

Massachusetts Institute of Technology

Independent Activities Period

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Women in Physics: *International View*



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Aside...

Committee on Status of Women in Physics (CSWP)

● **For Students:**

- Female Friendly Physics Departments
- APS/IBM Research Internship Program for Undergraduate Women
- “Physics in Your Future”

● **For Department Chairs:**

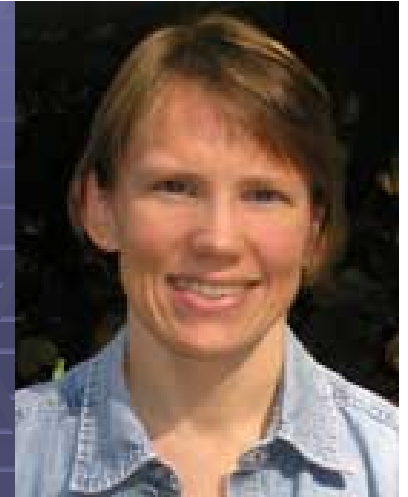
- Recommendations from Gender Equity Conference, May 2007
- Improving the Climate for Women in Physics Site Visits
- “Best Practices for Recruiting and Retaining Women in Physics”
- The Roster of Women and Minorities in Physics

● **For Women Faculty:**

- Professional Skills Development for Women Physicists
- M. Hildred Blewett Scholarship for Women in Physics

● **For Everyone:**

- CSWP Events at APS Annual Meetings
- Two list serves: “Friends of CSWP” and “WIPHYS”
- Colloquium Speakers List of Women in Physics
- *The Gazette*



Finish Aside...



The 3rd IUPAP International Conference on Women in Physics

October 8 - 10, 2008
Seoul, Korea



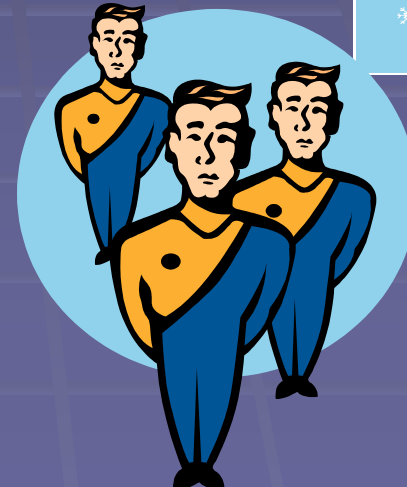
Women in Physics: *International View*

WIP: *International Phenomena...*



Metaphorically Speaking...

- “leaky pipeline”
- “glass ceiling”
- “chilly climate”
- “cloning”



What's the Big Deal?

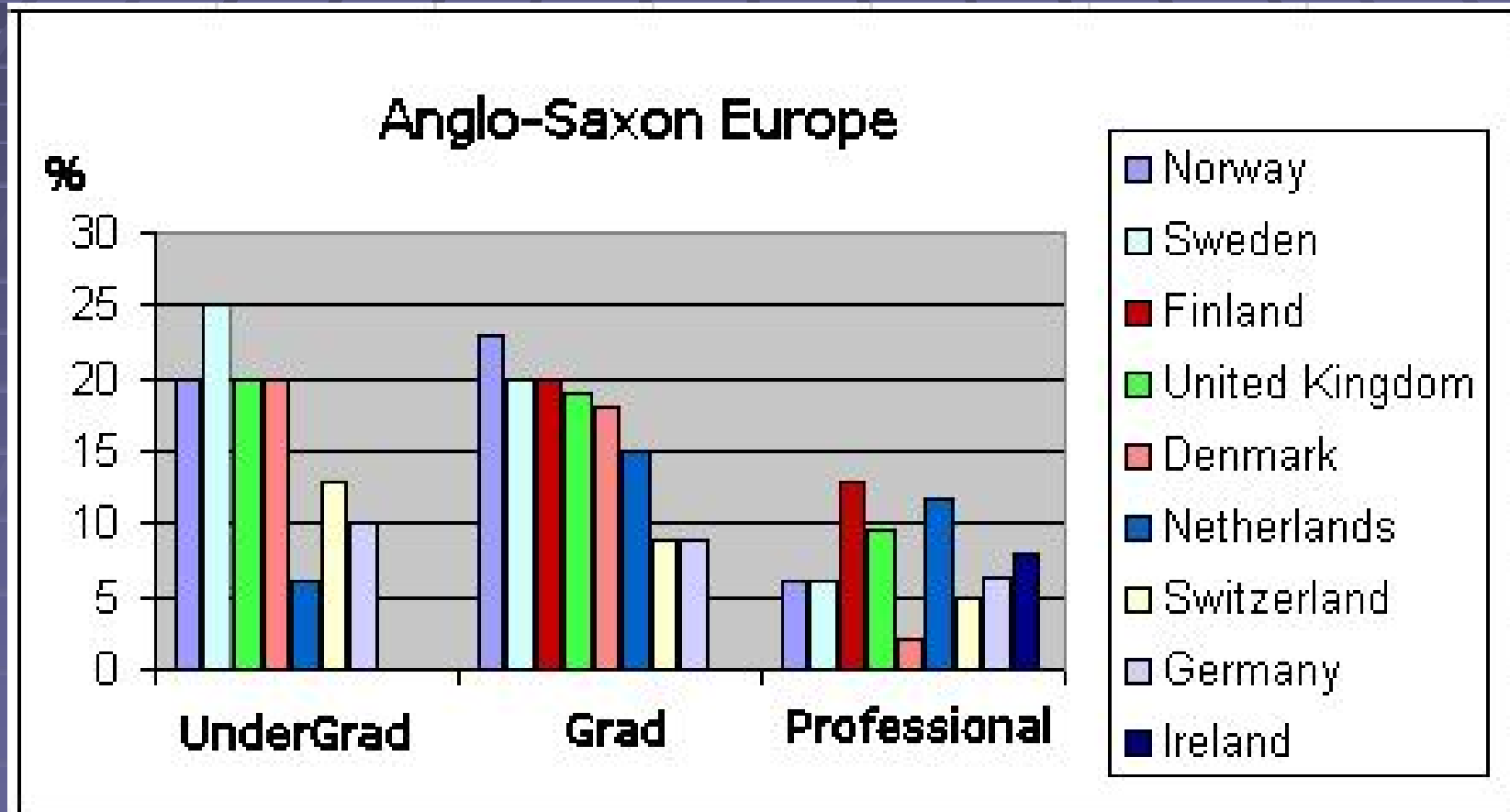
Statistics on Women in Physics in the U.S.

