Interesting Things Learned from WIA II

Stefanie Wachter, Luisa Rebull, & Jennifer Karr

http://spider.ipac.caltech.edu/staff/rebull/womensci.html

Historical Background

- 1st Workshop on "Women in astronomy" on September 8 – 9 1992 at STScI, Baltimore, MD
- Baltimore charter adopted by AAS
- AAS Committee on Status of Women in Astronomy (CSWA) established in 1979

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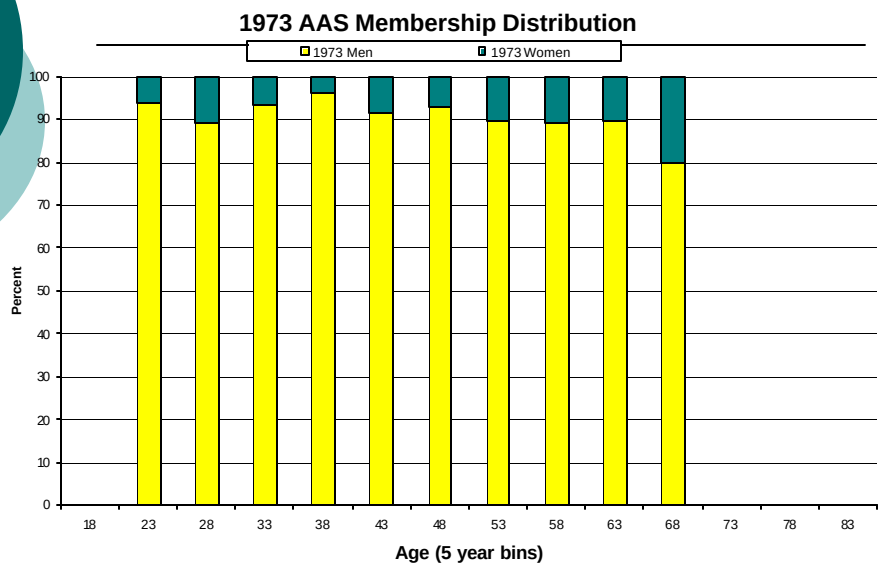
Demographics - 1973



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Slide by Kevin Marvel- AAS Deputy Executive Officer

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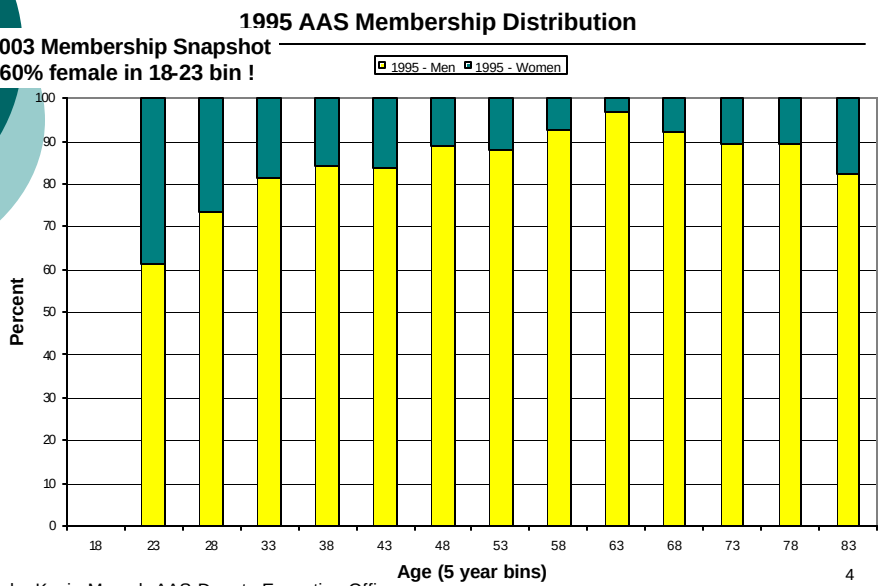
Demographics - 1995

