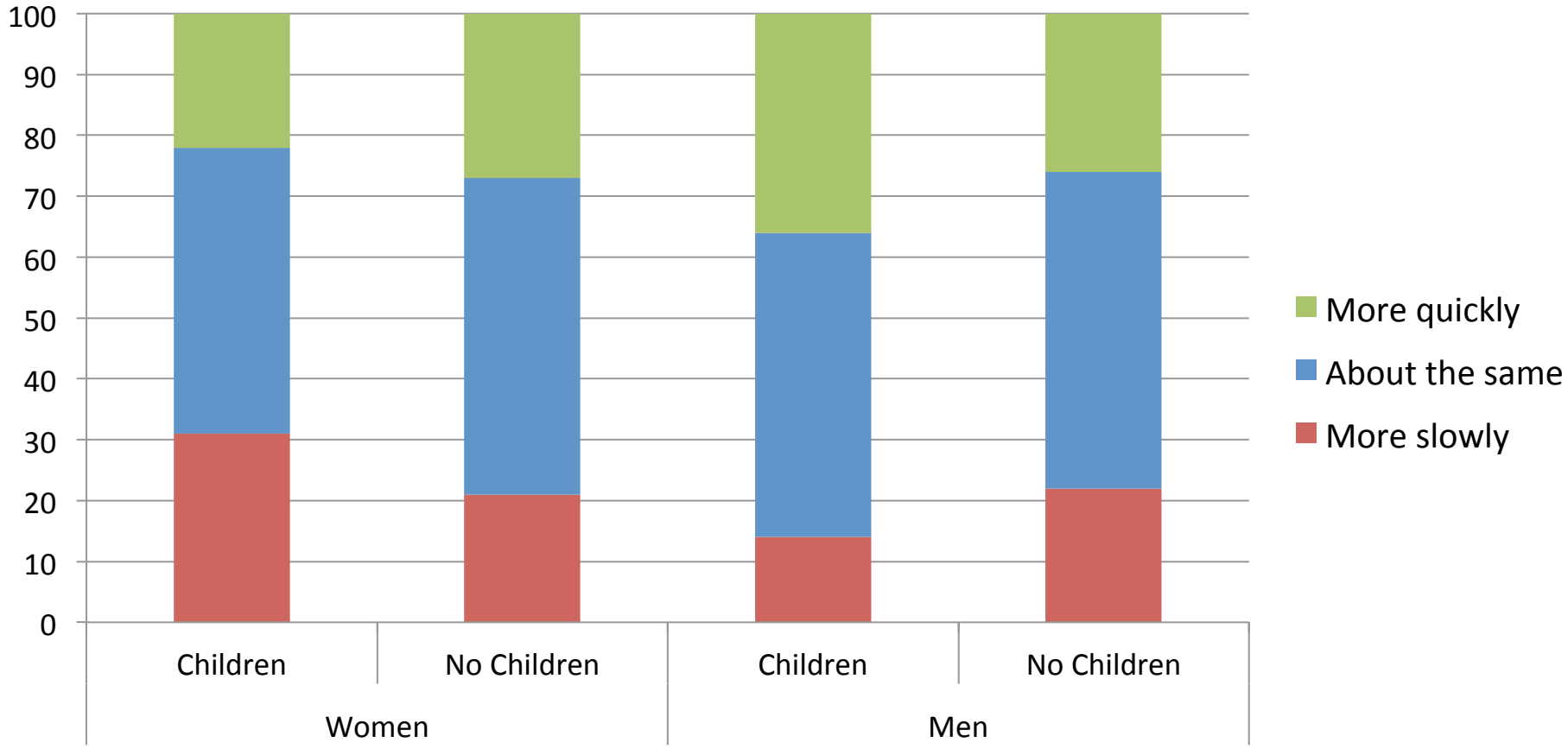


Relationship between career progress and opportunities




Sex
Economic development
Employment sector
Age
Opportunities and resources
Sex*Children
Career progress

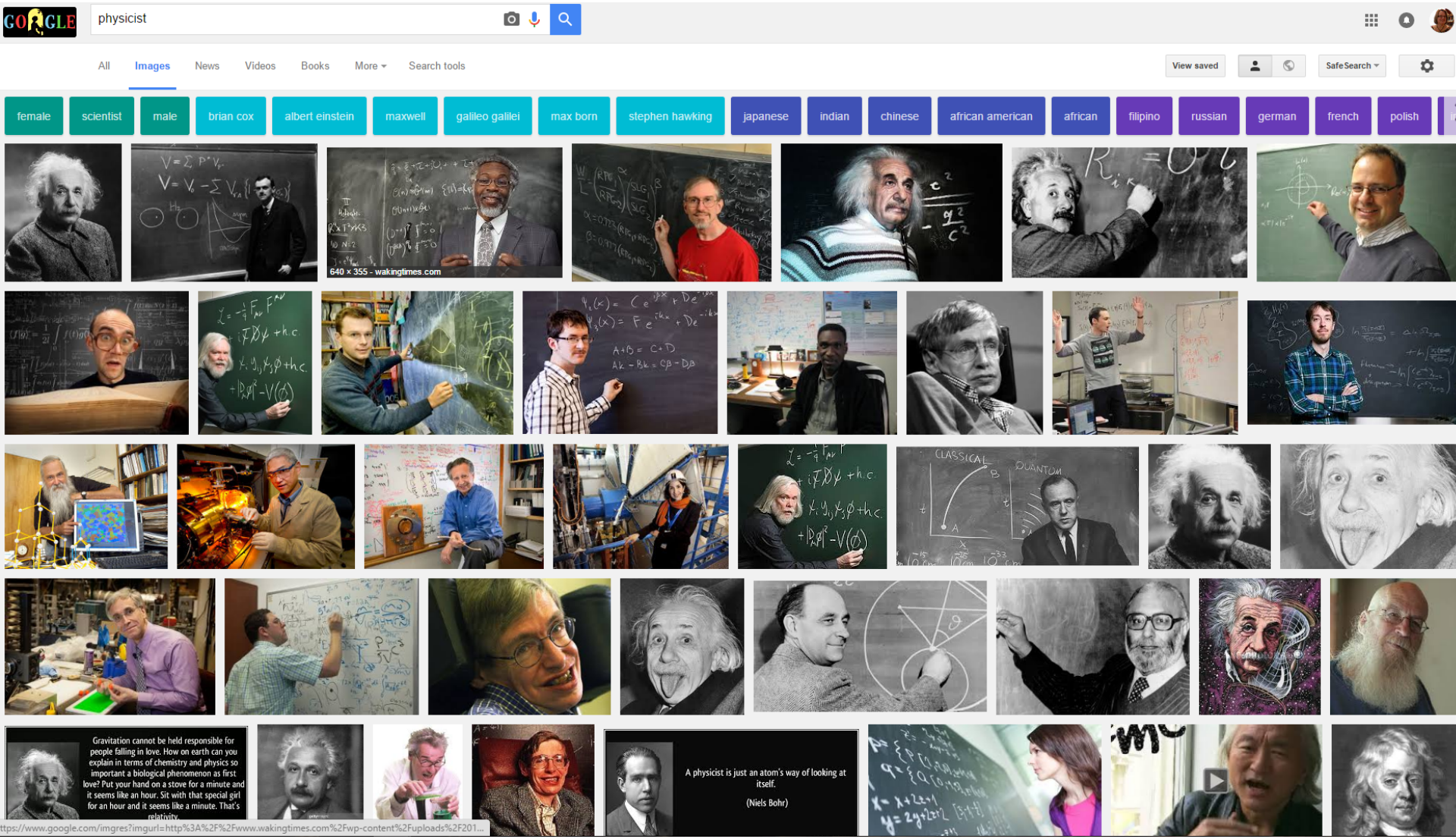
Compared to colleagues, how quickly have you progressed in your career?



