Women in Astronomy II: Ten Years After

Report and Discussion
by UC Berkeley Attendees
November 19, 2003

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* Thanks to Luisa Rebull, Caltech

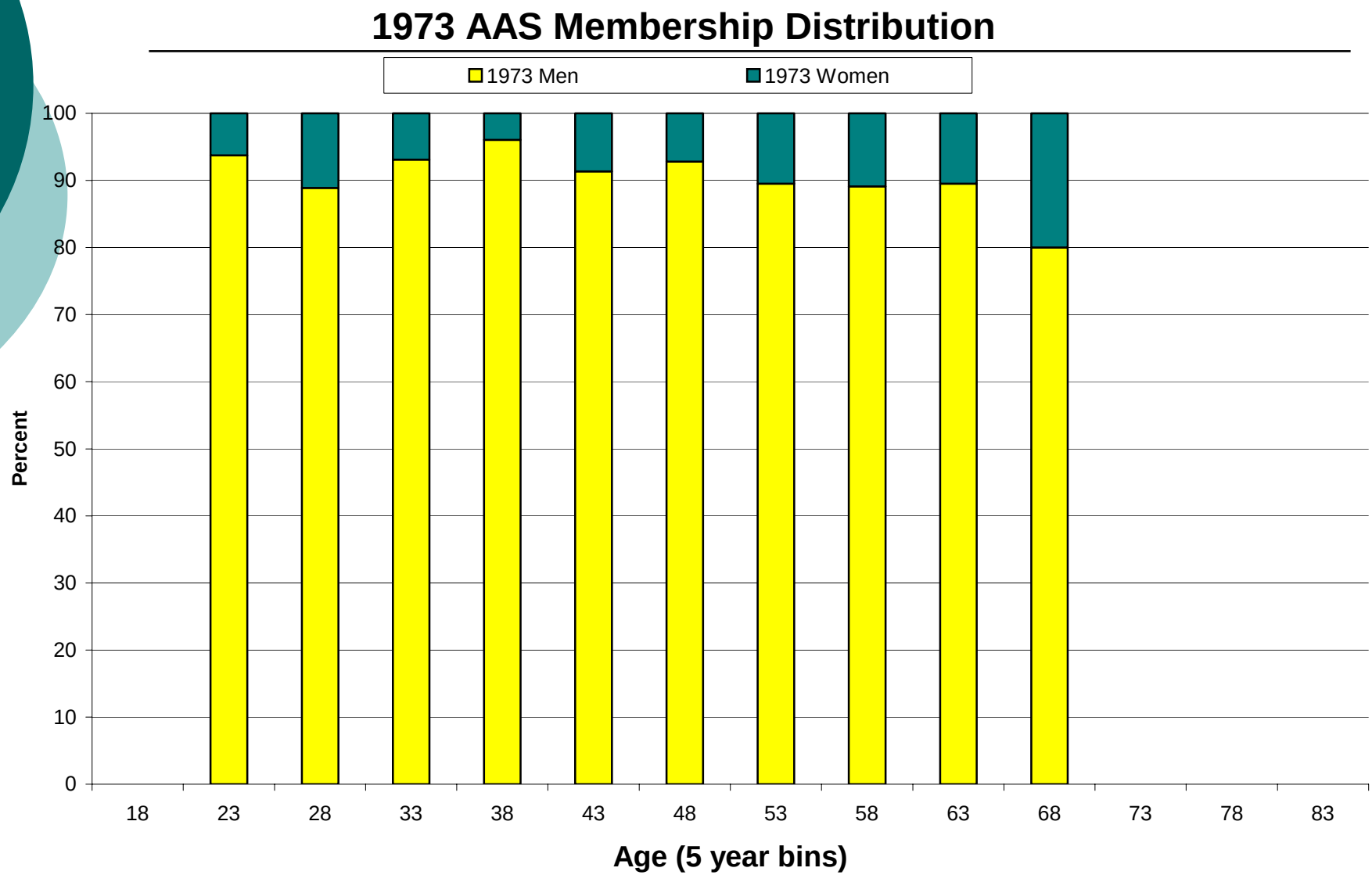
Historical Background

- AAS Committee on Status of Women in Astronomy (CSWA) established in 1979
- *Women at Work: A Meeting on the Status of Women in Astronomy* held September 8-9, 1992 at STScI; Baltimore Charter drafted
- Baltimore Charter endorsed by AAS in 1994
- *Women in Astronomy II: Ten Years After* held June 27-28, 2003 at Caltech; >150 participants

Presentation Outline

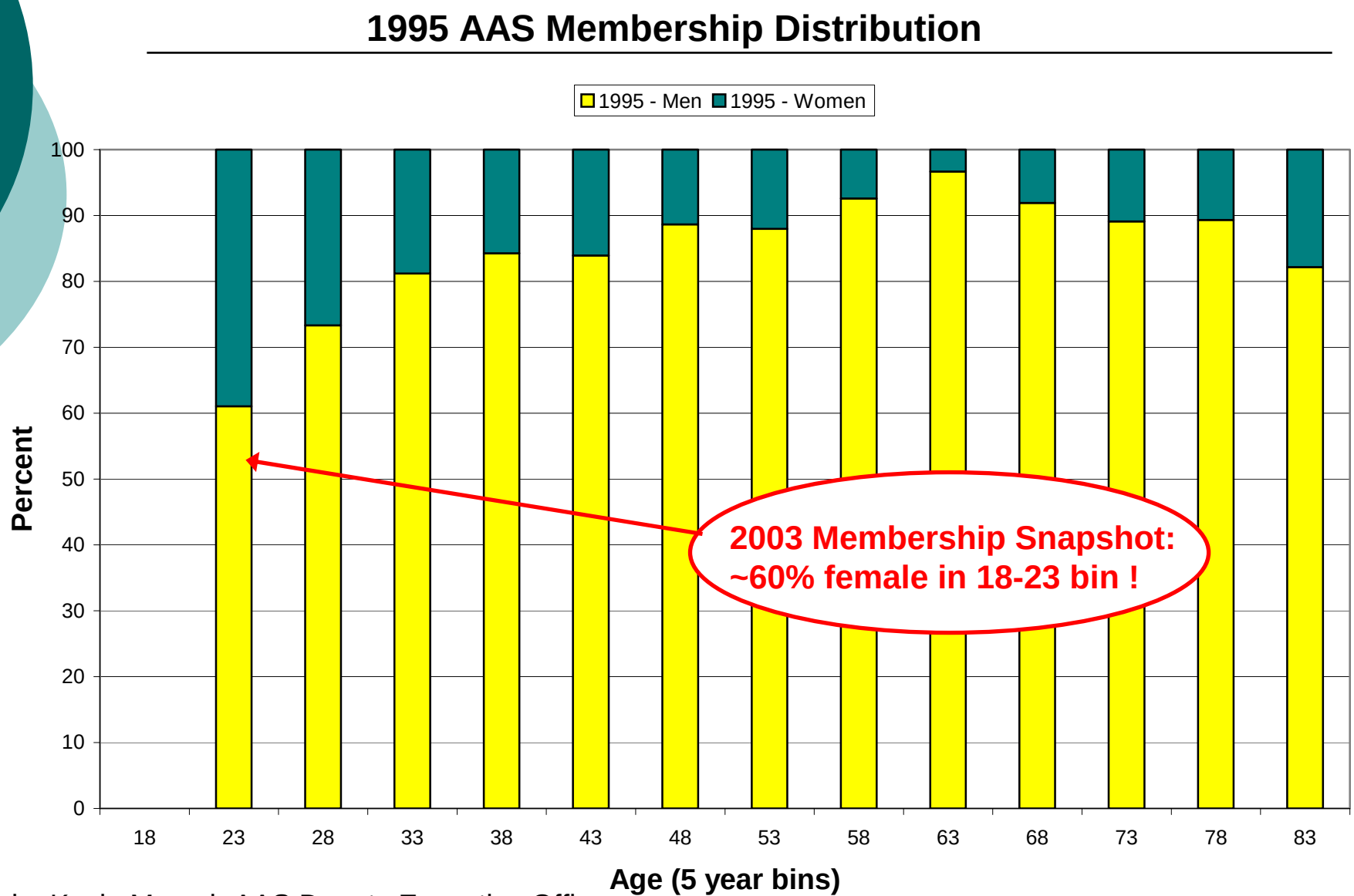
1. Statistics -- Jennifer
2. Why So Slow? -- Brenda
3. SWPS and Women in UCB Physics -- Loraine
4. Grad Women in UCB Astronomy -- Ruth
5. Undergrad Women in UCB Astronomy
   -- Amanda, Cassandra, Liliana, Ximena
6. Summary: Strategies for Improvement