2003 Membership Snapshot
~60% female in 18-23 bin !



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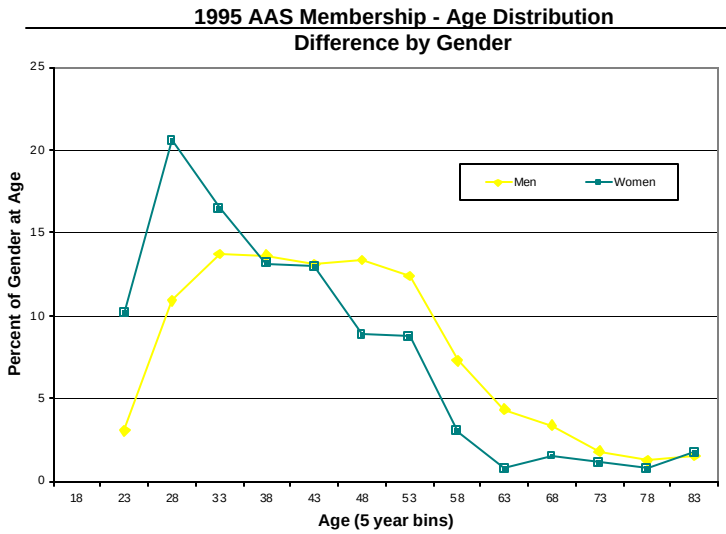
Demographics - 1995



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AAS Awards by Gender

	As of 1990			Since 1990		
	men	women	% women	men	women	%women
Russel	43	2	4.6	13	1	8
Warner	38	1	2.6	13	0	0
Pierce	18	3	17	12	4	33
Tinsley	3	1	33	8	0	0
Heineman	11	1	9	13	0	0

Russel – lifetime achievement, **Warner** – early career observational/theoretical, **Pierce** – early career observational, **Tinsley** – especially innovative research, **Heineman** – outstanding work in astrophysics

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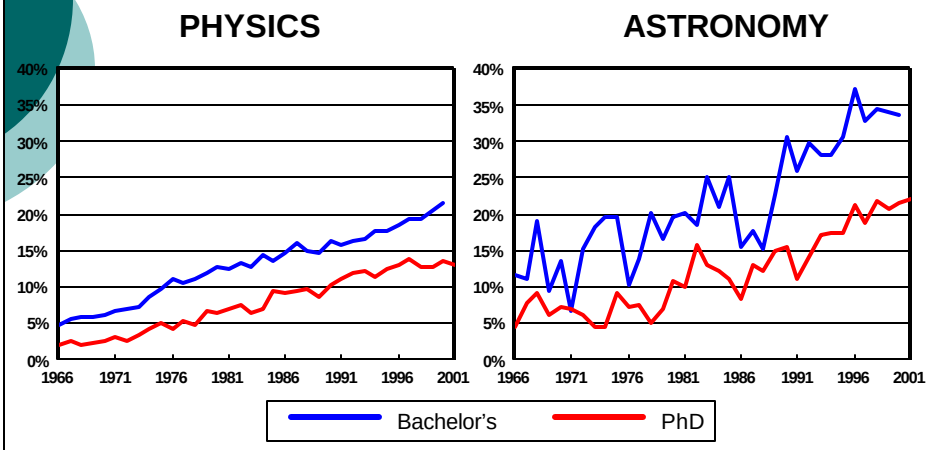
Percent of Bachelor's and PhD Degrees Earned by Women in Physics and Astronomy, 1966-2001



Slide by Rachel Ivie, AIP

Sources: National Science Foundation and National Center for Education Statistics. Bachelor's degree data for Academic Years 1999 and 2001 were not available. Compiled by AIP Statistical Research Center.

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Current Statistics

- In US (2002), women earn
  - >50% of all Bachelor's degrees
  - >40% of all PhDs
- In physics, women earn
  - 23% of all Bachelor's degrees
  - 13% of all PhDs
- In Astronomy, women earn
  - 34% of all Bachelor's degrees
  - 22% of all PhDs

Slide by Rachel Ivie, AIP

Sources: National Science Foundation, National Center for Education Statistics, and AIP. Compiled by AIP Statistical Research Center.