Thanks to my colleagues Susan White and Patrick Mulvey

For more information

Rachel Ivie
Director
Statistical Research Center
301-209-3081
rivie@aip.org

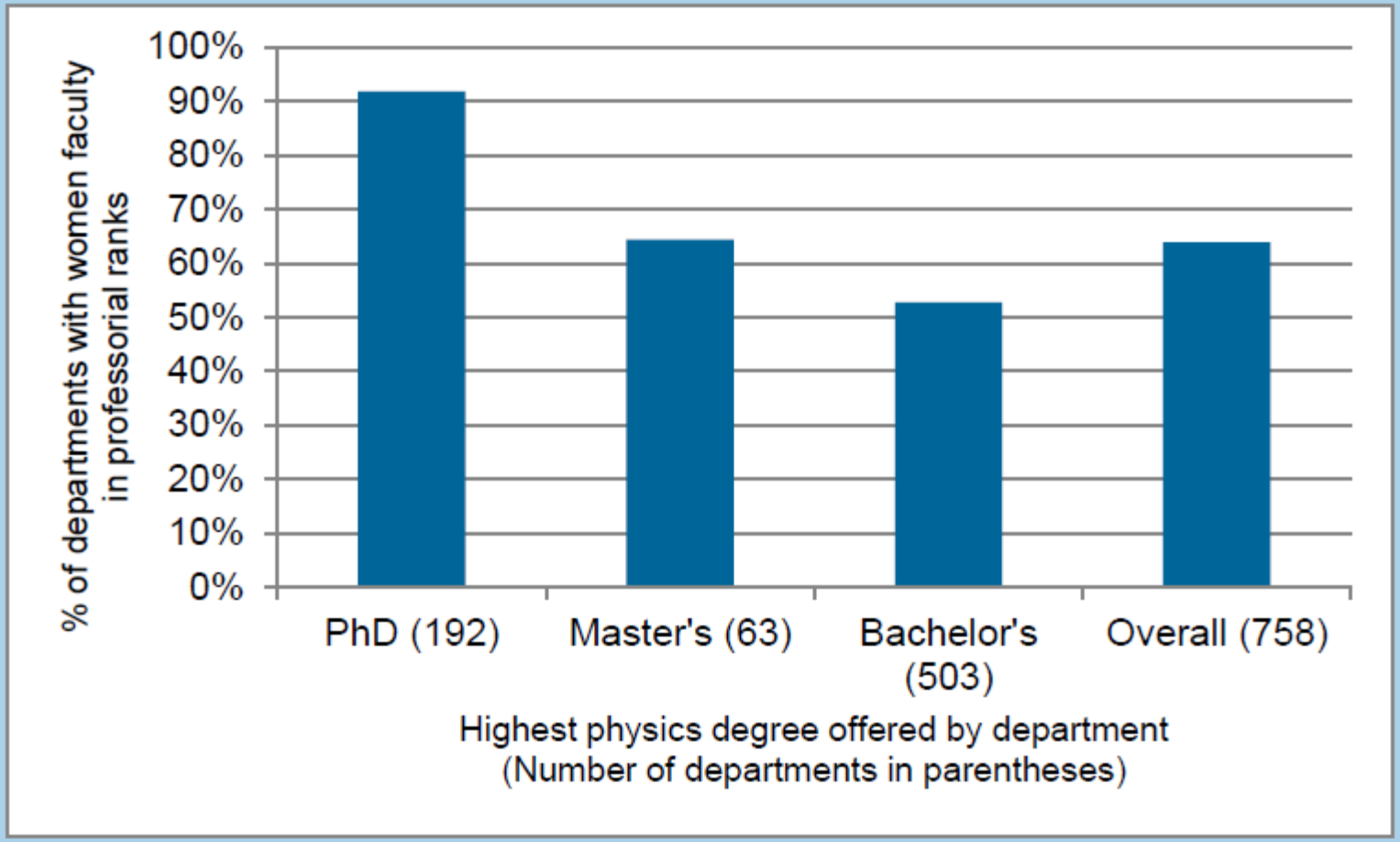

physicist
All
Images
News
Videos
Books
More
Search tools
View saved
SafeSearch
female
scientist
male
brian cox
albert einstein
maxwell
galileo galilei
max born
stephen hawking
japanese
indian
chinese
african american
african
filipino
russian
german
french
polish
640 × 355 - wakingtimes.com
CLASSICAL
QUANTUM
Gravitation cannot be held responsible for people falling in love. How on earth can you explain in terms of chemistry and physics so important a biological phenomenon as first love? Put your hand on a stove for a minute and it seems like an hour. Sit with that special girl for an hour and it seems like a minute. That's relativity.
A physicist is just an atom's way of looking at itself.
(Niels Bohr)
https://www.google.com/imgres?imgurl=http%3A%2F%2Fwww.wakingtimes.com%2Fwp-content%2Fuploads%2F201...

Percentage of Newly-Hired Physics Faculty Who Are Women

by Academic Rank	Year 2006	2008	2010
	(%)	(%)	(%)
Full Professor	9	10	20
Associate Professor	8	20	14
Assistant Professor	25	22	29
Instructor / Adjunct	23	23	24
OVERALL	**22**	**21**	**26**