AAS Demographics - 1973



Slide by Kevin Marvel- AAS Deputy Executive Officer

AAS Demographics - 1995



Slide by Kevin Marvel- AAS Deputy Executive Officer

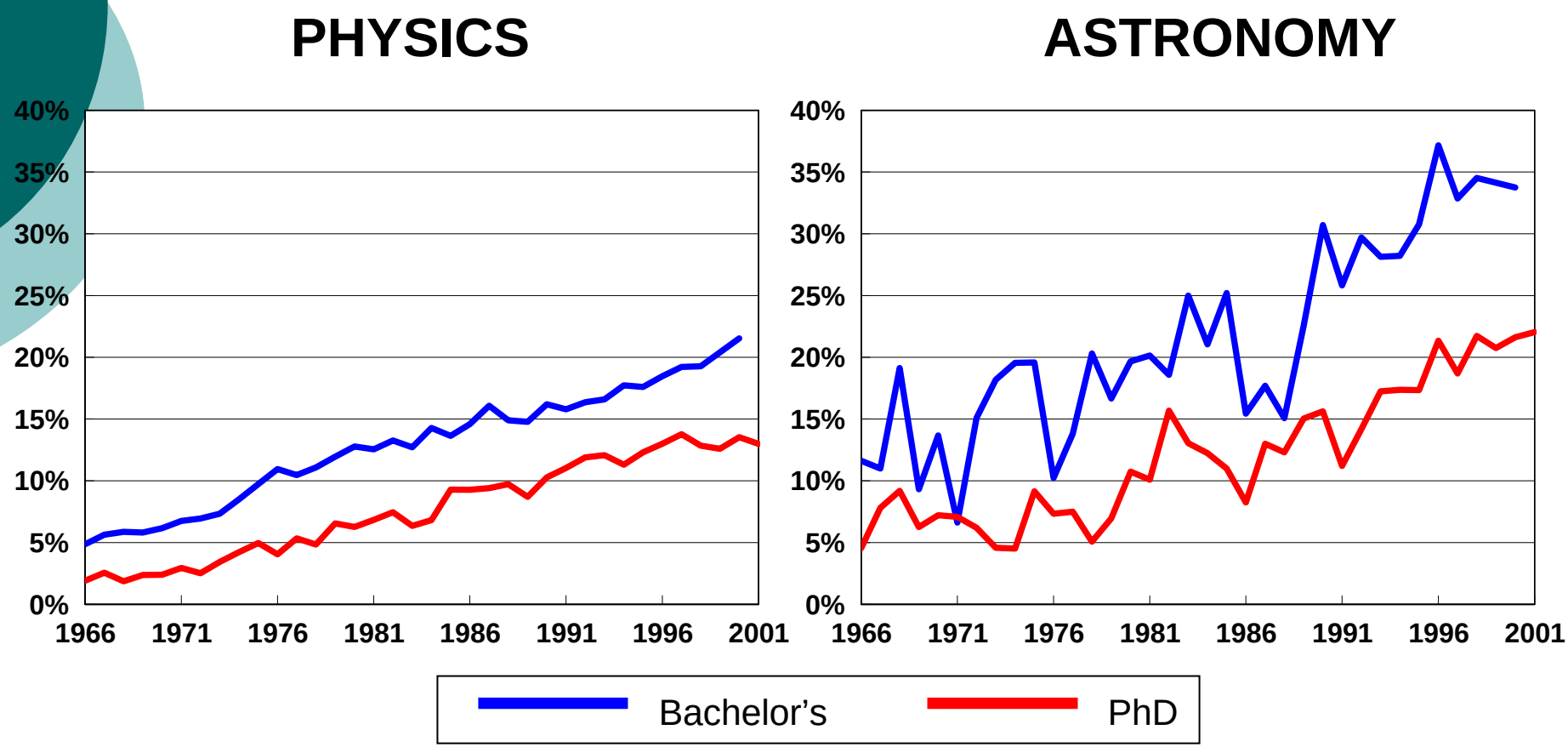
AAS Awards by Gender

	As of 1990			Since 1990		
	men	women	% women	men	women	%women
Russel	43	2	5	13	1	8
Warner	38	1	3	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

Slide by Luisa Rebull, Caltech

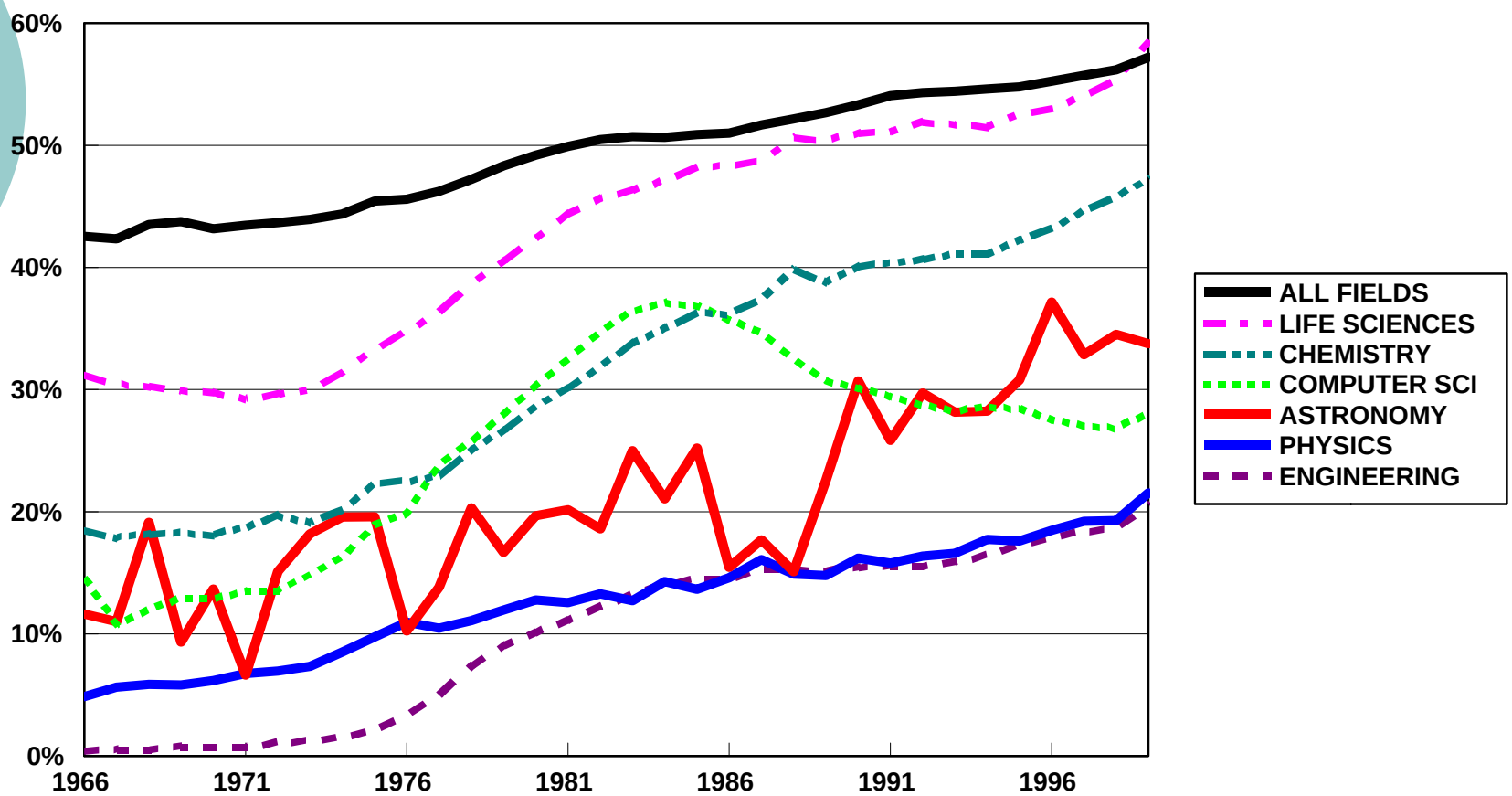
Percent of Bachelor's and PhD Degrees Earned by Women in Physics and Astronomy, 1966-2001



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.

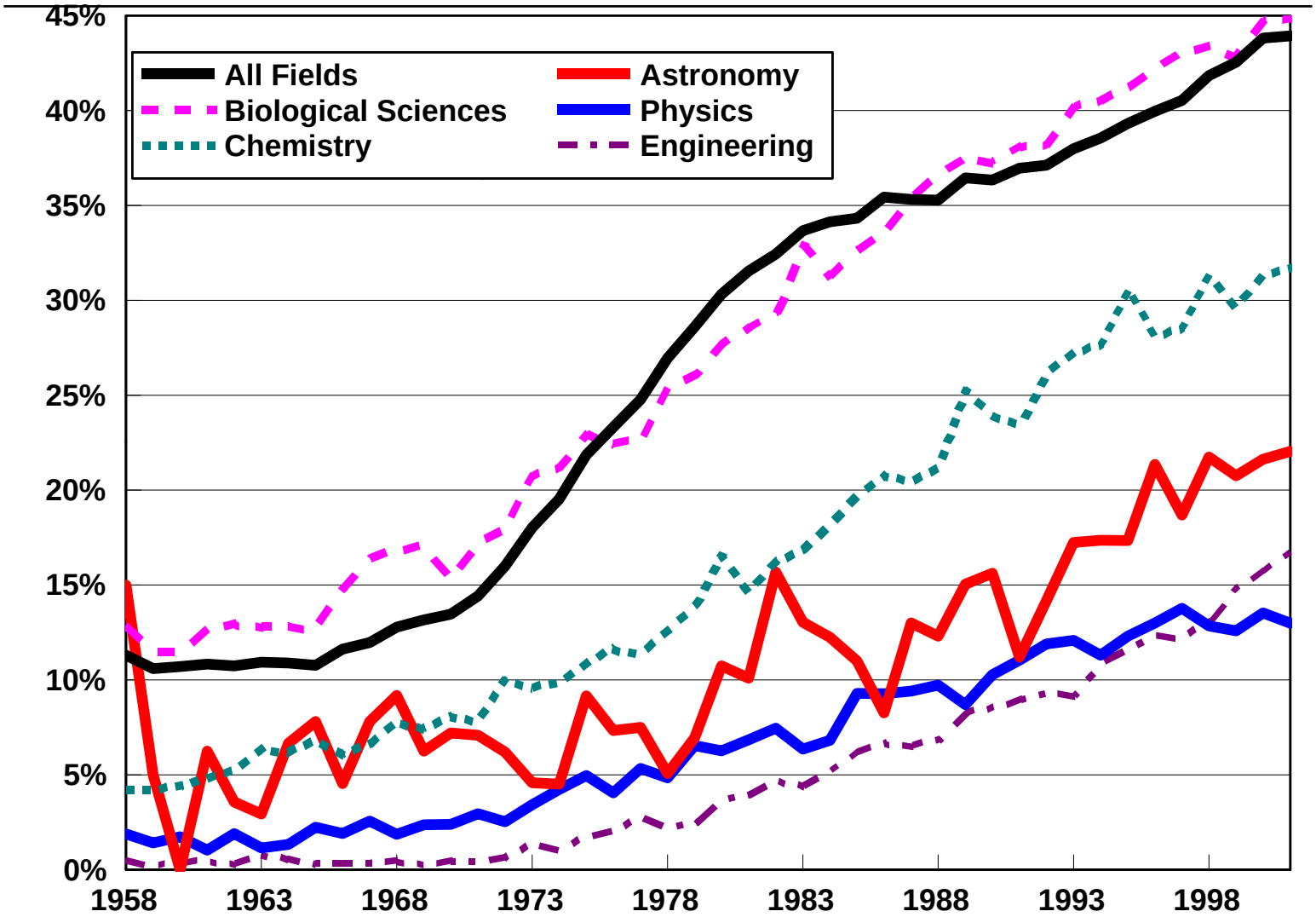
Percent of Bachelor's Degrees Earned by Women in Selected Fields, 1966-2000



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.