- 47% of high school students taking physics (2005)
- 21% of undergraduate majors (class of 2006)
- 17% of Ph. D.'s (class of 2006)
- 6% full professors (2006)
- 43% of all departments have no women on faculty (2006)
- < 20 departments graduate ≥ 5 women B.S.'s (1999-2003)
- 10 departments producing ≥ 5 women Ph.D's (1999-2003)

women are still rare in the U.S. physics departments
(minorities even more rare)

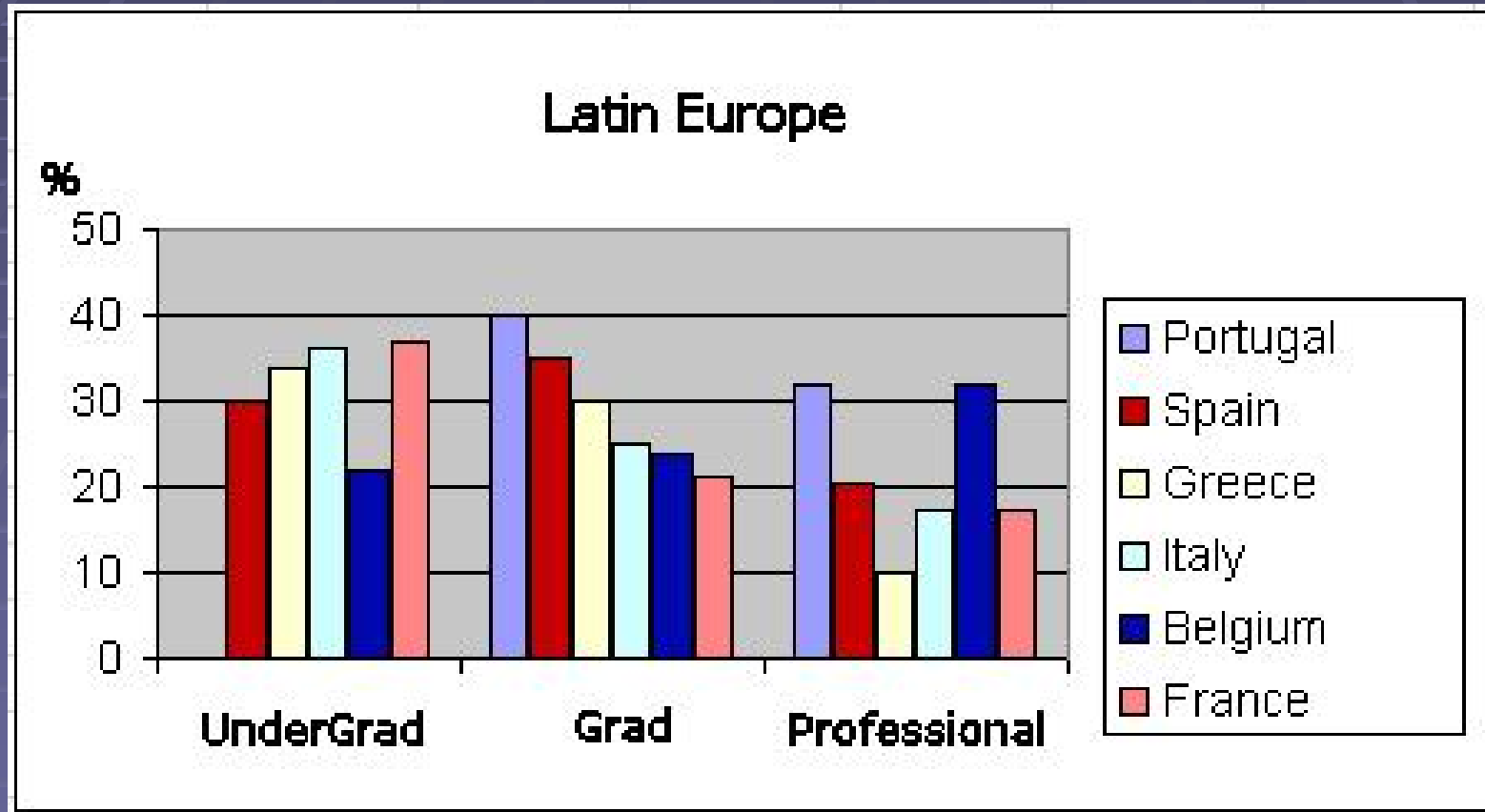
What's the Big Deal?