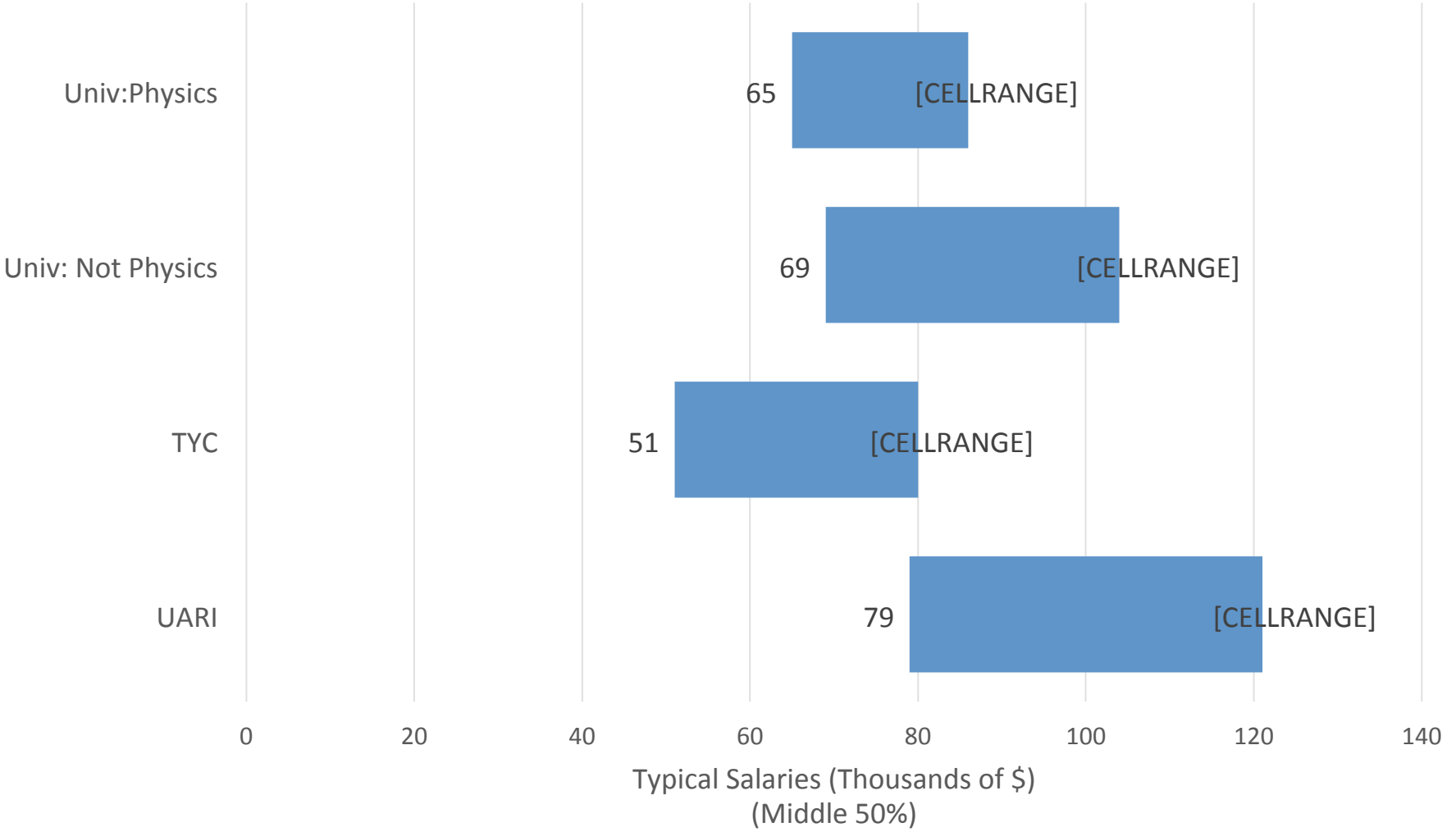
The year in the table refers to the spring semester; for example, 2010 represents the 2009-10 academic year.

Proportion of Physics Departments with Women Faculty by Highest Degree Granted, 2009-10 Academic Year

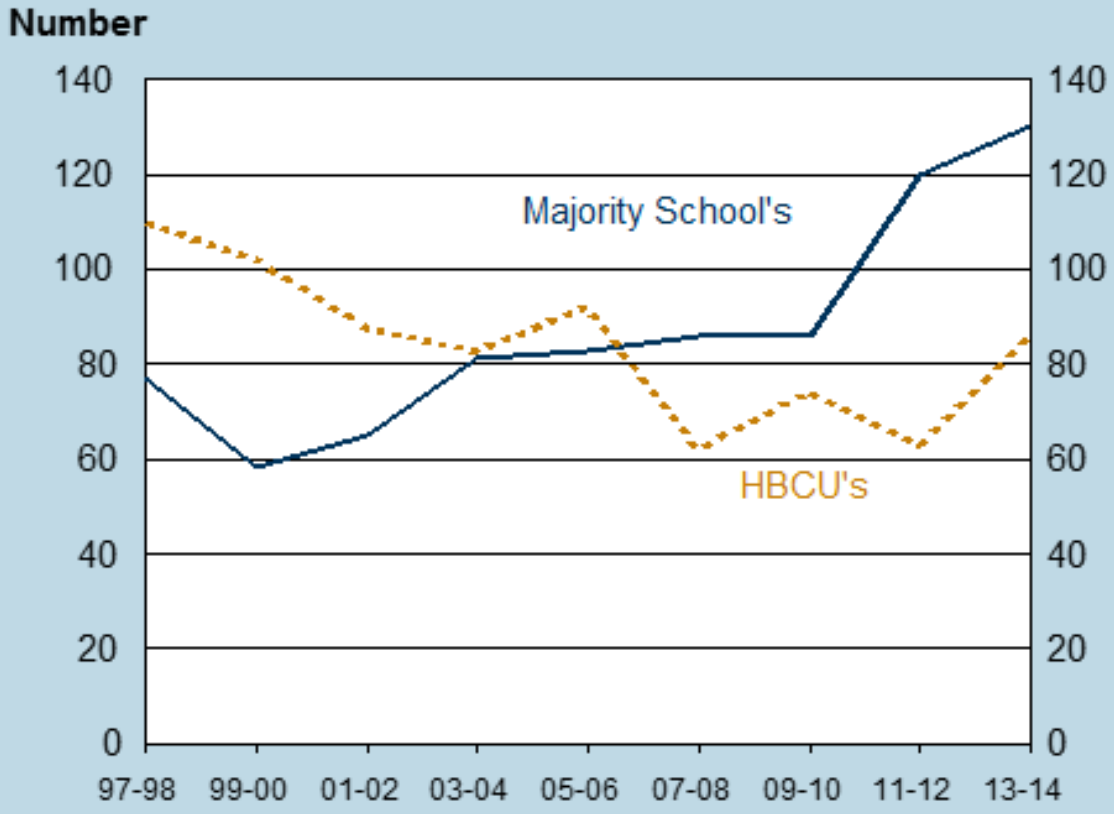


http://www.aip.org/statistics

Academic Salaries



Number of African Americans Receiving Physics Bachelor's Degrees, Classes of 1997 through 2014. (2-Year Average)