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



Slide by Rachel Ivie, AIP

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

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 (13;16)	10 (7)

Slide by Rachel Ivie, AIP

Sources: AIP Statistical Research Center; AAS CSWA survey; MIT survey).

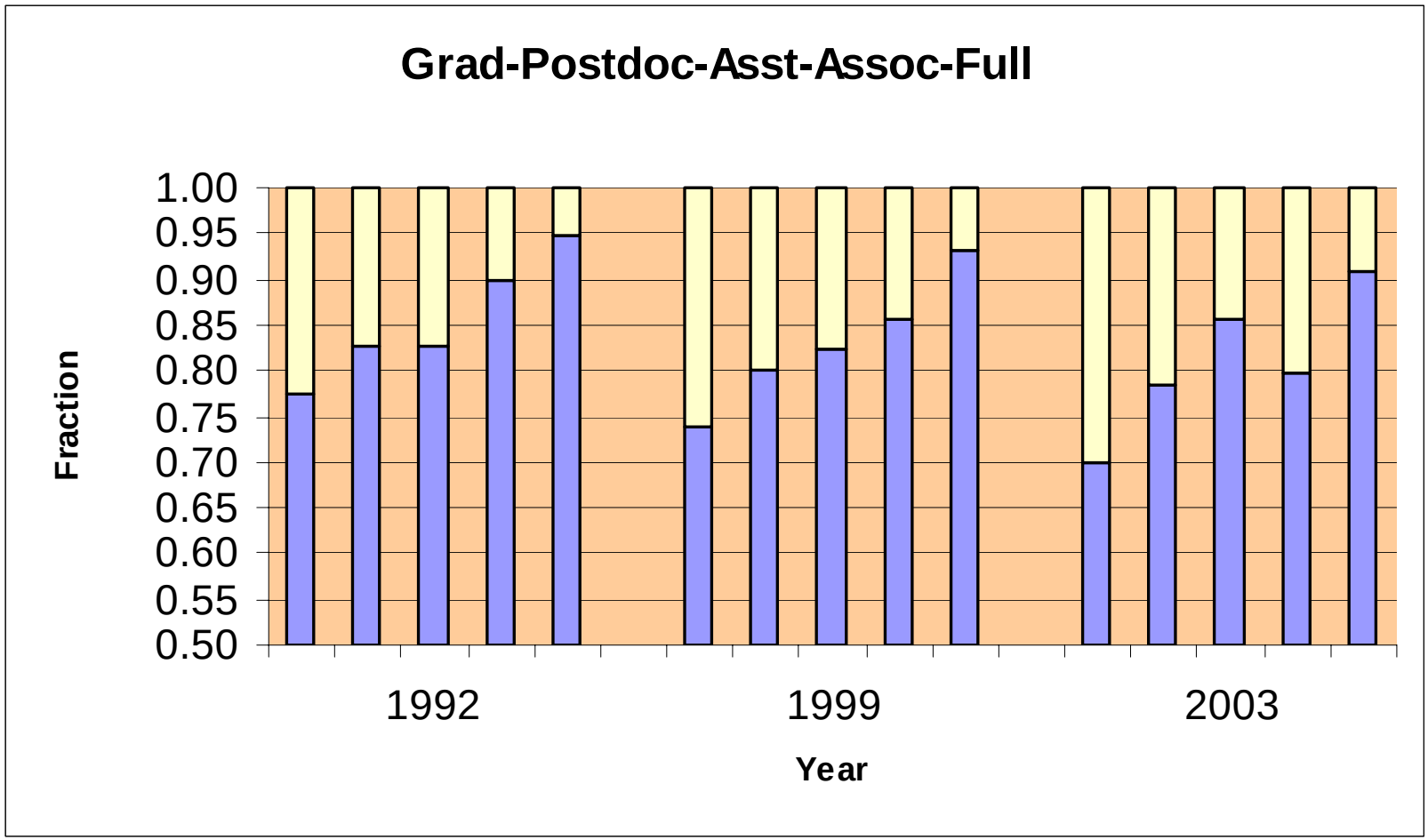
Representation of Women Astronomy Faculty Compared to Percentage Earning PhDs

	Mean Years since PhD (2002)	**% PhDs to Women at that time (year)**	**% 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)

Sources: AIP Statistical Research Center, AAS CSWA surveys

Slide by Rachel Ivie, AIP

However…
Women in Astronomy by Rank and Time



Source: AAS CSWA surveys

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%

Source: AAS CSWA surveys

UC Berkeley Statistics

Rank	UCB Astronomy		Field
Full	1 / 16.25	6.2%	9.0%
Assoc	1 / 2	50.0%	20.3%
Asst	1 / 10	10.0%	14.5%
Postdoc	2 / 13	15.4%	21.6%
Grad St	7 / 32	21.9%	30.0%
All PhDs	5 / 41.25	12.1%	15.8%

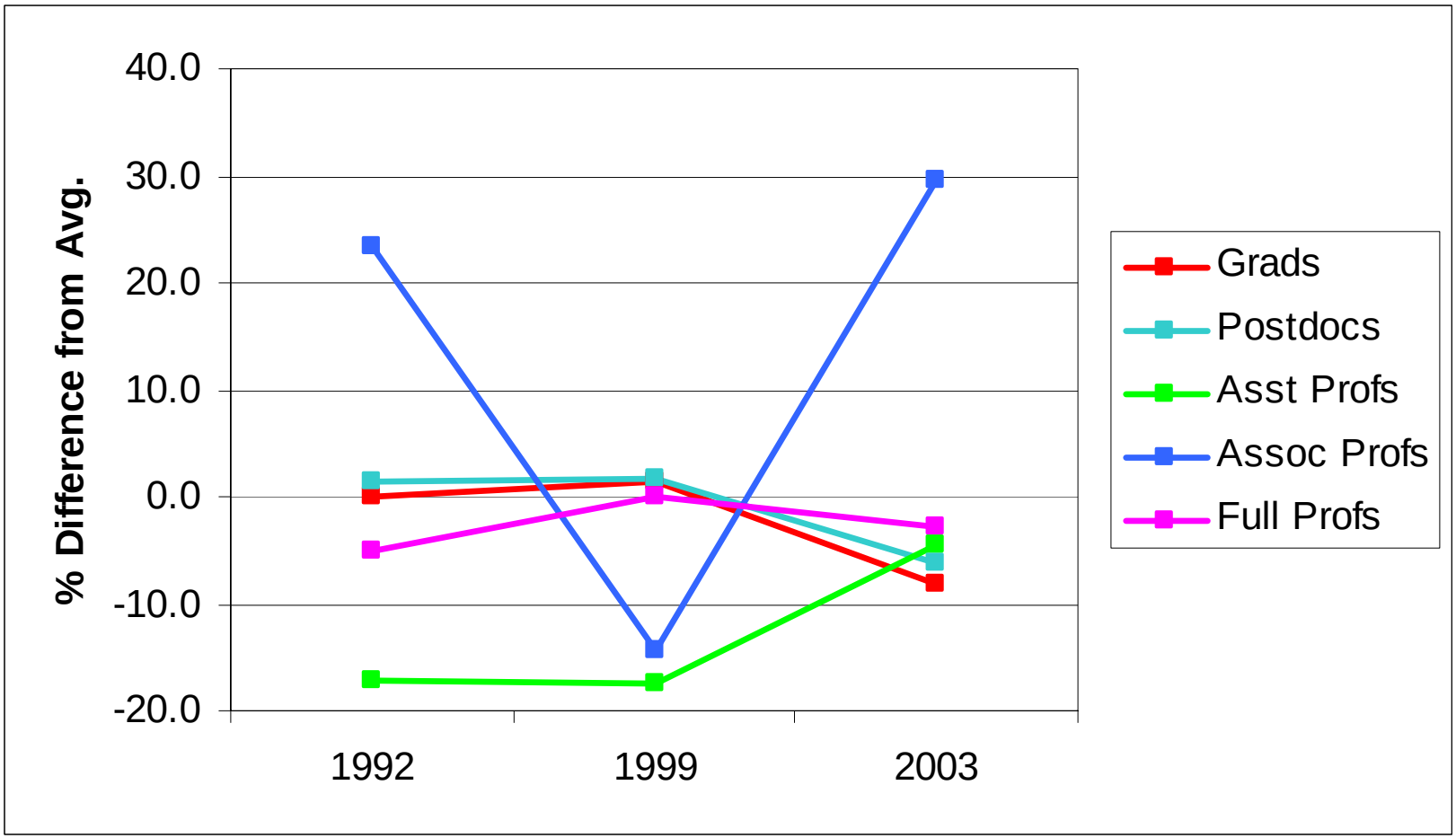
As of May 2003; includes research faculty
Source: 2003 AAS CSWA survey

UC Berkeley Statistics over Time

Year	Grad Student		Postdoc	
1992	7 / 31	22.6%	3 / 16	18.8%
1999	8 / 29	27.6%	5 / 23	21.7%
2003	7 / 32	21.9%	2 / 13	15.4%
Year	Assistant		Associate	
1992	0 / 1	0.0%	1 / 3	33.3%
1999	0 / 2	0.0%	0 / 1	0.0%
2003	1 / 10	10.0%	1 / 2	50.0%
Year	Full Prof		All PhDs	
1992	0 / 12	0.0%	4 / 32	12.5%
1999	1 / 15	6.7%	6 / 41	14.6%
2003	1 / 16.25	6.3%	5 / 41.25	12.1%