Statistics on Women in Physics in Europe



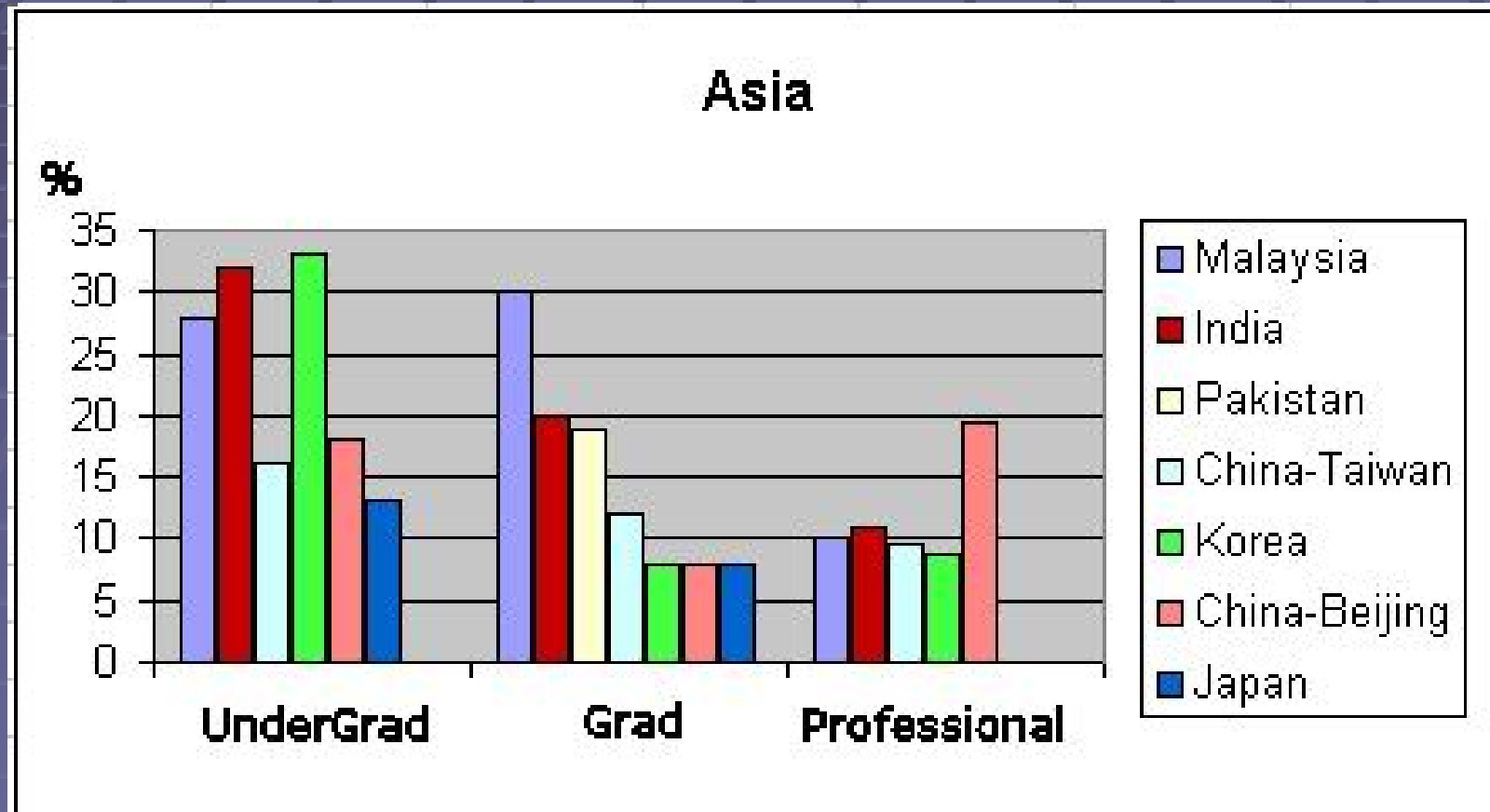
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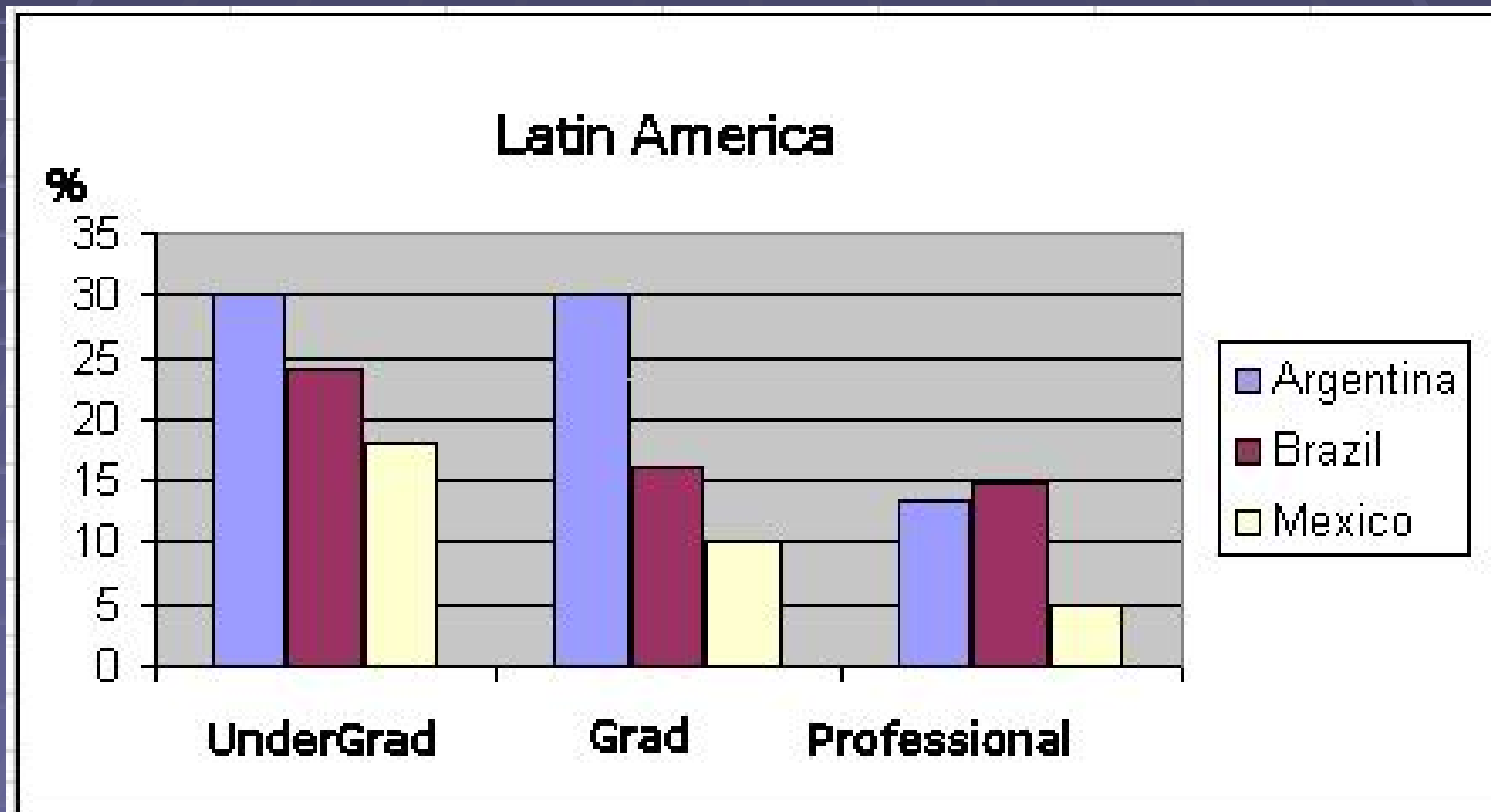
What's the Big Deal?