http://www.aip.org/statistics

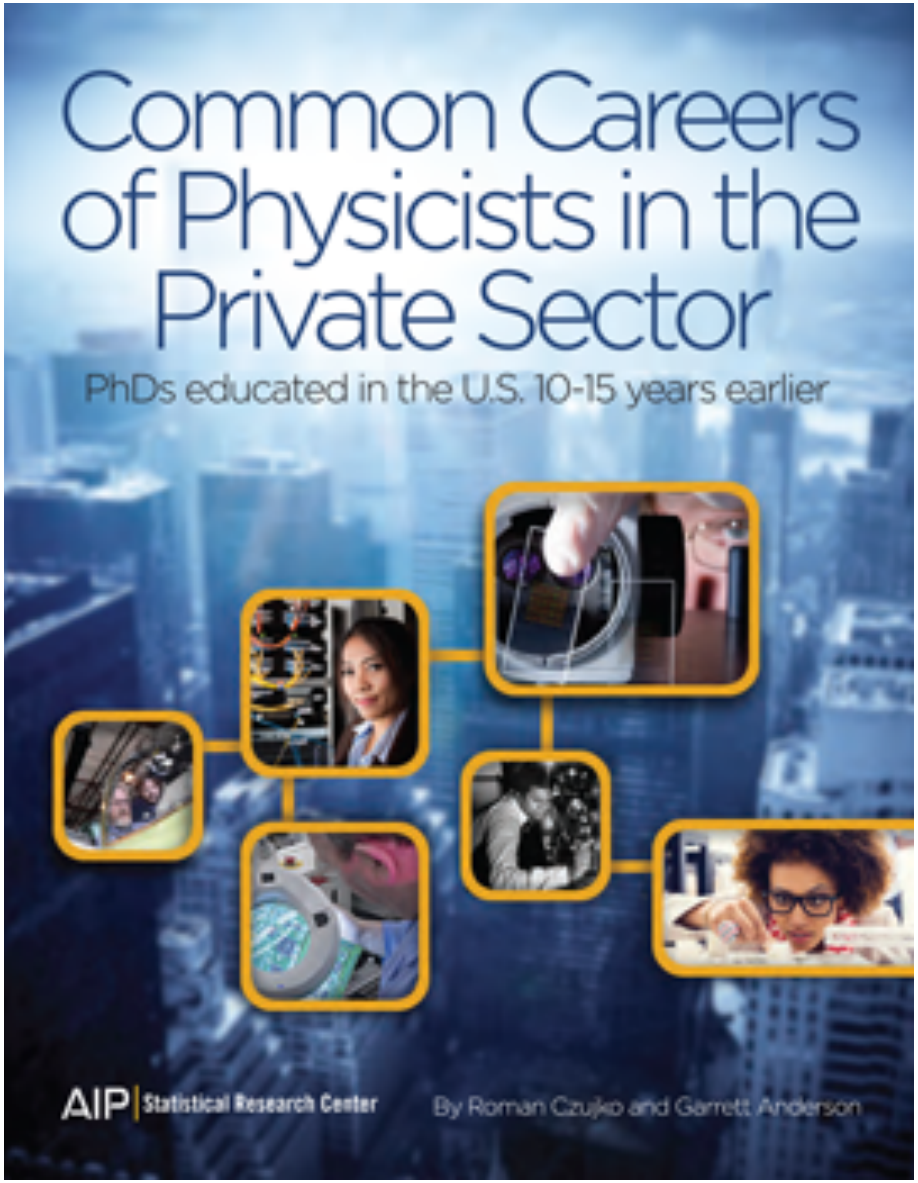
Departments Averaging 3 or More African American Physics Bachelor's Per Year, Classes of 2012 through 2014.

	Annual Average
Morehouse College (GA)*	10
Dillard U (LA)*	6
Delaware State U*	4
Hampton U (VA)*	4
North Carolina A&T State U*	4
U of Arkansas, Pine Bluff*	4
U of Maryland, College Park	4
Xavier U (LA)*	4
Florida A&M U*	3
Grambling State U (LA)*	3
Jackson State U (MS)*	3
Mass Inst of Tech (MIT)	3

List includes only those departments that contributed degree data for all 3 years.

***Historically Black College and University**

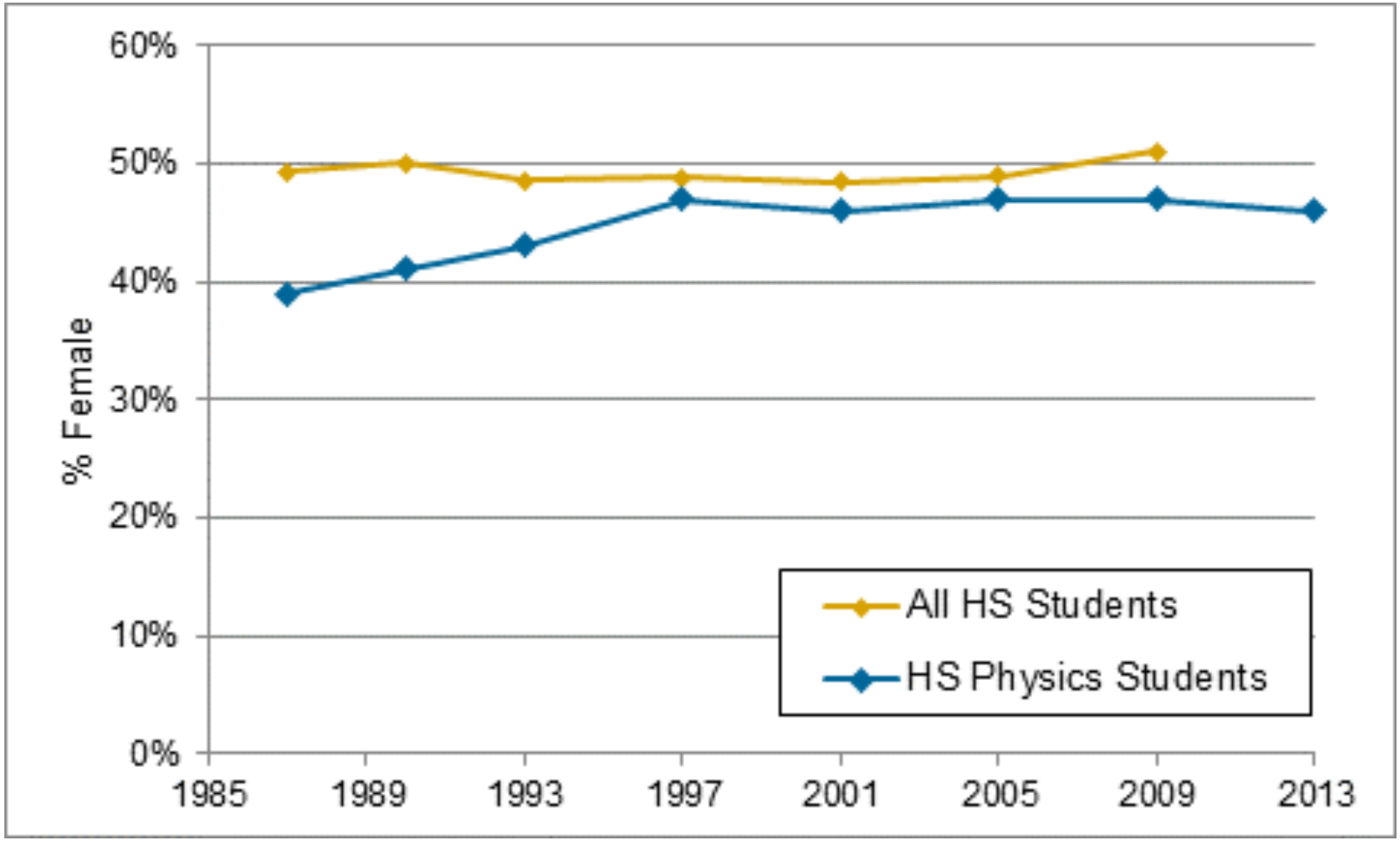
http://www.aip.org/statistics


Common Careers of Physicists in the Private Sector
PhDs educated in the U.S. 10-15 years earlier
AIP | Statistical Research Center
By Roman Czujko and Garrett Anderson