Includes research faculty; source: AAS CSWA surveys

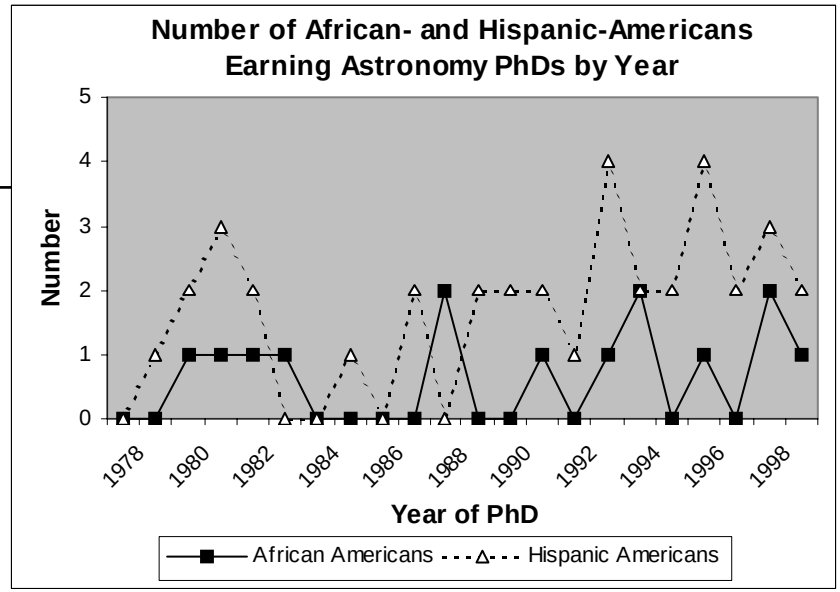
UC Berkeley Compared with Field

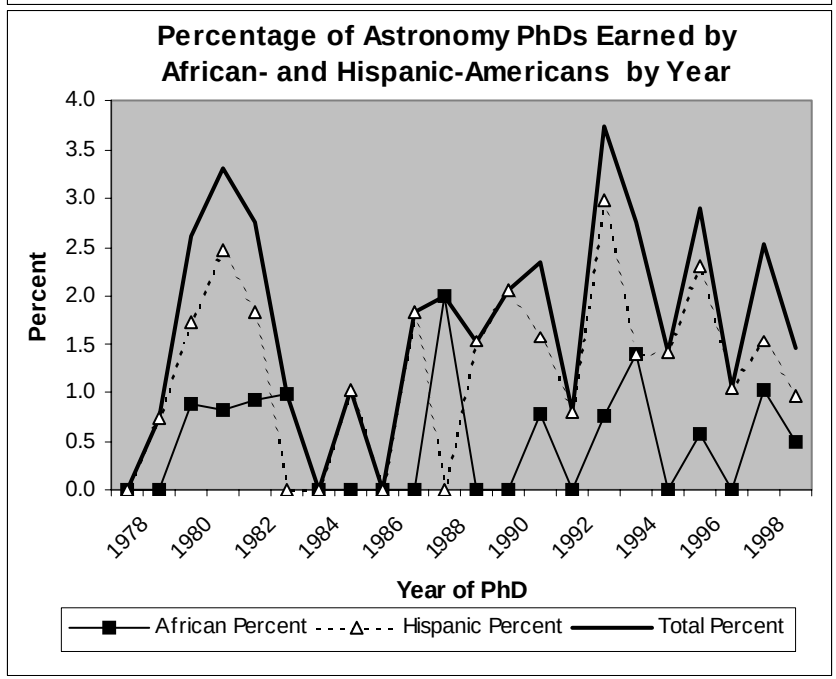


Includes research faculty; source: AAS CSWA surveys

Status of Minorities

- Astronomy faculty:
  - 91% white
  - 6% Asian
  - 1% black
  - 1% Hispanic
  - 0% Native American
- Order-of-magnitude issue:
  - 25% of population
  - 2-3% of astronomy PhD's, less of faculty
  - PhD rate unchanged in 25 years





Slide by Keivan Stassun, Vanderbilt
Source: MIT survey, upcoming in SPECTRUM

Summary of Statistics

- The number of women entering astronomy is increasing (women are now >50% of youngest AAS members, 34% of bachelors).
- The overall percentage of women in astronomy is also increasing, but less quickly (women are now 22% of PhDs,14% of faculty).
- Percentages are still low compared with most other sciences; the “PhD gap” is not closing.
- Women are underrepresented among AAS award recipients.

Summary of Statistics, cont.

- The “leaky pipeline” may be less of a concern than once thought (but note limitations of study).
- At UCB, percentages are near average and holding; no trend towards increased representation.
- Minorities are severely underrepresented in astronomy: 25% of population, 1-2% of astronomy faculty.
- More detailed studies are needed, especially tracking of specific cohorts.

Highlights and Recurring Themes

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

Highlights and Recurring Themes

- Women are rarely found in the pool of tenured faculty in the sciences, due to both ‘chance’ and ‘choice’ (1)
  - requires a ‘perfect trajectory’
    - any serious event (illness for yourself or in the family, baby, etc) can throw you off
    - Reality is that 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…)

Highlights and Recurring Themes

- Women are rarely found in the pool of tenured faculty in the sciences, due to both ‘chance’ and ‘choice’ (2)
  - Culture of academia is “broken” and unappealing – for everyone, not just women
    - Why would *anyone* be a professor?
    - In chemistry, women who get their PhD’s from “top tier” schools rarely return to academia.
  - 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.

Highlights and Recurring 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

Highlights and Recurring Themes

- Gender schemas (preconceptions) affect everyone, everywhere.
  - Studies suggest that we can't adequately assess something as quantitative as heights of people – 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!

Mountains are molehills (piled high)

- Computer model of promotion practices (Martell et al. 1996)
  - Organization with 8-level hierarchy staffed at bottom level with equal numbers of men & women
  - Model assumed promotion over time with tiny bias favoring men (bias of 1% in the inherent variability of promotion)
  - After many promotion series, highest level was 65% male
- Small Effects Have Measurable Consequences!

It is unfair to neglect even minor instances of group-based bias, because the results can be large disparities in salary, promotion & prestige.

Highlights and Recurring Themes

- 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 (on average) believe science is a meritocracy, more than men. Work to set up clear, open procedures that make it a meritocracy.

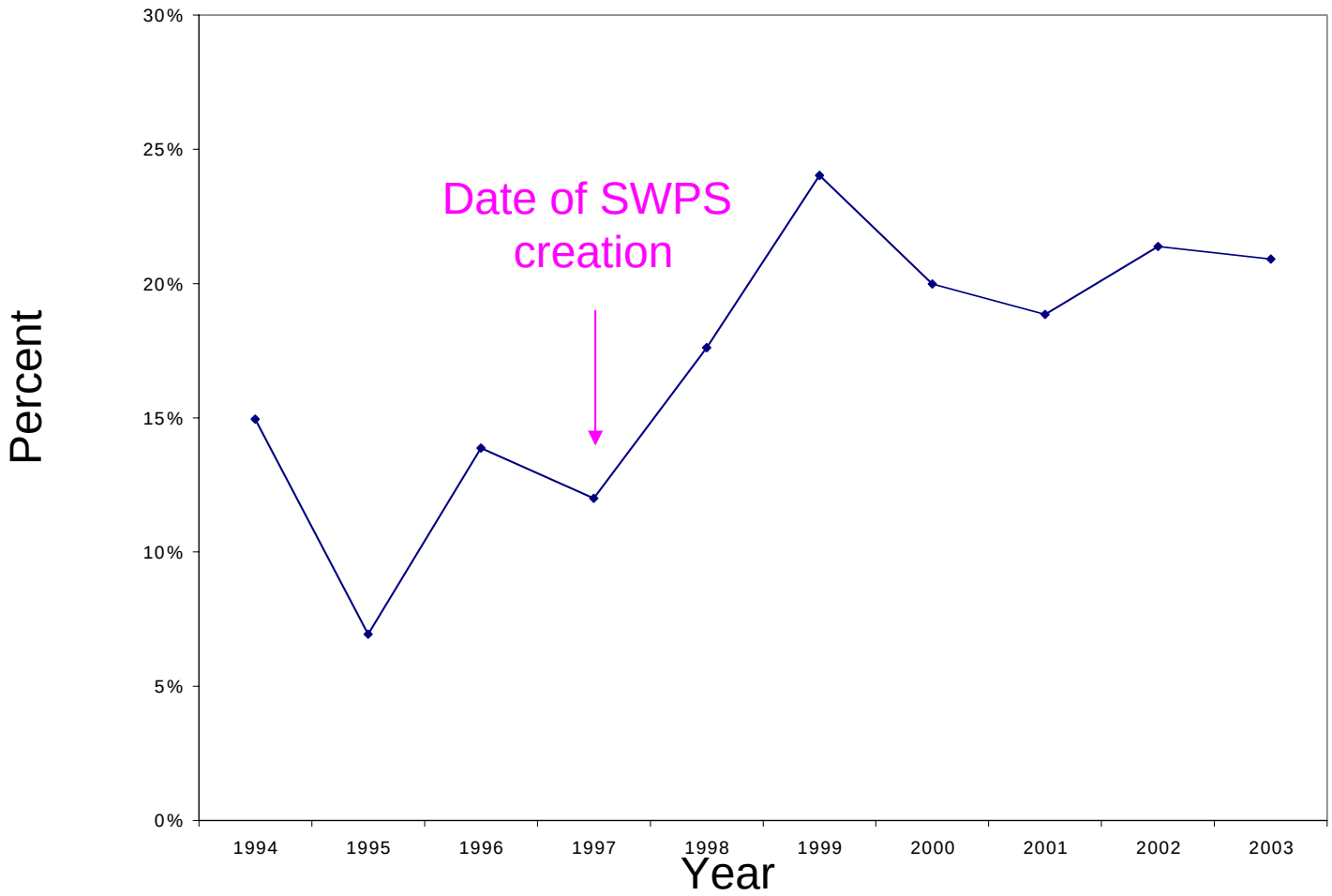
Highlights and Recurring Themes

- 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.
- 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.