Statistics on Women in Physics in Asia



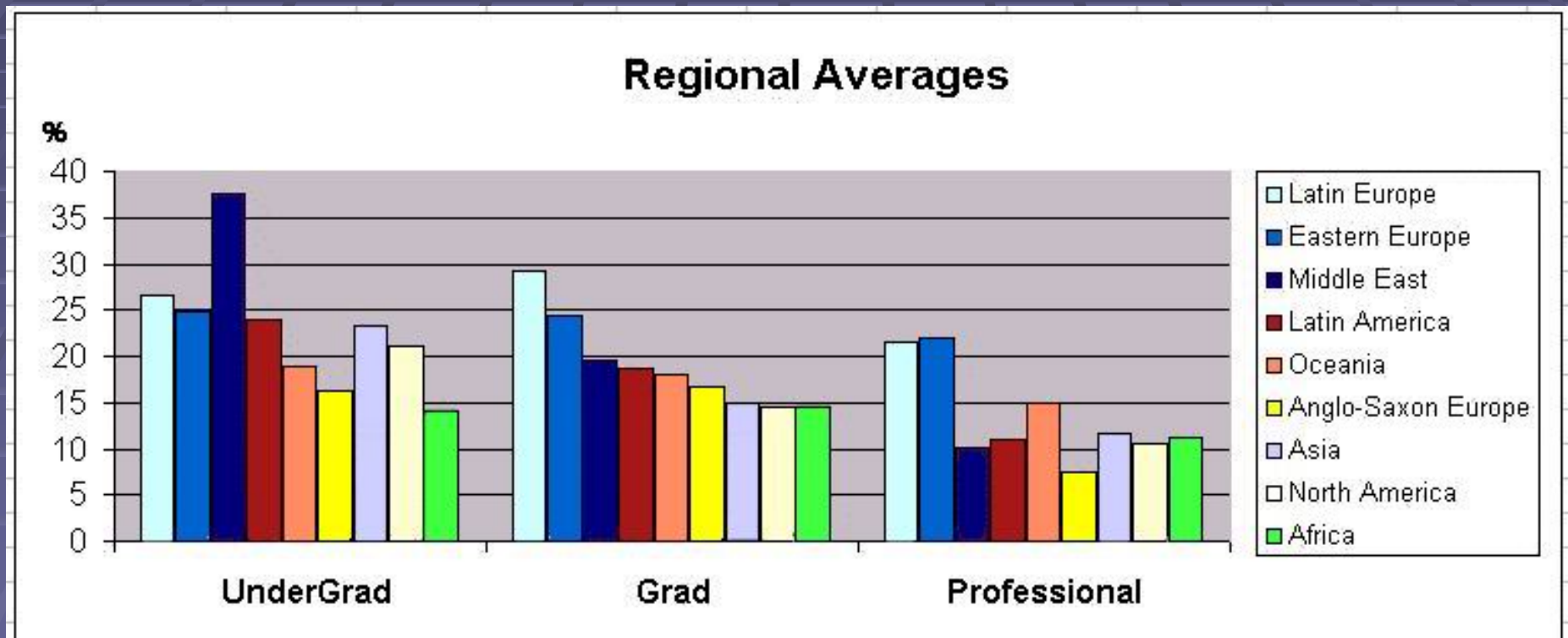
What's the Big Deal?