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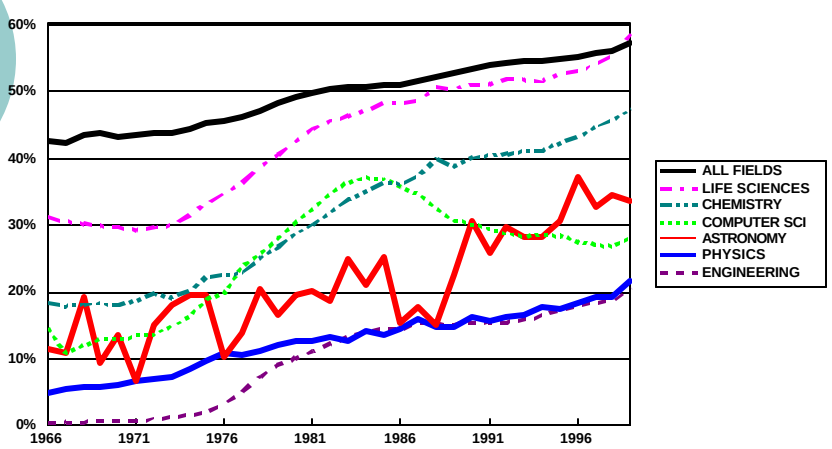
Percent of Bachelor's Degrees Earned by Women in Selected Fields, 1966-2000



Slide by Rachel Ivie, AIP

Source: National Center for Education Statistics. Data for Academic Year 1999 were not available. Compiled by AIP Statistical Research Center.

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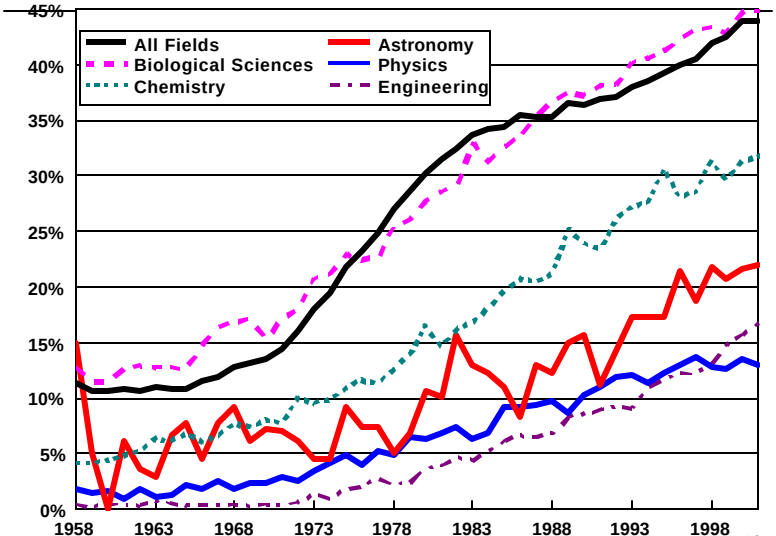
Percent of PhDs Earned by Women in Selected Fields, 1958-2001



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

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Percent of Faculty Positions in Astronomy and Physics Held by Women

Academic rank	Astronomy (2003)	Physics (2002)
Full professor	10	5
Associate professor	23	11
Assistant professor	23	16
Instructor/adjunct	15	16
Other ranks	15	13
Overall	14	10

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Source: AIP Statistical Research Center.

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Representation of Women Astronomy Faculty Compared to Percentage Earning PhDs

	Mean Years since PhD (2002)	**% PhDs to Women at that time**	**% Women Faculty, 2002 AIP/CSWA**
Full Professor	27	9 *(1975)*	10 (10)
Associate Professor	17	11 *(1985)*	23 (25)
Assistant Professor	7	17 *(1995)*	23 (17)

Source: AIP Statistical Research Center.