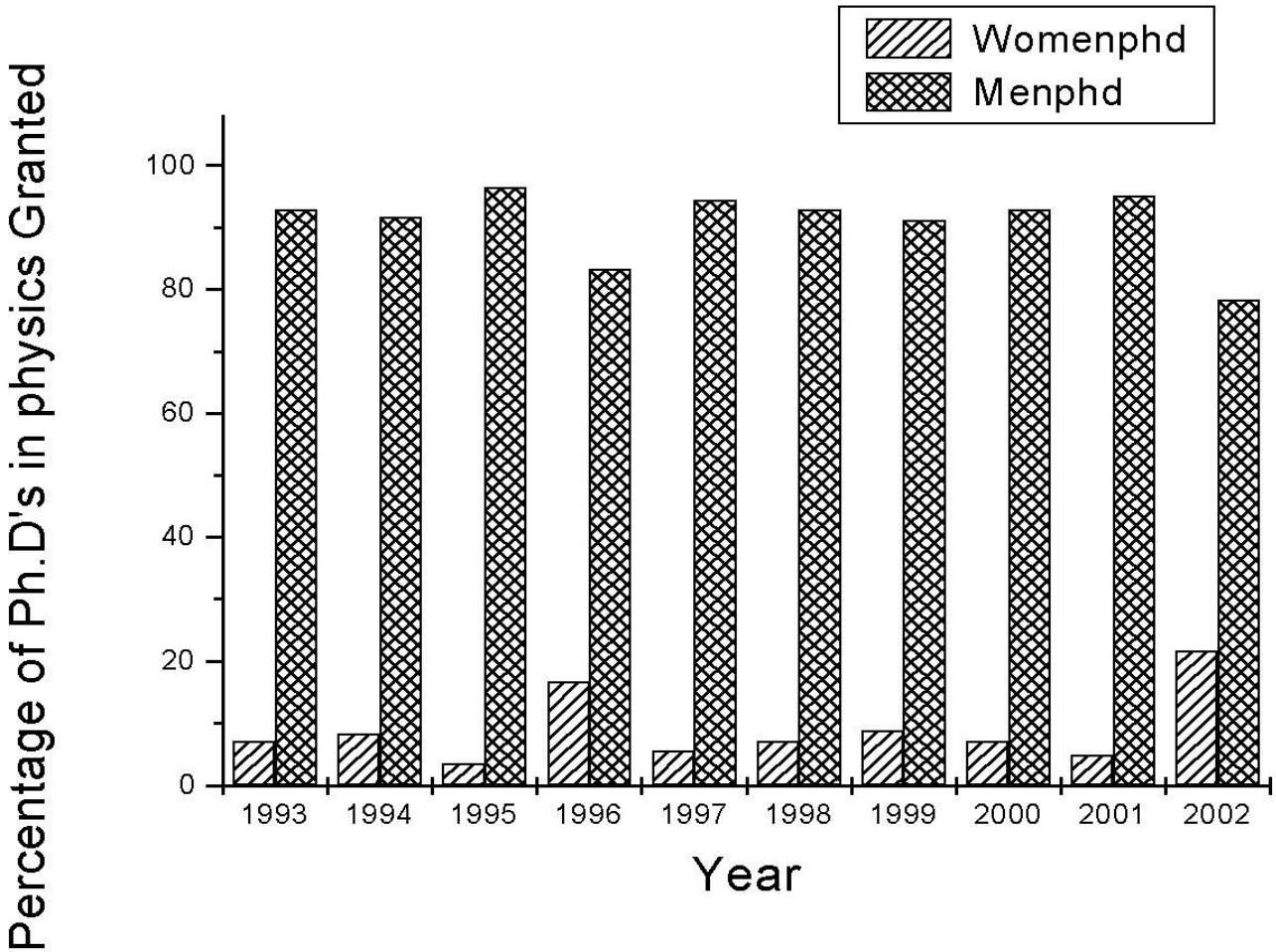
Highlights and Recurring Themes

- 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

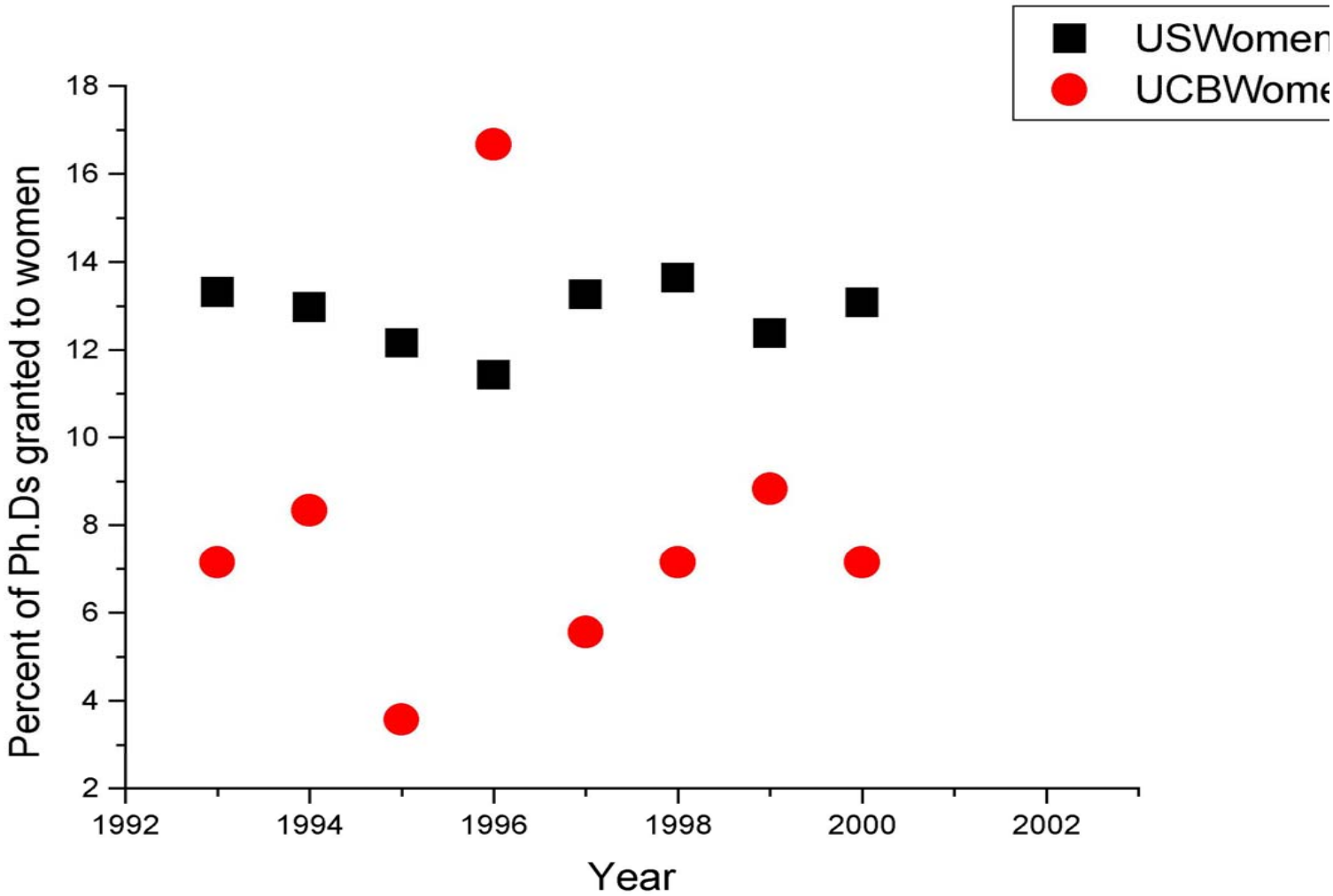
Percentage of Physics Bachelor Degrees Granted to Women at Berkeley