Statistics on Women in Physics in Latin America



What's the Big Deal?

Regional Averages on Women in Physics



Why The Concern?

“Because we want to create and work within a system that identifies, encourages, and supports the brightest and most motivated scientists and science students.”

- E. Gates, Phys. Today, 2006

Why The Concern?

- **Excellence of Science:**

excluding women weakens physics -- and all of science

- **Fairness and Justice:**

women deserve the same opportunity to have a career in physics;

taxpayer funded science need to benefit everyone equally

- **Health of Society and Science:**

more scientifically literate public → more support of science

- **Trained Workforce**

NAS, Beyond Bias and Barriers (2006)



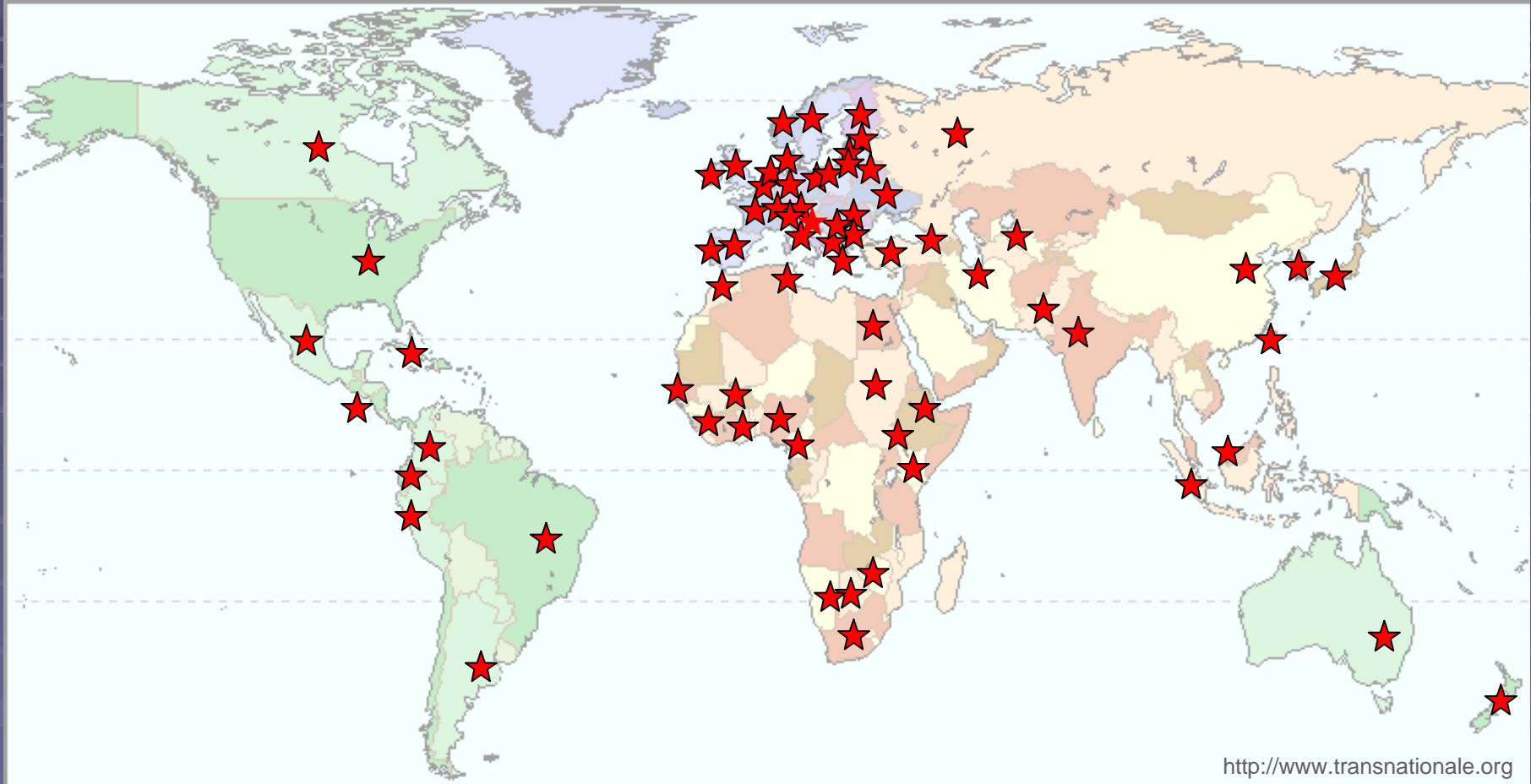
3rd IUPAP International Conference on Women in Physics