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Success is relative…

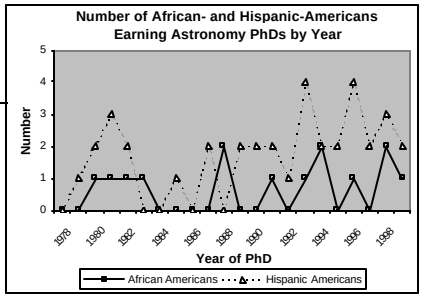
School	Rank	% women 1992	% women 1999	% women 2003
Columbia University	Asst. profs	33.3%	37.5%	42.9%
	Assoc. profs	33.3%	16.7%	14.3%
	Full profs	0%	10%	21.4%
Cornell University	Asst. profs	0%	0%	0%
	Assoc. profs	0%	0%	0%
	Full profs	7.1%	5.9%	5.0%

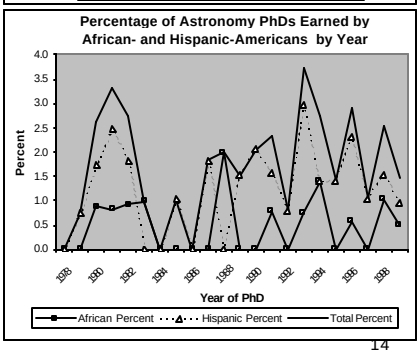
Stats from http://www.ruf.rice.edu/~jhoffman/stats/

Status of Minorities

- Order-of-magnitude issue:
  - 25% of population
  - 2-3% of astronomy faculty
  - PhD rate unchanged in 25 years

CSMA website:
http://www.astro.wisc.edu/csma/





Slide by Keivan Stassun

Summary of Statistics

- Overall percentage of professional women in astronomy still relatively low (22% of PhDs, 14% of faculty), but number of women entering the field appears to be increasing (>50% of youngest AAS members).
- Women possibly underrepresented among AAS award recipients.
- There appears to be no **overall** "leaky pipeline"! But large variations from department to department, small number statistics.
- Extreme under-representation of minorities: 25% of population, 2-3% of astronomy faculty.

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Highlights and Recurring Themes 1

- This conference had lots of people *who weren't astronomers* sharing knowledge, experience from other fields.
- Several phrases or themes kept reappearing…

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Highlights and Recurring Themes 1

- Women are rarely found in the pool of tenured faculty in the sciences, due to both 'chance' and 'choice' (1)
  - To get there, it requires a 'perfect trajectory,' and any serious event (illness for yourself or in the family, baby, etc) can throw you off. The consequences of "real life situations" fall disproportionately on women.
  - Academic life does not mesh well with family life; both academia and parenthood are 'all-consuming.'
  - Active discouragement of people who want to teach; people who want to teach tend to leave. (People who want to "make a difference" tend to want to teach…)

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Highlights and Recurring Themes 1

- Women are rarely found in the pool of tenured faculty in the sciences, due to both 'chance' and 'choice' (2)
  - In chemistry, women who get their PhD's from "top tier" schools rarely return to academia.
  - Culture of academia is "broken" and unappealing – for everyone, not just women. (Why would *anyone* be a professor?)
  - Given all of this, women tend to have more openness to other options; when chances come along, women will take the plunge and try something different. (Serendipity rather than by design.)
  - Is it possible to "fix" the culture?

Highlights and Recurring Themes 1

- Science is an ‘anomic’ profession.
  - “Anomie” is a social situation in which rules for behavior are unclear, arcane, shifting, missing, and/or conflicting, with shifting boundaries.
  - You can never give enough. (Parenthood is also like this.)
  - This sort of situation statistically tends to benefit men over women.

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Highlights and Recurring Themes 1

- What to do about ‘anomie.’
  - Clear and well-defined criteria for hiring, promotion (and everything else, like computer upgrades).
  - Standardize processes, make them open and transparent.

Highlights and Recurring Themes 1

- Gender schemas (preconceptions) affect everyone, everywhere.
  - Studies suggest that we can't adequately assess something as quantitative as heights of people (Valian talk) – how will we ever assess CVs? (Steinpreis et al 1999: psych profs prefer Brian's application to Karen's 2:1 even though they were identical!)
  - There is bias in EVERYTHING we do, from hiring process to interactions in meetings.
  - Bottom line: women tend to benefit less from their qualifications than men (everywhere).
  - Accumulations of little inequities – adds up!

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Highlights and Recurring Themes 1

- What to do about gender schemas
  - Educate ourselves and our colleagues. Helps to have more women in the pipeline, but not a solution in and of itself. Takes effort just to keep from losing ground.
  - Women believe it's a meritocracy, that it will come to us. It's not. Women: Go out and get it. (corollary: don't take rejection personally.) Men: Work to set up clear, open procedures that make it a meritocracy.
  - Women have trouble being seen as in charge, even when they are. If you are the manager of a woman manager, choose your words carefully, don't belittle (this will help her maintain authority).