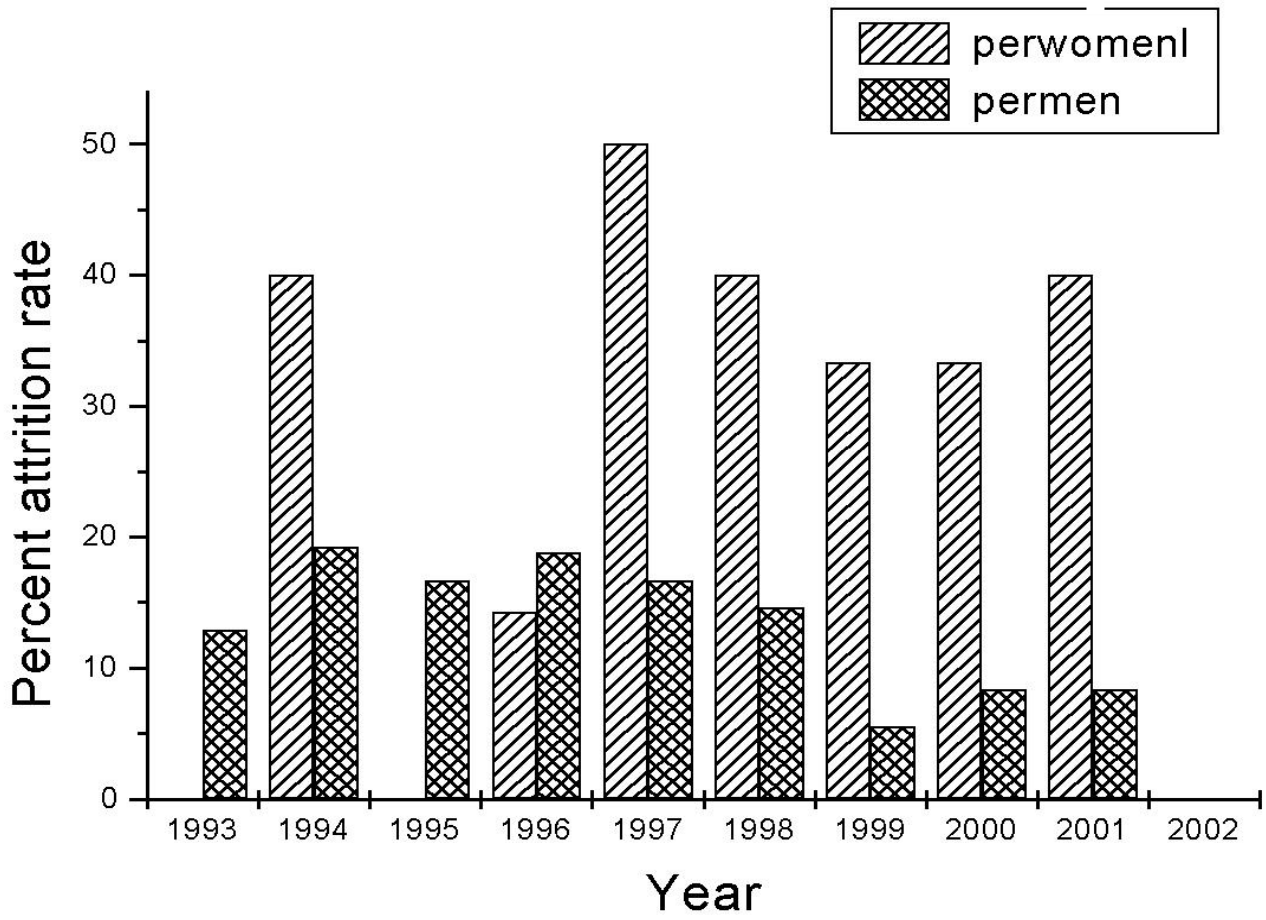
Physics PhDs Granted at Berkeley



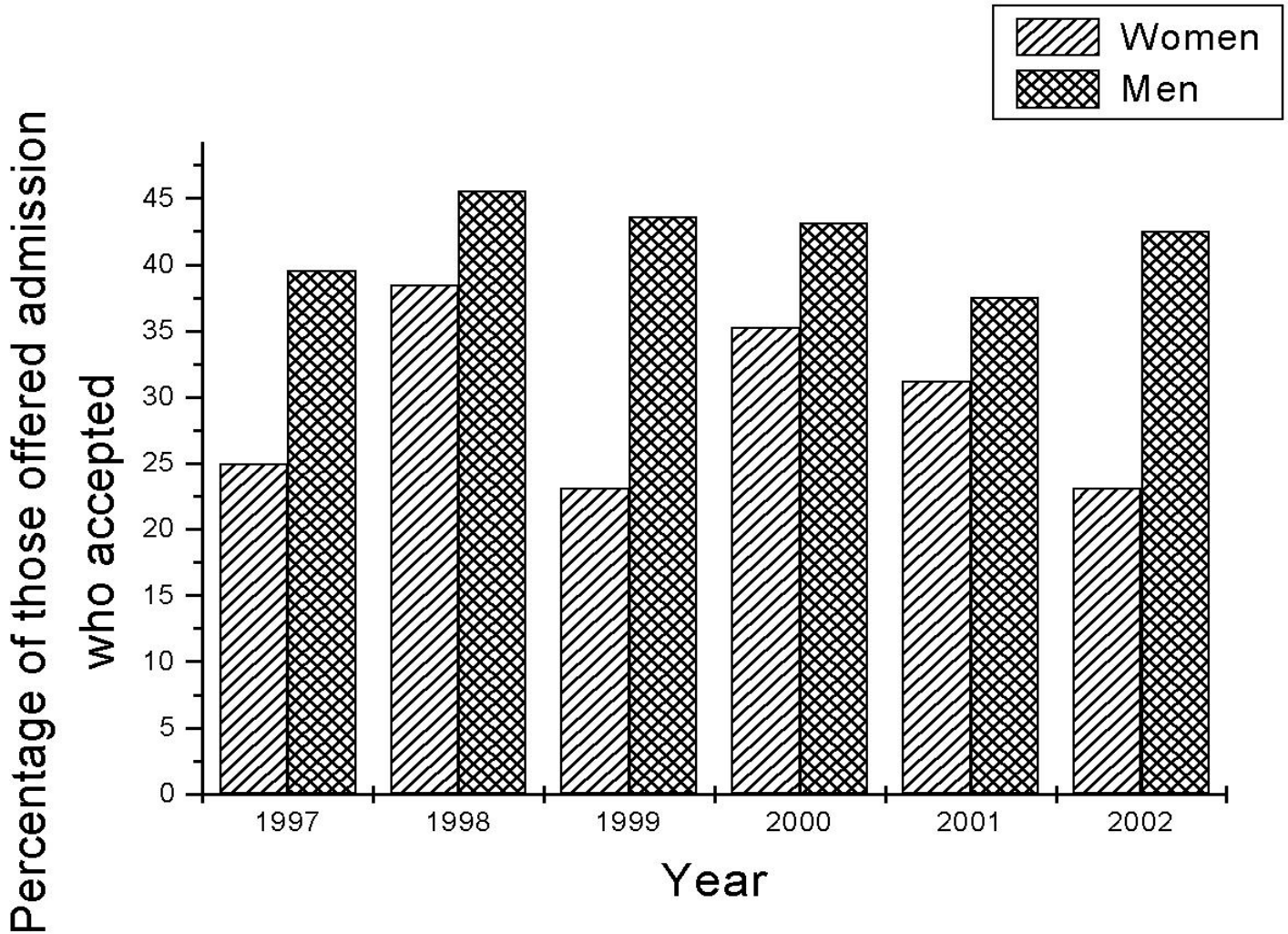
Percentage of Physics PhDs Granted to Women



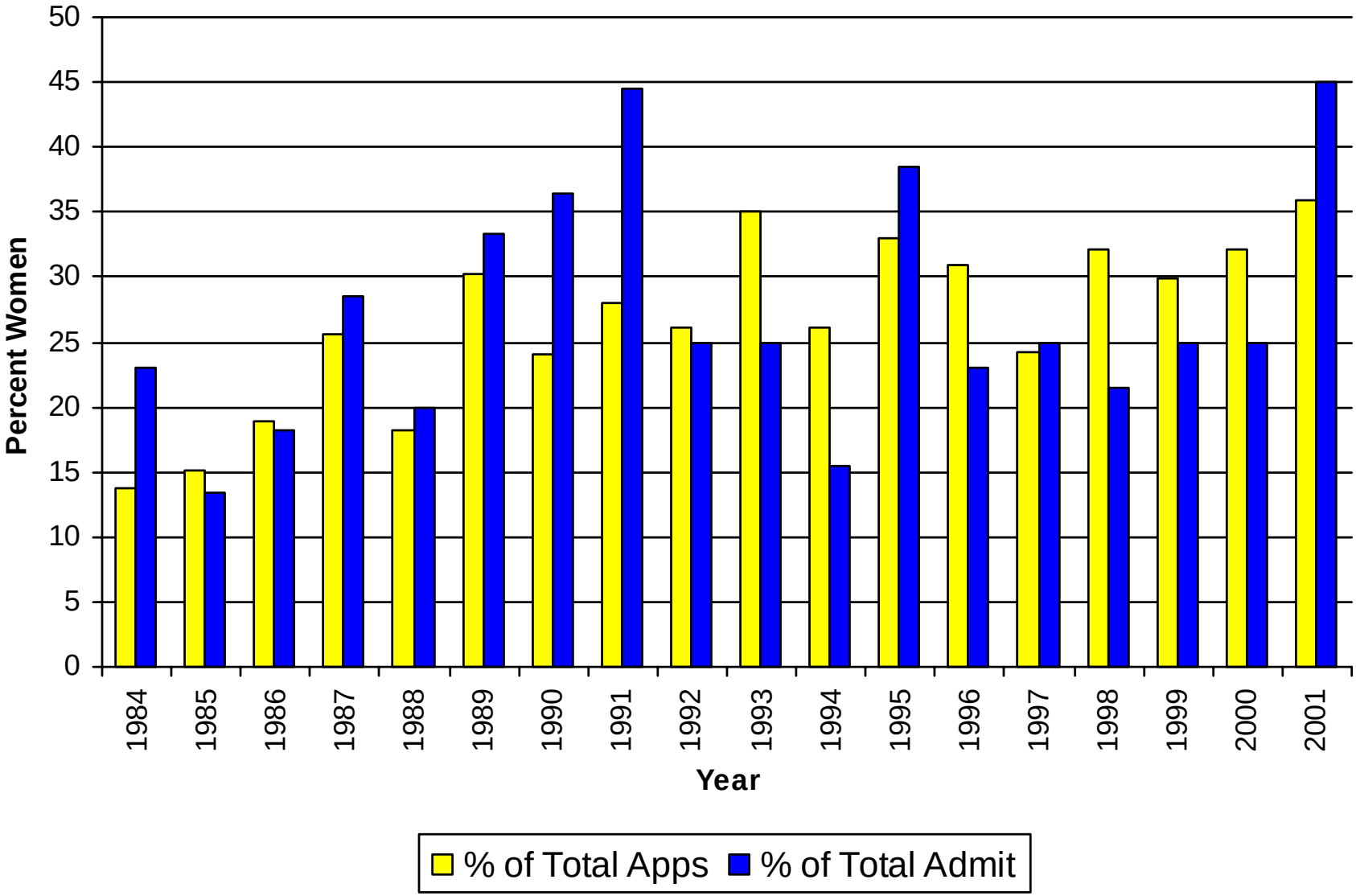
Physics Graduate Student Attrition Rates at UCB