Purposes of the Conference:

- (i) to analyze the international status of women in physics, including recent progress in promoting their participation;**
- (ii) to provide an international arena for women in physics to share their scientific accomplishments and create scientific collaborations; and**
- (iii) to build each participating country's capacity to improve women's advancement in physics and related fields**

Conference Participants

~300 participants from 58 countries



- academic institutions
- national laboratories
- industry

- scientific societies
- national governments
- granting agencies

U.S. Delegation



(also Judy Franz, APS)

Conference Program: Plenary Talks

- Monika Ritsch-Marte (Medizinische Universität Innsbruck, Austria)
<http://www2.i-med.ac.at/medphysik/MRM.html>

Light microscopy's new jobs

- Maki Kawai (The Institute of Physical and Chemical Research, Japan)
<http://www.riken.go.jp/lab-www/surf-chem/maki/maki.html>

Single Molecule Chemistry

- Young-Kee Kim (University of Chicago and Fermilab, USA)
<http://hep.uchicago.edu/~ykkim/>

Extreme Physics where Small and Big Things Meet

- Pratibha Jolly (Delhi University, India)

Research and Innovation in Physics Education: Transforming Classrooms, Teaching and Student Learning at the Tertiary Level

- Michele Leduc (Ecole Normale Supérieure, France)
<http://www.phys.ens.fr/~leduc/>

Laser Cooling, Trapping and Bose-Einstein Condensation of Atoms and Molecules

- Thaisa Storchi Bergmann (Instituto de Física-UFRGS, Brazil)
<http://www.if.ufrgs.br/~thaisa>

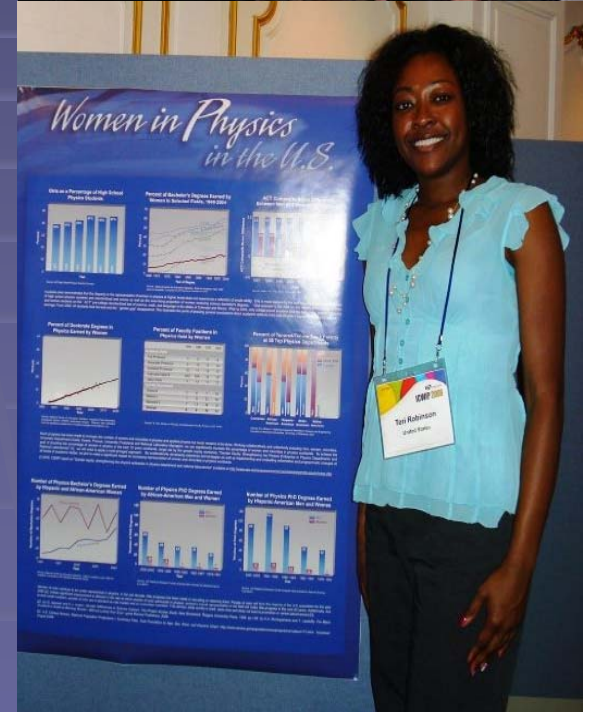
Feeding the Monster

Conference Program: Workshops

- **Personal professional development**
 - Navigation and Negotiation (aimed at early career people)
 - Negotiation to get what you need and want
 - Transitioning into leadership positions (aimed at senior women)
- **Attracting girls to physics**
 - Attracting young people to physics
 - Girl-friendly pedagogy
 - Camps, summer schools and programs
- **Site visits assessing and improving the climate for women**
- **Successful proposals and project leadership; Fund raising**
 - Fundraising
 - Grant Writing
 - Project Leadership
- **Organizing WIP Working Groups**
 - How to establish and keep alive a working group: networking
 - Women in physics country groups: useful things to do
 - Statistics on WIP: surveys, government database and more

Conference Program

- Posters:
 - Status of Women in Physics in each country
 - Research
- Reports from Workshops
- Conference Resolutions



Excerpts From Posters and Papers

● Namibia:

“Physics is a man’s subject, it’s too difficult for the fragile girl’s head to handle.”

● Kenya:

“women who pursue male dominated careers, like [that of] physics, tend to develop masculine characteristics, such as hairy body, kink hair. ... [Furthermore,] women become barren and ... look ugly, the feminine body structure disappears.”

● Senegal:

Women “have the responsibility of housework and taking care of children. There is no housework sharing between men and women. Traditionally, it is forbidden [for] men to do the housework.”

● Ethiopia:

“The learning of physics is adding challenge to [the women’s] existing challenge.”

● Burkina Faso:

“Women have to face multiple obstacles and barriers and have to arm themselves with a strongest willpower.”

Excerpts From Posters and Papers

● Estonia:

“In Estonia, women and men have equal legal rights. Women are expected to earn their living like men -- and unlike men to be the main (often the only) provider and caregiver for children.”

● Canada:

“Canadian women that have higher education may not encounter gender discrimination until they encounter the so called 'maternal wall' that hinders advancement in their professional careers.”