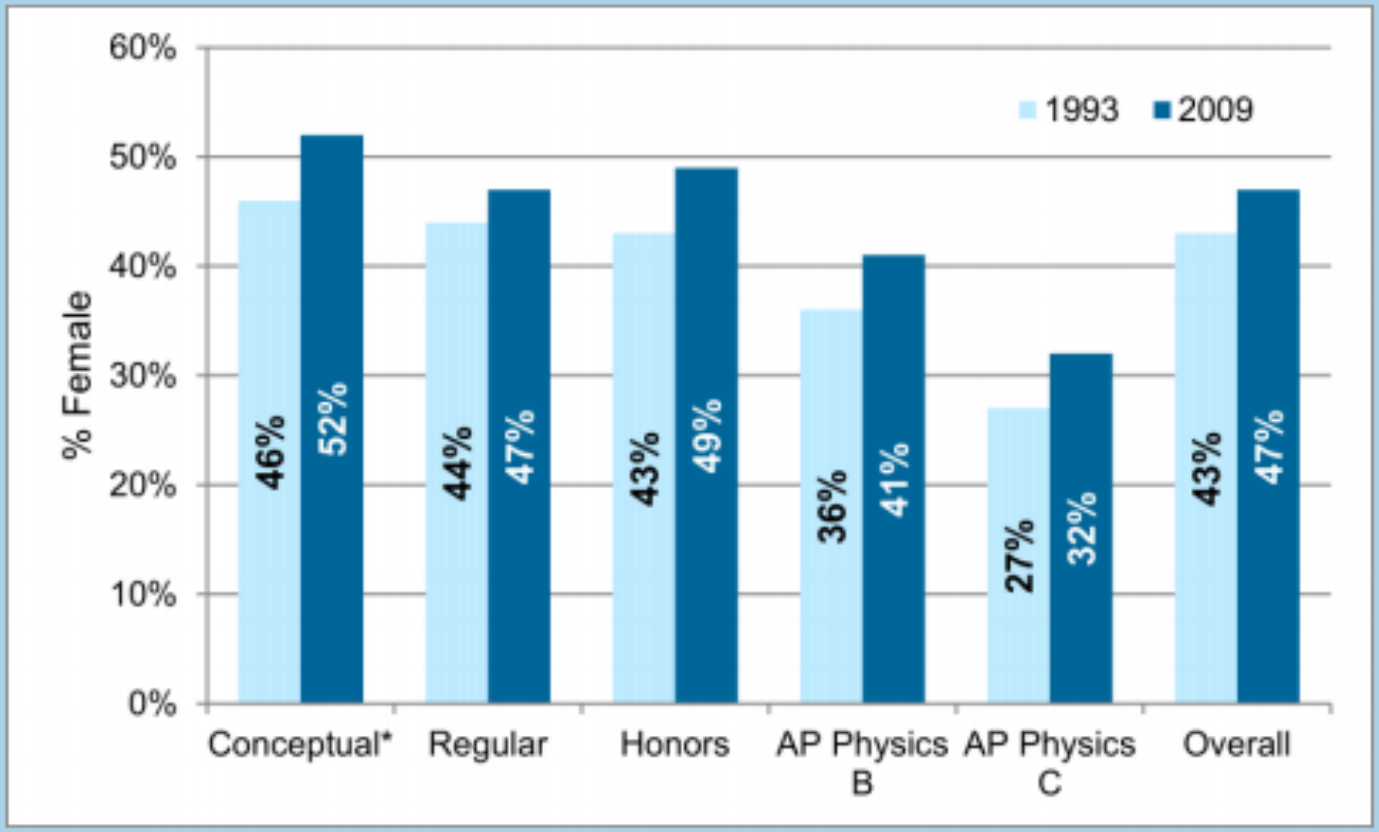
PRIMARY TYPES OF CAREERS IN PRIVATE SECTOR

Top eight primary types of careers that mid-career physicists chose to pursue in the private sector:

- –self-employed
- –finance
- –government contractors,
- –primarily engaged in engineering
- –primarily engaged in computer science
- –primarily engaged in physics
- –primarily engaged in other STEM fields
- –not working in a STEM field.


60%
50%
40%
30%
20%
10%
0%
% Female
1985
1989
1993
1997
2001
2005
2009
2013
All HS Students
HS Physics Students

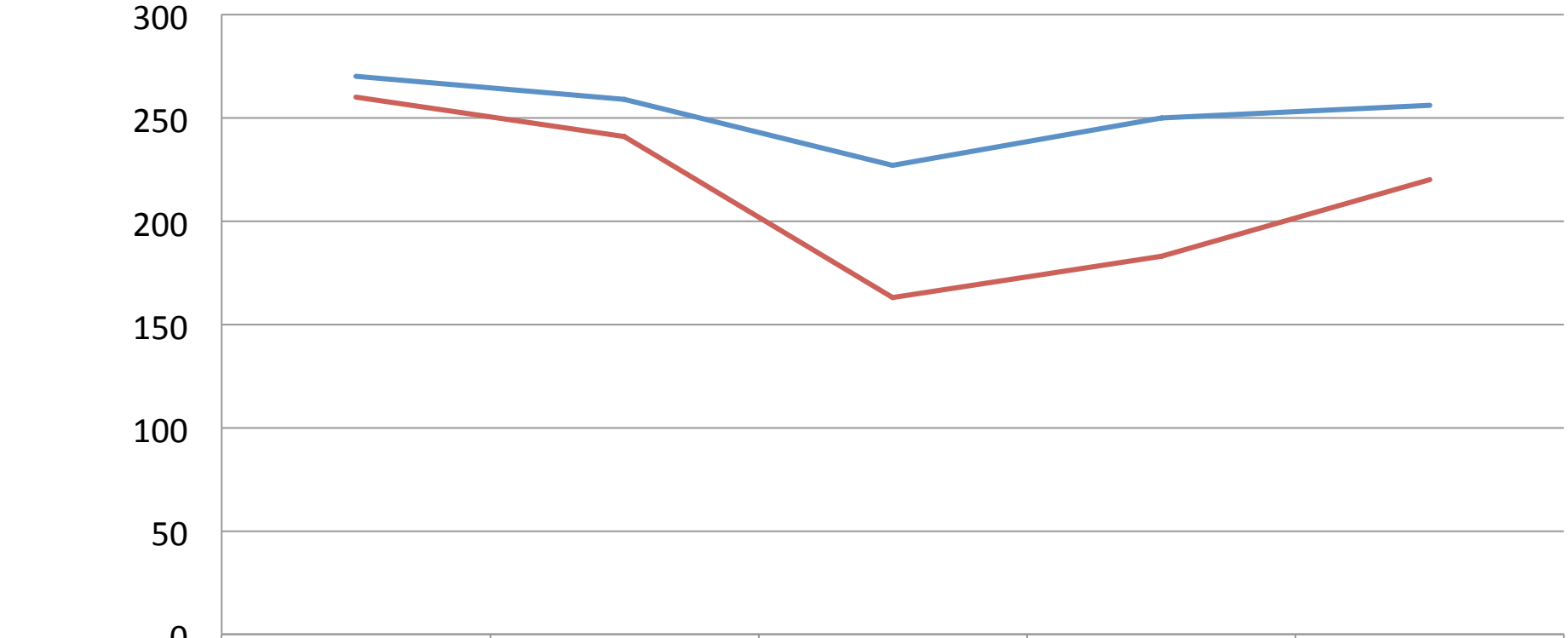
Representation of Female Students among Physics Students by Type of Course
All US High Schools



* Includes data for both Physics First and Conceptual Physics for 2009; Physics First data was not collected separately in 1993