Highlights and Recurring Themes 1

- Community needs training – where else will we learn?
  - Mentoring (and being mentored)
  - Public speaking, group psychology/behavior
  - Management, budgeting
  - Hiring/promotions processes
  - Confidence/negotiations/handling harassment (or other difficult situations)

Underrepresented Minorities (URM) in Astronomy

- ~ 25% of US population
- 2-3% in astronomy
- URM – Hispanic, African American, Native
- Number of PhDs flat over last 25 years
- Minority faculty typically at minority serving institutions
- Many graduates from community colleges (50%)
  - Transition to larger schools

Approaches and Recommendations

- Need long term relationships between recruiting grad schools and small colleges
- Connections and retention important at transitions
- Support for 'first-time' college/grad students
- Research based connections/summer programs
- Mentoring
- Policites don't work unless individuals and administration committed.

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Simple Changes

- Blind orchestra auditions
  - Women hired increased from 30-55%
- Carnegie Mellon computer science
  - Increased female admissions from 7-40%
    - removed programming experience prerequesite
    - just math SATs
  - Retention of female students
    - grading criteria from emphasis on 'flashy, unique' to 'portable, explainable, useable'
    - order of presentation (application then theory)

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Family and the Two-Body Problem

- A major concern for men as well as women
  - Effects generally fall more heavily on the women
  - Childcare/time committments/impact on career/parental care
- Synchronicity of the tenure and biological clocks
- No clear cut solution – some suggestions
  - Flexibility in hours/location
  - 'Core Hours'
  - Accessible, affordable childcare at all stages
  - Good medical coverage at all stages

Roots of Academic Culture

- Monastic Tradition
  - Devoting life to scholarship, study
  - Support structure for food/housing/clothes
  - Aesceticism
- Calvinist/Puritan legacy
  - Predestination – success an indication of God's favour
  - Lack of success suspect
- 19th century social Darwinism
  - Rugged individualism
- Science a pursuit of the nobility – leisure activity

General Themes

- To find out how the system does/doesn't work
  - Ask people who have left the system too
- Everyone has biases, preconceptions, 'schemas,' many of which they don't recognise themselves
  - People can be evaluated differently for the same qualifications/behaviour/position
  - Similar biases shown by men and women
- Small disadvantages can accumulate to produce a major impact

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General Themes

- The current system works for some people
  - Easier for some people to advance than others
  - People who stay are ones who adapted/fitted well with the current system
  - Doesn't mean that if the system doesn't work for someone that they are the problem
- Better if it worked for more people
  - Larger pool of people coming into the system
  - Larger variety of insights/talents →better research
- Supply of science and engineering professionals

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Thoughts from Jason S.

- Surprising statistics on the leaky pipeline – specifically that it seemed like if one corrected for the size of the applicant pool, it looked like the graduate/post-graduate pipeline did not leak significantly. Astronomy is much, much better than physics.
- Surprising AAS statistics on changes in AAS membership. Is the high % of women in the younger bins real?
- The "perfect trajectory" model of attaining faculty jobs– surprising that any one single-event upset is enough to derail someone permanently from the "idealized" career path.
- IPAC appears by most measures to be way better off than its peer institutions.

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Thoughts from Susan S.

- WIA 1: sheer number of women astronomers made more of an impression then: empowering. This not quite as much (too familiar now?).
- Also eye-opening to hear other women (both my age and older) openly talk about problems they've had as women. "Grin and bear it" means nothing changes.
- Both men and women are more aware of subtle (and not-so-subtle) discrimination now against women than they were a decade ago.
- The situation for minorities is still terrible and needs to be improved.
- Same problems were discussed at both meetings → progress is slow, but some strides have been made.
- Good to see some institutions taking improving the numbers of women and the climate seriously.
  - Important to publicly "out" those institutions that do an abysmal job of attracting and retaining women. Some of this "naming names" happened; need a punishment/reward system (meaning real $$$).
- Positive change must come from the leadership. Grass-roots helps, but for real improvements, attitudes and rules must be set by the leaders.
- Training can make a difference--for both men and women.
  - Management/budgeting, public speaking/style, hiring/interviewing, …
- We need to be able to have power.
  - "Prestige does not necessarily generate power." – Sheila Tobias
  - Administrative positions, although often seen negatively in academia, is one way to have power and influence.