● Estonia:

“Physics and engineering are perceived as male areas and women active in these areas are often treated as exceptions.”

Where Are the Problems?

Society and Image of a Scientist:



- Why would I want to be a physicist: dull, nerdy, deficient in social skills MAN?
- What does HE do anyway?
- Where is the HUMAN aspect in physics?
- Man's world – not a “girly” thing to do?
- Doesn't society expect of me to choose a “soft option for future”?
- And is there money in it?
- Where are the role models?



Education, Teachers, and Schools:



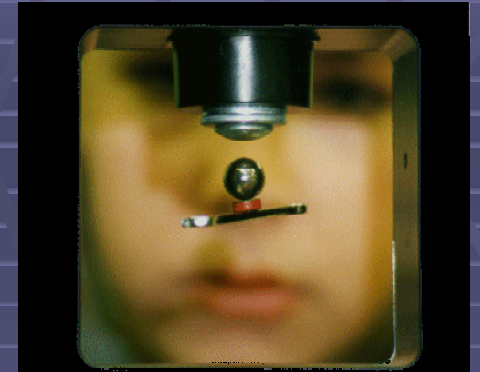
- Lack of *knowledgeable* and *enthusiastic* teachers
- Teachers perceptions and prejudices: doubting girls' abilities
- Alienating classroom atmosphere
- Stereotype threat
- Textbooks and teaching methodologies that are unfriendly to women
- Girl's perception of themselves: lacking assertiveness and self-confidence



Where Are the Problems?

Role of Family:

- Parents -- changing perceptions and prejudices :
 - girls are potential scientists,
 - education is not just the route to marriage,
 - science, just as humanities, is a valid carrier path
- Spouse:
 - choice of a spouse is critical,
 - support for balancing work and family responsibilities is essential



<http://www.phy.hw.ac.uk/events/set.html>

Third World Problems:

- Education:
 - large classrooms - no personal attention to girls,
 - lack of laboratory equipment - no connection to real life,
 - science, just as humanities, is a valid carrier path,
 - low glamour for academic and teaching jobs-poor teaching.
- Society:
 - pressure to get married rather than obtain a career,
 - low economic status,
 - lack of governmental financial support - science is uninteresting, unrelated to real life, useless
 - lack of job opportunities



Jamaican school, Winter 2002



Other Issues

Covert Discrimination:

- Lower expectations for women
- Uneven evaluation
- Narrow view of excellence
 - aggressiveness, assertiveness valued
- Accumulation of disadvantage
- Exclusion from informal networks
- Lack of transparency in hiring and promotions

"when men are in higher number in decision making bodies, women have much less chance of improving [their] numbers... unless men support the cause of women."

- Czech Delegation



Other Issues

Balancing Family and Career:

- Dual career and trailing spouse problem
- Childbearing and rearing as an additional full-time job
- Childbearing years overlap with establishment of career
- but...
 - Women w/o children not more successful
 - Many women in other demanding fields (e.g., biology)
 - Countries w/ strong support systems (e.g., Scandinavia) have few women in physics



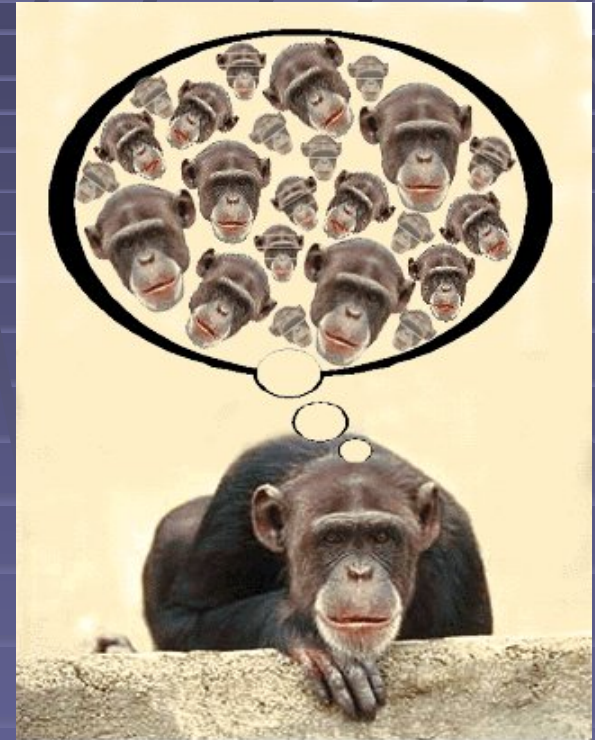
"Although the problem is now recognized, solutions to overcome problems such as women promotion and under-representation need constant actions from the women groups at the different institutions."

- Spanish Delegation

Other Issues

“Chilly” Climate:

- Unappealing hyper-competitive atmosphere --“combat physics”
 - instead, collaborative approach
 - ambition, not elitism
- “Cloning”
 - stereotype of successful physicist
 - lack of mentoring
 - lack of role models



Our ancestor. It is on the way to extinction.
Being cloned might avoid such adversity.