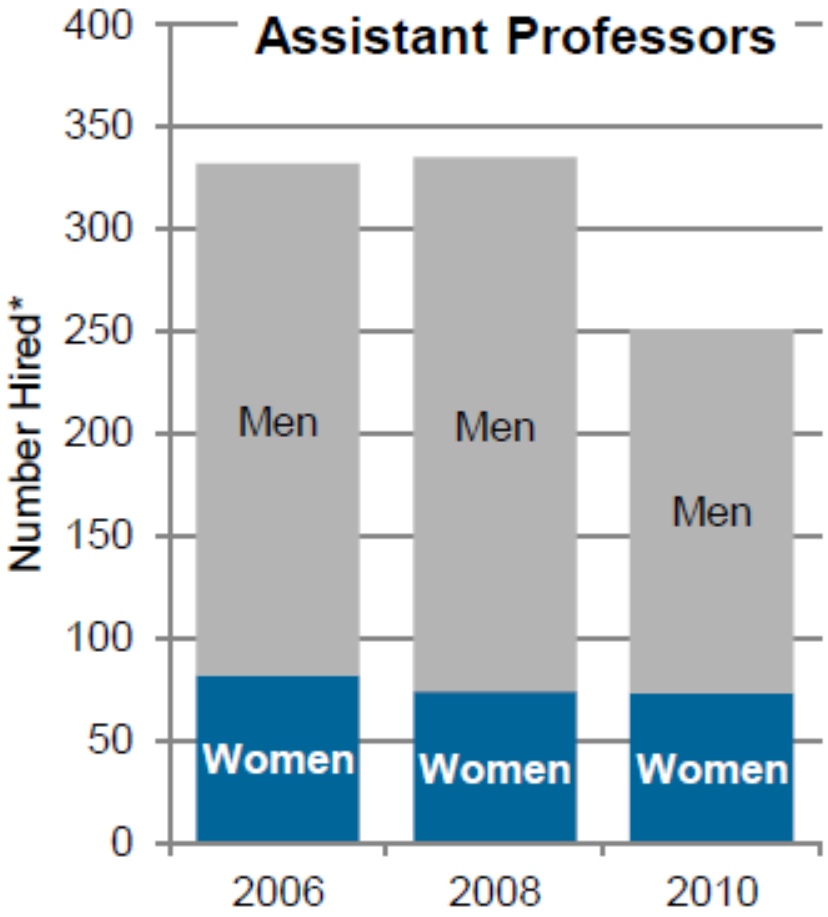
http://www.aip.org/statistics

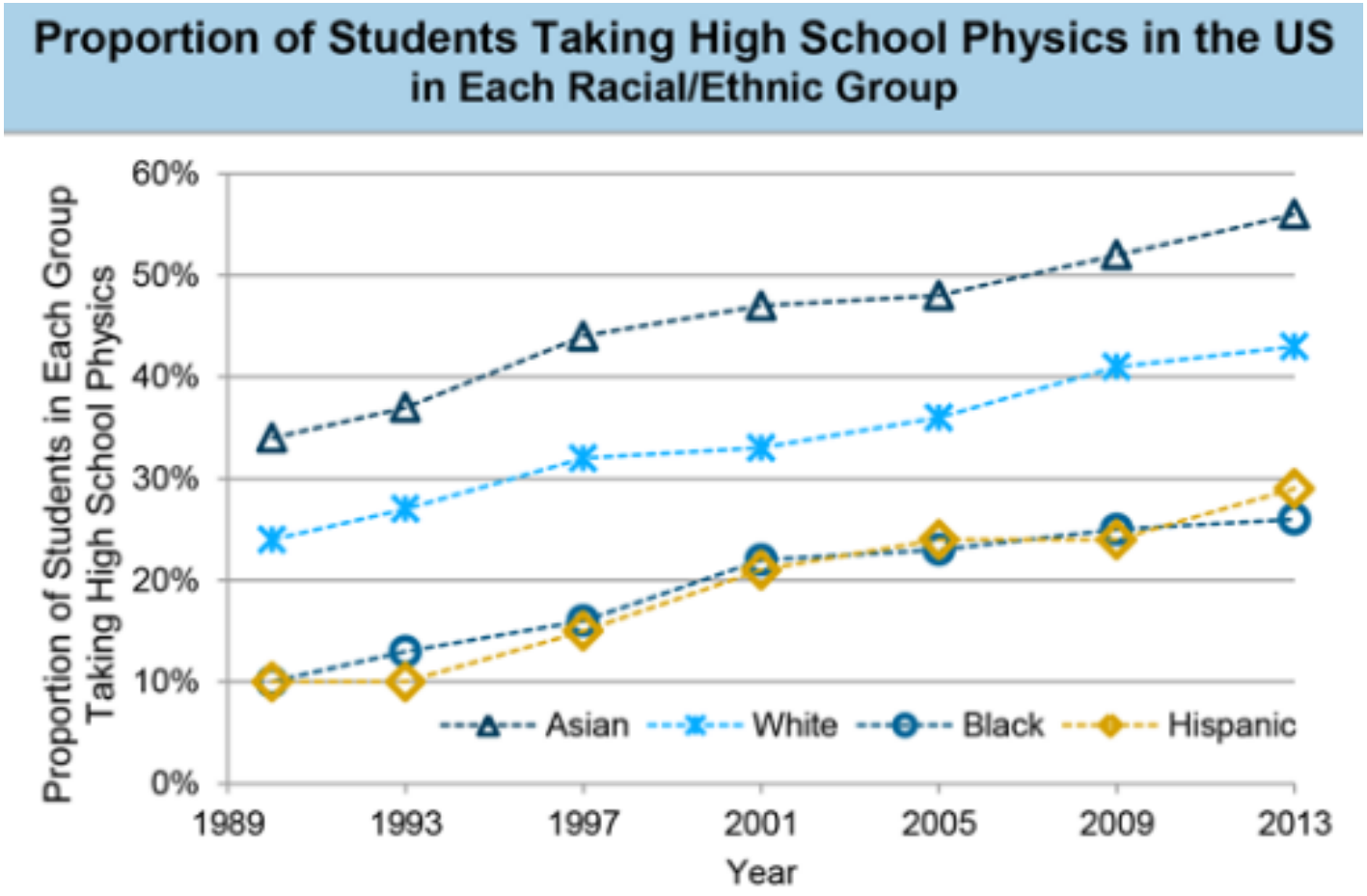
Number of New Hires in Physics Departments