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Reserve slides

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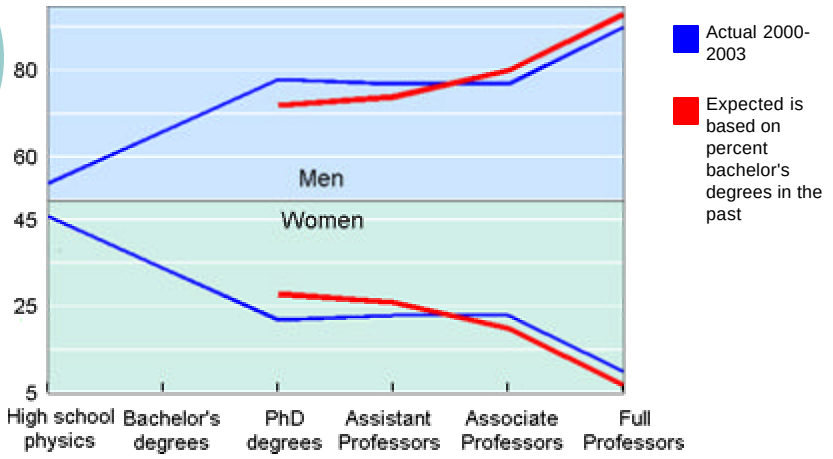
Actual and Expected Percentage of Women and Men in Astronomy in the US



Source: AIP Statistical Research Center.

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Columbia University, Department of Astronomy

ensci.html

1992	Men	%	Women	%
Grad Students	15	68.2	7	31.8
Postdocs	8	100.0	0	0.0
Asst Profs	4	66.7	2	33.3
Assoc Profs	2	66.7	1	33.3
Full Profs	7	100.0	0	0.0
Total PhDs	21	87.5	3	12.5

1999	Men	%	Women	%
Grad Students	17	77.3	5	22.7
Postdocs	7	100.0	0	0.0
Asst Profs	5	62.5	3	37.5
Assoc Profs	5	83.3	1	16.7
Full Profs	9	90.0	1	10.0
Total PhDs	26	83.9	5	16.1

2003	Men	%	Women	%
Grad Students	23	71.9	9	28.1
Postdocs	11	100.0	0	0.0
Asst Profs	4	57.1	3	42.9
Assoc Profs	6	85.7	1	14.3
Full Profs	11	78.6	3	21.4
Total PhDs	32	82.1	7	17.9

Cornell University, Department of Astronomy

1992	Men	%	Women	%
Grad Students	27	90.0	3	10.0
Postdocs	24	96.0	1	4.0
Asst Profs	2	100.0	0	0.0
Assoc Profs	4	100.0	0	0.0
Full Profs	13	92.9	1	7.1
Total PhDs	43	95.6	2	4.4

1999	Men	%	Women	%
Grad Students	19	63.3	11	36.7
Postdocs	20	76.9	6	23.1
Asst Profs	4	100.0	0	0.0
Assoc Profs	2	100.0	0	0.0
Full Profs	16	94.1	1	5.9
Total PhDs	42	85.7	7	14.3

2003	Men	%	Women	%
Grad Students	20	69.0	9	31.0
Postdocs	31	77.5	9	22.5
Asst Profs	1	100.0	0	0.0
Assoc Profs	2	100.0	0	0.0
Full Profs	19	95.0	1	5.0
Total PhDs	53	84.1	10	15.9