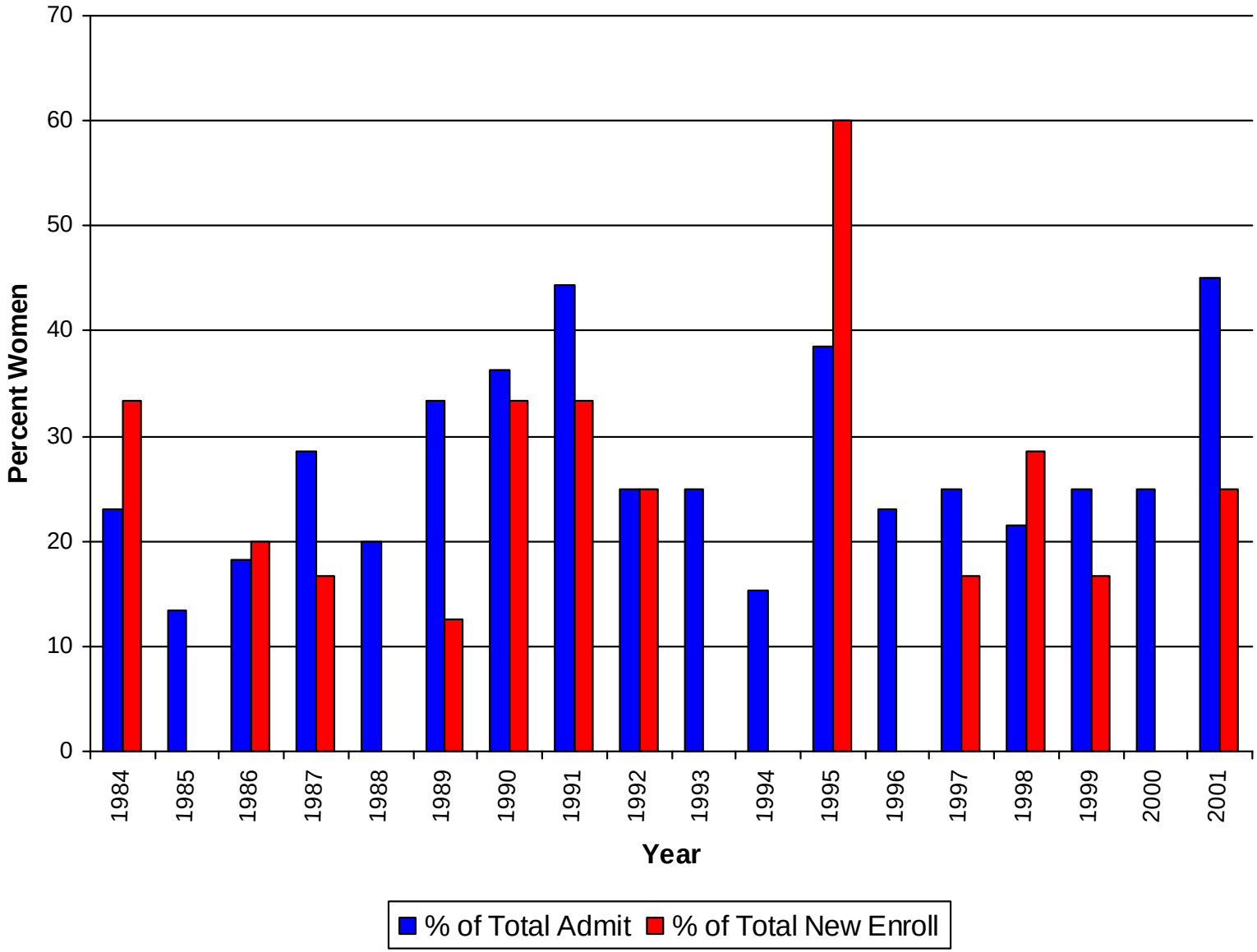
Enrollment Rates for Students Admitted to Graduate School in Physics at UCB



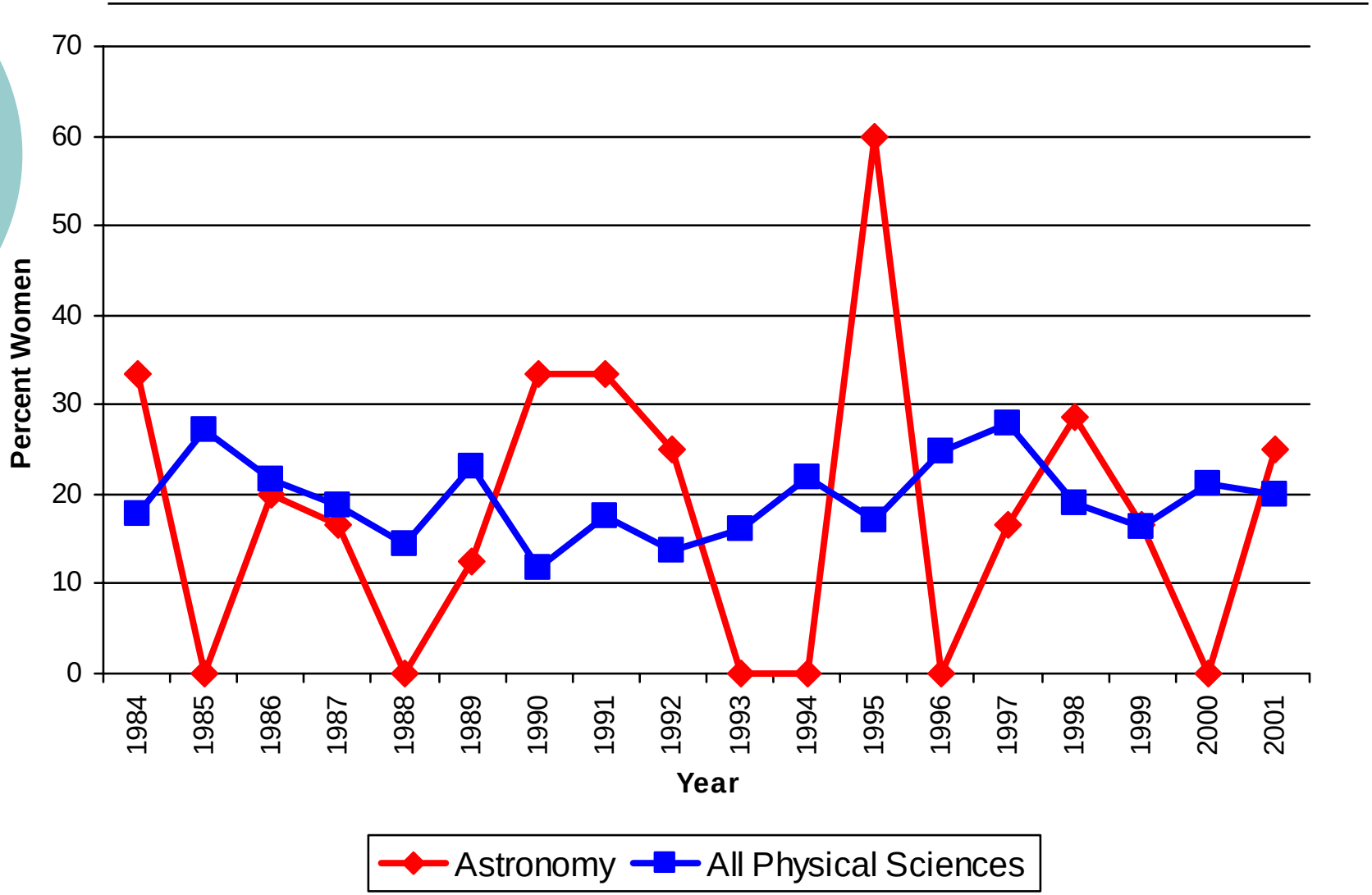
Graduate Application and Admission Rates for Women in UCB Astronomy



Graduate Admission and Enrollment Rates for Women in UCB Astronomy



Enrollment Rates for Women in Physical Science at UCB



The grad students are generally happy

Grad Student Suggestions

For Faculty:

- Designate an official faculty mentor (not the advisor) for each student
- Continue with courses on special topics
- Spread out courses more evenly
- If you don’t know how your grad student is doing, ask

Grad Student Suggestions

For Grad Students and Faculty:

- Directed reading course third year for grounding in subfield
- Meeting time with colloquium speaker
- Emphasize research talks, journal club, oral finals

Perspective

Presented By:

Liliana Lopez * Amanda Heiderman
Ximena Cid * Cassy VanOutryve

Outline

Environment

- TALC & UG Astrolab
- Student - Student Interactions
- Prof/GSI - Student Interactions
- A minority perspective

Suggestions

- Importance of Mentorship
- Availability of Information

Concluding Remarks

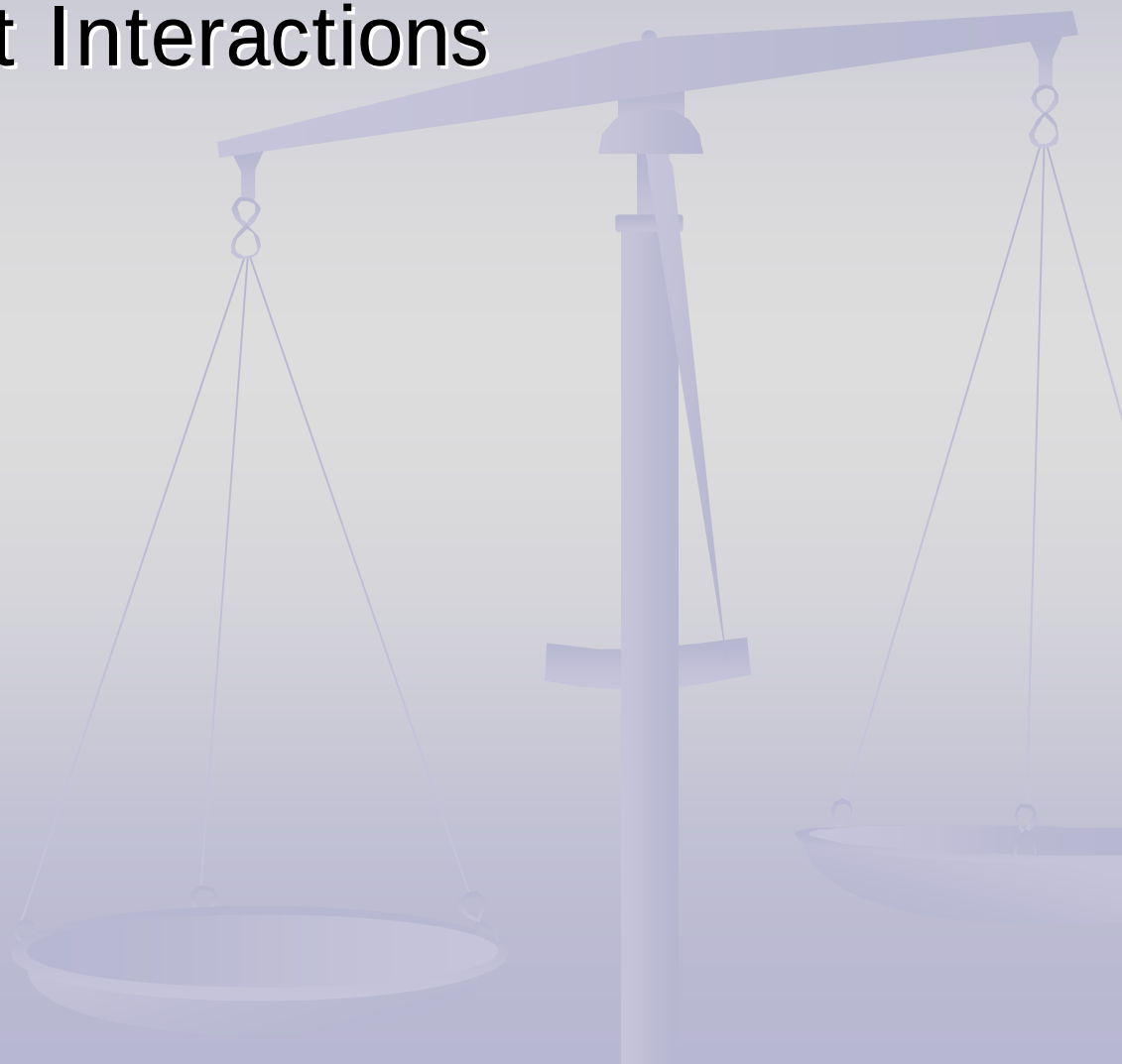
Environment

Hospitable Department

- Undergraduate statistics
  - 20 out of 51 are female (39%)
- Undergraduates are comfortable regardless of gender
  - TALC
  - UG Astrolab