	2006	2008	2010	2012	2014
Bachelor's	270	259	227	250	256
PhD	260	241	163	183	220

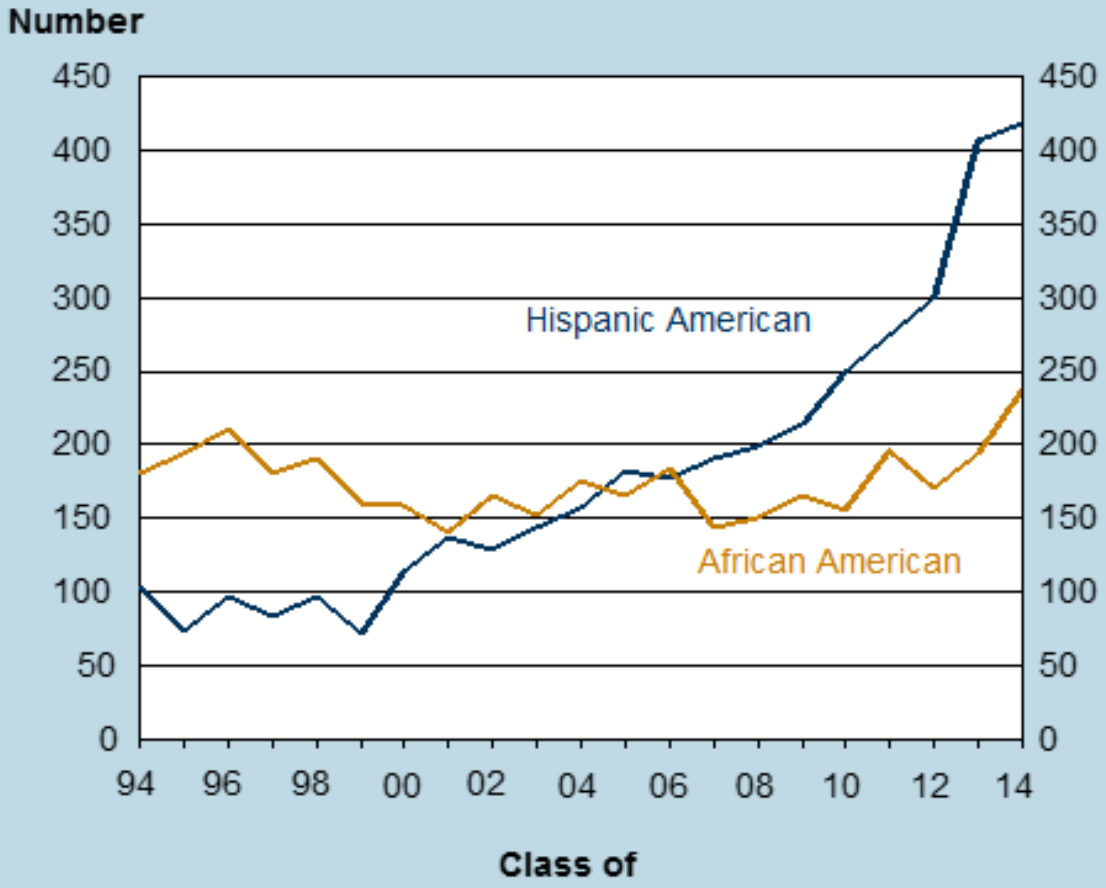
Men and Women among Newly-Hired Physics Assistant Professors





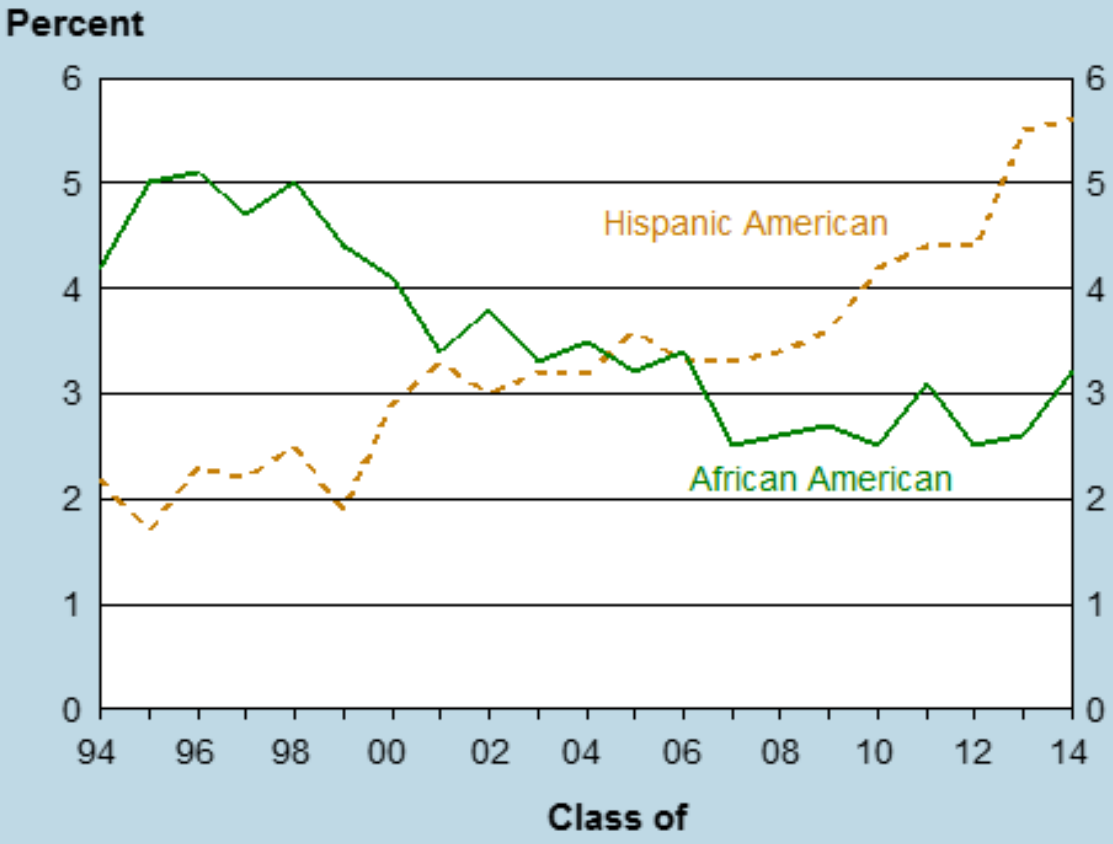
A closer examination of the data reveals that these differences are likely driven more by socioeconomic factors than by race.

Number of Physics Bachelor's Degrees Earned by African Americans and Hispanic Americans, Classes of 1994 through 2014.