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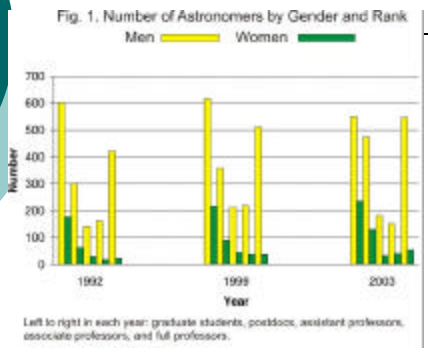
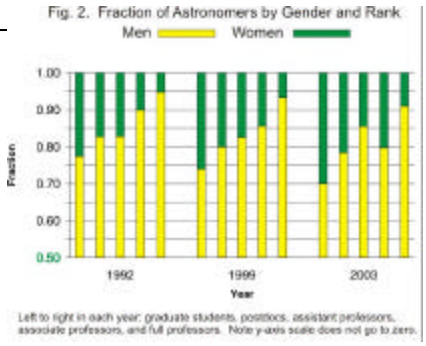
Survey conducted by the CSWA





The percentage of women among current postdocs is approximately the same (22%) as the percentage of women among graduate students in 1992 and among Ph.D. recipients in astronomy in 2000 and 2001 (PhD statistics from the NSF 2001 Science and Engineering Doctorate Awards report).

There were a third as many female assistant professors in 2003 as female postdocs in 1999; for men, the fraction was one half (but if you compare postodcs in 1992 to assistant professors in 2003, the fraction is the same).

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Tenured/Tenure-Track Faculty at the "Top 50" Physics Departments by Race/Ethnicity and by Rank (FY 2002)

	White				Black				Hispanic				Asian				Native Am.				Total
University	Full	Assoc	Asst	*Tot*	Full	Assoc	Asst	*Tot*	Full	Assoc	Asst	*Tot*	Full	Assoc	Asst	*Tot*	Full	Assoc	Asst	*Tot*	
Johns Hopkins U	24.002	0	3	*27.002*	0	0	0	*0*	0	0	0	*0*	4	1	0	*5*	0	0	0	*0*	**32.002**
MA Institute of Tech	50.004	5	11.002	*66.006*	0	0	0	*0*	0	0	0	*0*	2	2	6.002	*10.002*	0	0	0	*0*	**76.008**
U CA Berkeley	30.002	6	5	*41.002*	0	0	0	*0*	1	0	0	*1*	9	2.001	1	*12.001*	0	0	0	*0*	**54.003**
California Inst of Tech	41	0	2.001	*43.001*	0	0	0	*0*	0	0	0	*0*	2.001	1	0	*3.001*	0	0	0	*0*	**46.002**
U TX at Austin**	31	8	2	*41*	0	0	0	*0*	1	0	1.001	*2.001*	3	2	1	*6*	0	0	0	*0*	**49.001**
Cornell University	30.001	6.001	4	*40.002*	0	0	0	*0*	0	1	0	*1*	2	0	1.001	*3.001*	0	0	0	*0*	**44.003**
Florida State University	24	4.001	5.001	*33.002*	1	0	0	*1*	3.001	0	1	*4.001*	1	2	4	*7*	0	0	0	*0*	**45.003**
U MD at College Park	39.001	10	5.001	*54.004*	1	0	0	*1*	0	0	0	*0*	17	0	0	*17*	0	0	0	*0*	**72.004**
Michigan State U	38	4	4	*46*	0	0	0	*0*	0	0	0	*0*	2	2	0	*4*	0	0	0	*0*	**50**
U CA Los Angeles	47.004	3	5	*55.004*	0	0	0	*0*	0	0	0	*0*	5	1	0	*6*	0	0	0	*0*	**61.004**
U Illinois Urbana-Cham	36.001	7.001	8.002	*51.004*	1	0	0	*1*	1	0	0	*1*	4	0	1	*5*	0	0	0	*0*	**58.004**
U WI-Madison	36.003	3.001	4	*43.004*	0	0	0	*0*	0	0	0	*0*	3.001	0	2	*5.001*	0	0	0	*0*	**48.005**
Indiana University	27.002	5	4	*36.002*	0	0	0	*0*	0	0	0	*0*	1	0	1	*2*	0	0	0	*0*	**38.002**
%female	4.8	8.8	9.1	5.9	0	0	0	0	9.5	0	50	18.9	8.1	14.6	13	10.4	0	0	0	0	6.6

http://www.awis.org/statistics/physicsTable.html

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