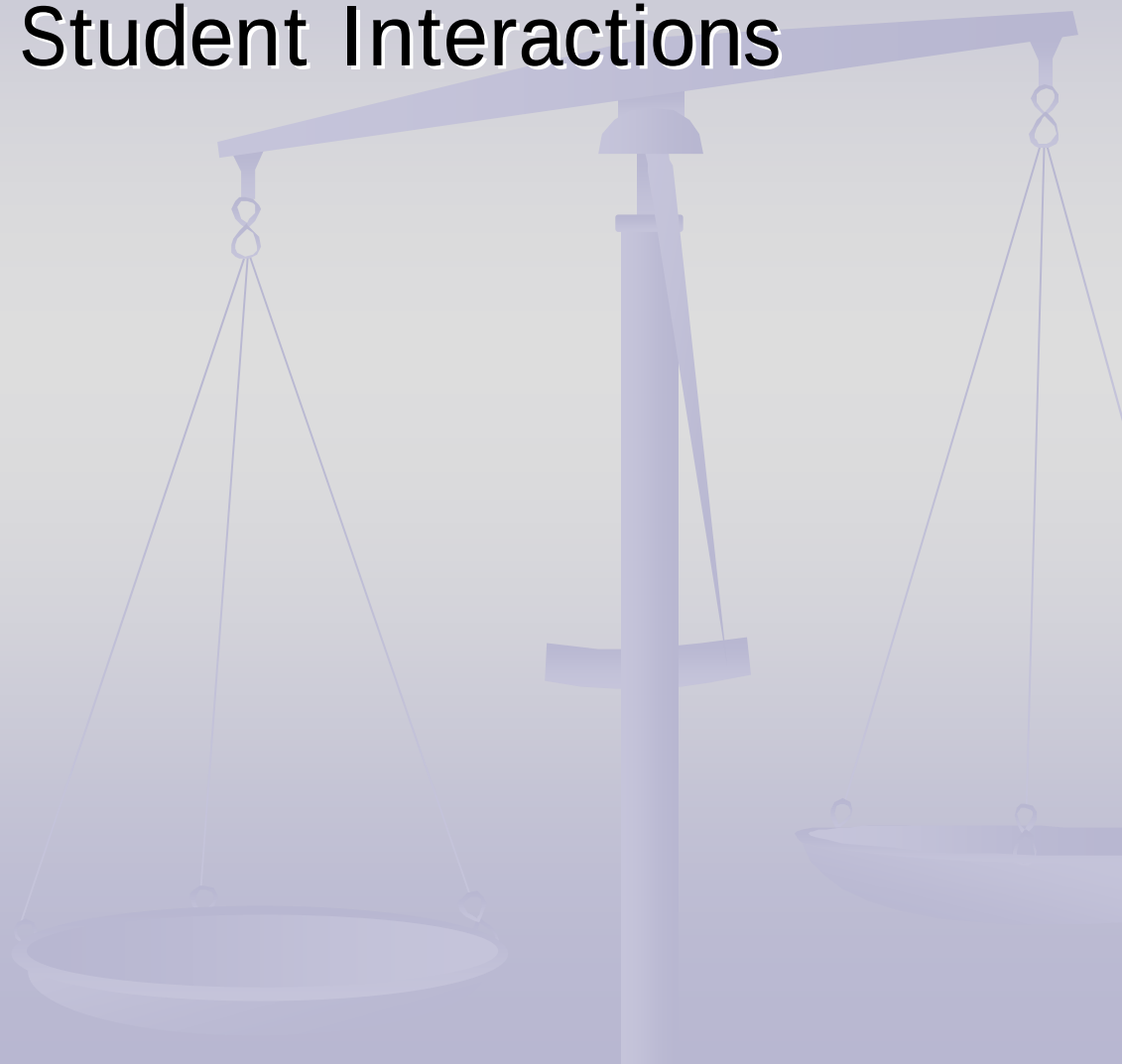
Environment

- Student-Student Interactions
  - Equality
  - Community
  - Support



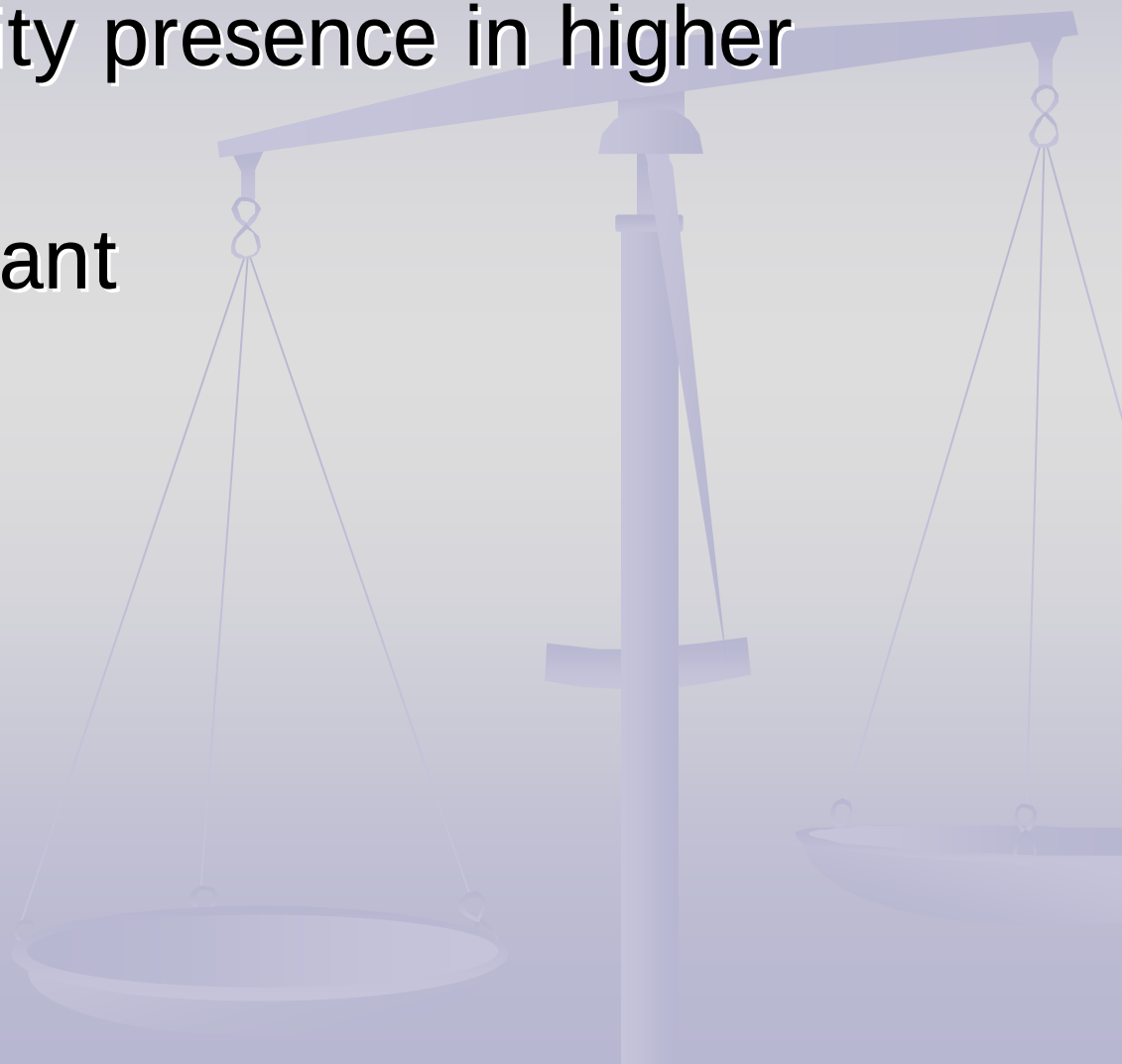
Environment

- Professor/GSI – Student Interactions
  - Approachable
  - Friendly
  - Interactive



Environment

- Lack of a minority presence in higher positions
- Why it is important



Suggestions

Importance of Mentorship

- What is a Mentor?
  - Someone who helps the mentee realize their potential
- What can Mentors provide?
  - Advice
  - Encouragement

Suggestions

- Availability of Information
  - Introduction to Astronomy Department
  - Update Website
  - Information for double majors

Conclusion

In short, our overall experience in the department has been positive, but the suggestions we have presented can continue to enhance the education of both female and male undergraduates.

Strategies for Improvement: What Can We Do?

Individuals:

- Nominate women and minorities for AAS and other awards, and for faculty job searches.
- Respond to surveys; encourage AAS and other organizations to sponsor more studies.
- Keep up with current statistics.
- Participate in outreach projects.
- Be aware of personal gender biases.
- Keep in touch with your graduate students.

Strategies for Improvement: What Can We Do?

Department, general:

- Regularly compile statistics on admission, attrition, graduation, fellowship and hiring pools; track graduates and others who leave the department.
- Respond to surveys; encourage AAS and other organizations to sponsor more studies.
- Order relevant books, studies for library.
- Endorse the Baltimore Charter.

Strategies for Improvement: What Can We Do?

Department, for grad students:

- Make relevant statistics available to students.
- Designate faculty mentors.
- Continue with courses on special topics.
- Spread out courses more evenly.
- Establish a third-year directed reading course.
- Set up meetings with colloquium speakers.
- Emphasize research talks, journal club, oral finals.

Strategies for Improvement: What Can We Do?

Department, for undergrads:

- Make relevant statistics available to students.
- Institute yearly orientation for majors and prospective majors.
- Update website regularly.
- Make undergrads aware of outreach opportunities (A100; another class?).