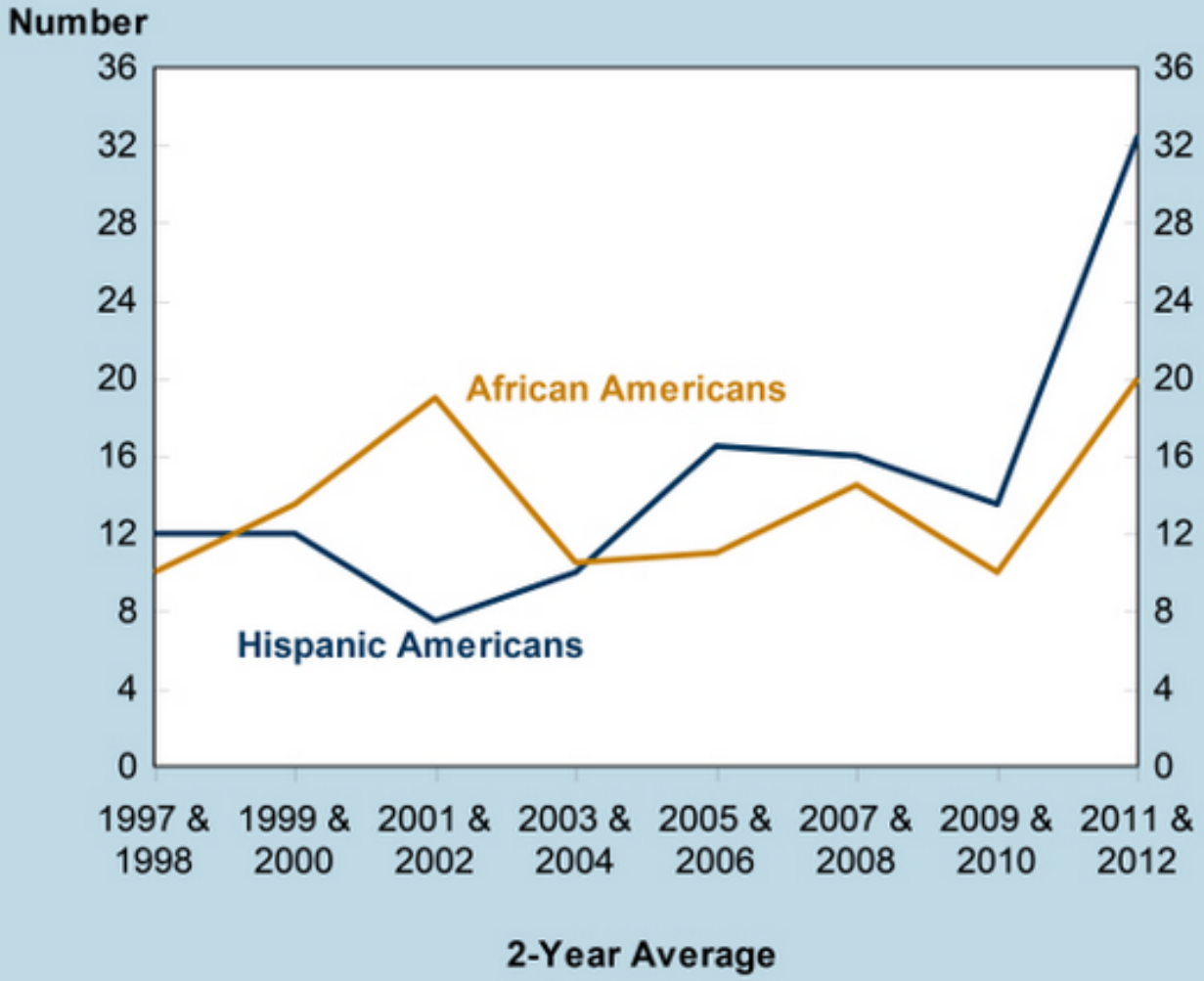
http://www.aip.org/statistics

Percent of Physics Bachelor's Degrees Earned by African Americans and Hispanic Americans, Classes of 1994 through 2014.



http://www.aip.org/statistics

Number of Physics Doctorates Earned by African Americans and Hispanic Americans, Classes of 1997 through 2012.

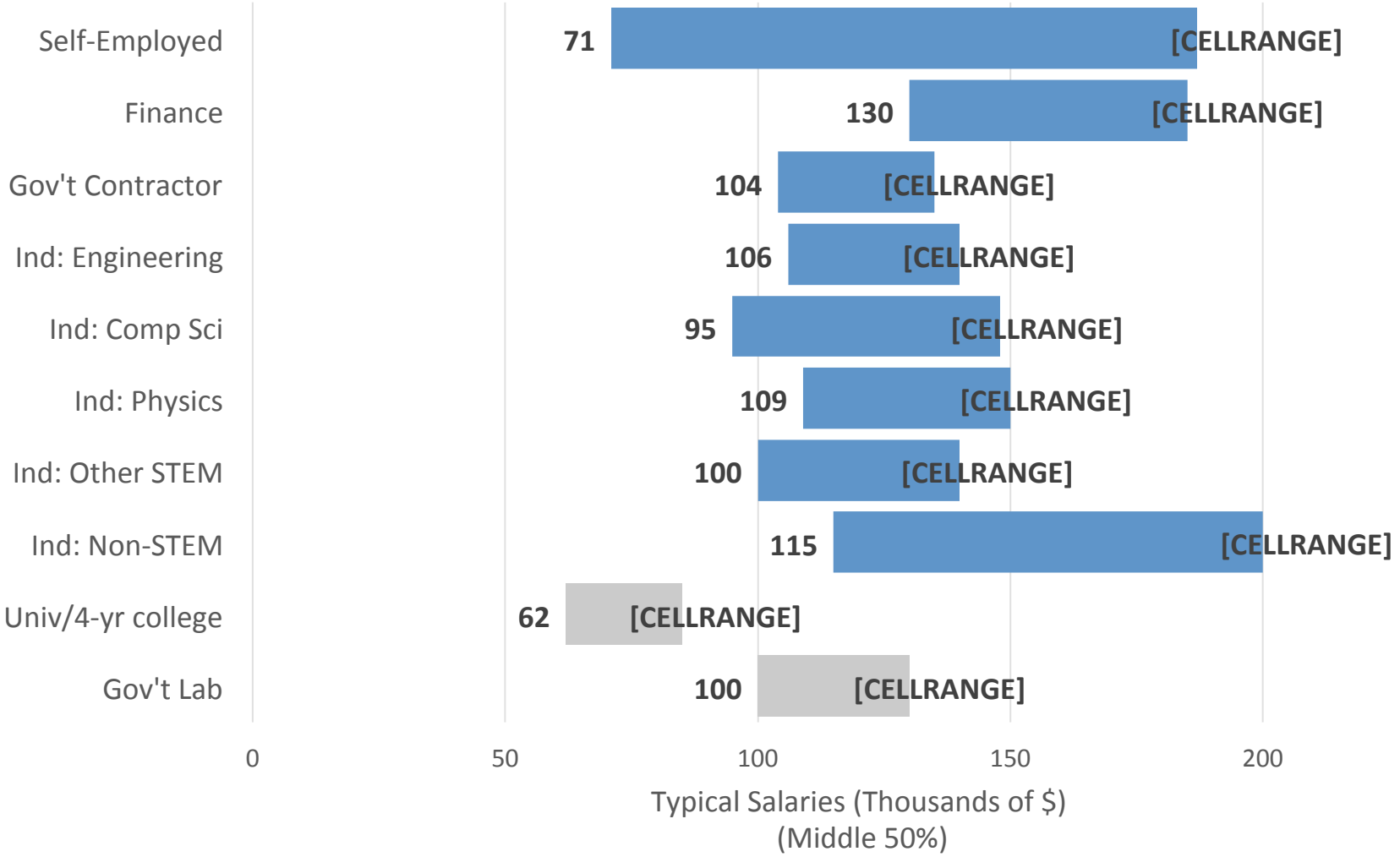


Number of Physics Departments with African-American and Hispanic Faculty by Highest Degree Awarded, 2012

Number of Departments that have ...	Highest Degree Awarded PhD	Master's	Bachelor's	Total
both African-American & Hispanic faculty	16	3	8	27
African-American faculty (and no Hispanic faculty)	18	10	45	73
Hispanic faculty (and no African-American faculty)	76	22	53	151
neither African-American nor Hispanic faculty	82	26	387	495
Total	192	61	493	746

www.aip.org/statistics

Salaries


Self-Employed
71
[CELLRANGE]
Finance
130
[CELLRANGE]
Gov't Contractor
104
[CELLRANGE]
Ind: Engineering
106
[CELLRANGE]
Ind: Comp Sci
95
[CELLRANGE]
Ind: Physics
109
[CELLRANGE]
Ind: Other STEM
100
[CELLRANGE]
Ind: Non-STEM
115
[CELLRANGE]
Univ/4-yr college
62
[CELLRANGE]
Gov't Lab
100
[CELLRANGE]
0
50
100
150
200
Typical Salaries (Thousands of $)
(Middle 50%)