Jose F. Jaramillo ©

Other Issues

Problems in Developing Countries:

- **Blatant discrimination**
- **Lack of equality in the law**
- **Economic problems (hunger)**
- **Opposition from husband/family**
- **Lack of educational opportunity**
- **Lack of resources**



[//www.themodernreligion.com/picture/p_hijab_folklore_dutch](http://www.themodernreligion.com/picture/p_hijab_folklore_dutch)

Learning From Regional Differences:

Similarities -- Passion for Physics!

- Childbearing/Family Responsibilities
- Parental Influences
- Lack of Job Security, Post Post-Doc Positions
- Scarcity and Isolation of Women Physicists

Differences -- Resources

- Technical and economic situation for science
- State, social, and family support
- Quality of girls' education
- Cultural expectations, public image of physicists
- Available data on women in physics

Take Home Messages

Learn from the World:

- Situation of WIP in the U.S. is similar to many other countries → adapt solutions tried elsewhere to make faster progress at home
- Regional alliances are able to push progress faster → create alliances between institutions throughout the U.S.
- Women and men must continue to collaborate in their work on improving the status of WIP

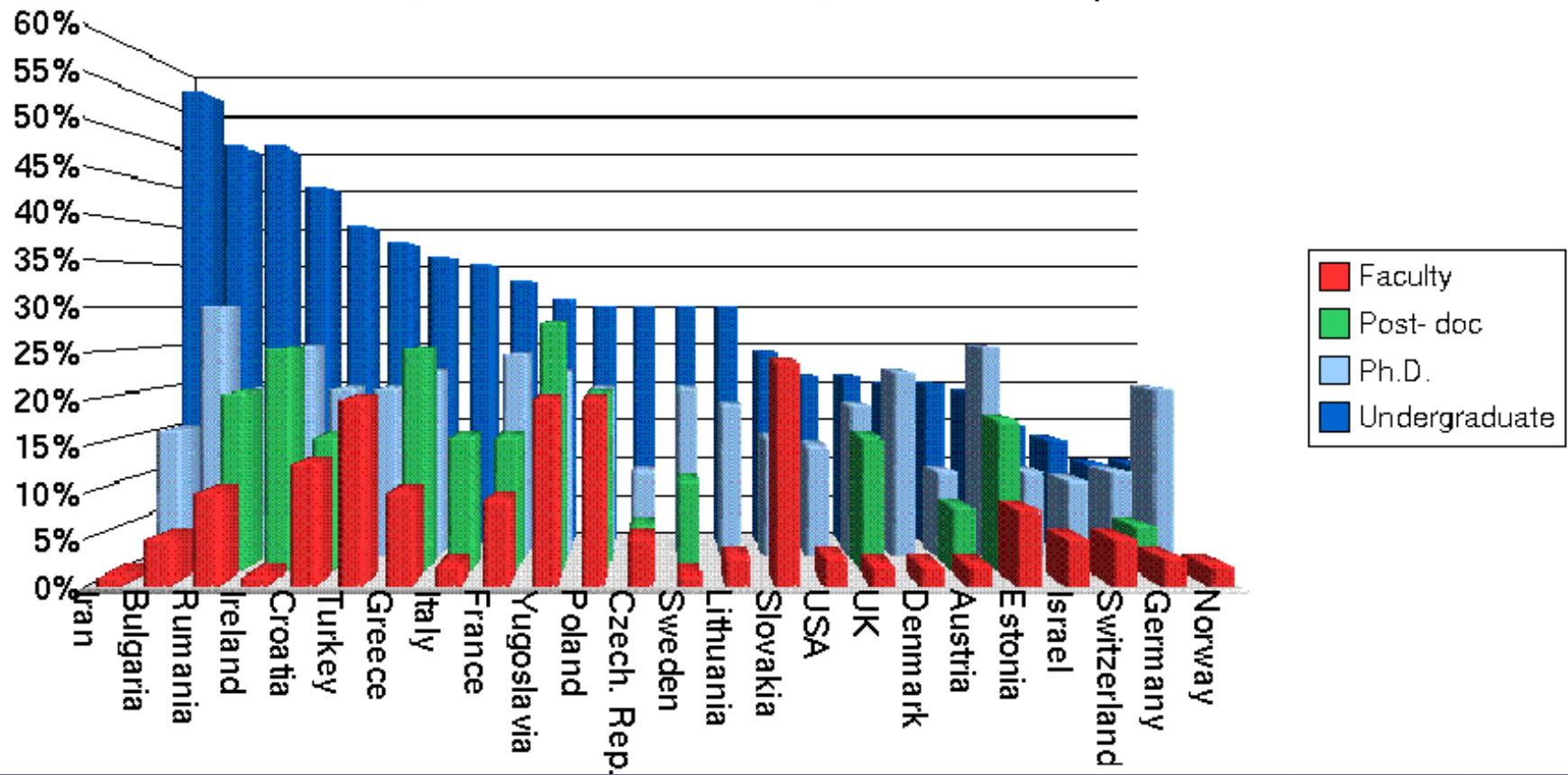
Take Home Messages

We Must Work Together with the World:

- **Overcome Myths:**
 - Women don't like physics
 - Women don't have innate ability to do physics: "fragile head" phenomenon
 - Women can't compete
 - Women have families which affects their advancement: "maternal wall" phenomenon
- **Learn from Each Other What Works:**
 - gathering statistics
 - forming WIP groups
 - site visits
- **Improve Women's Career**

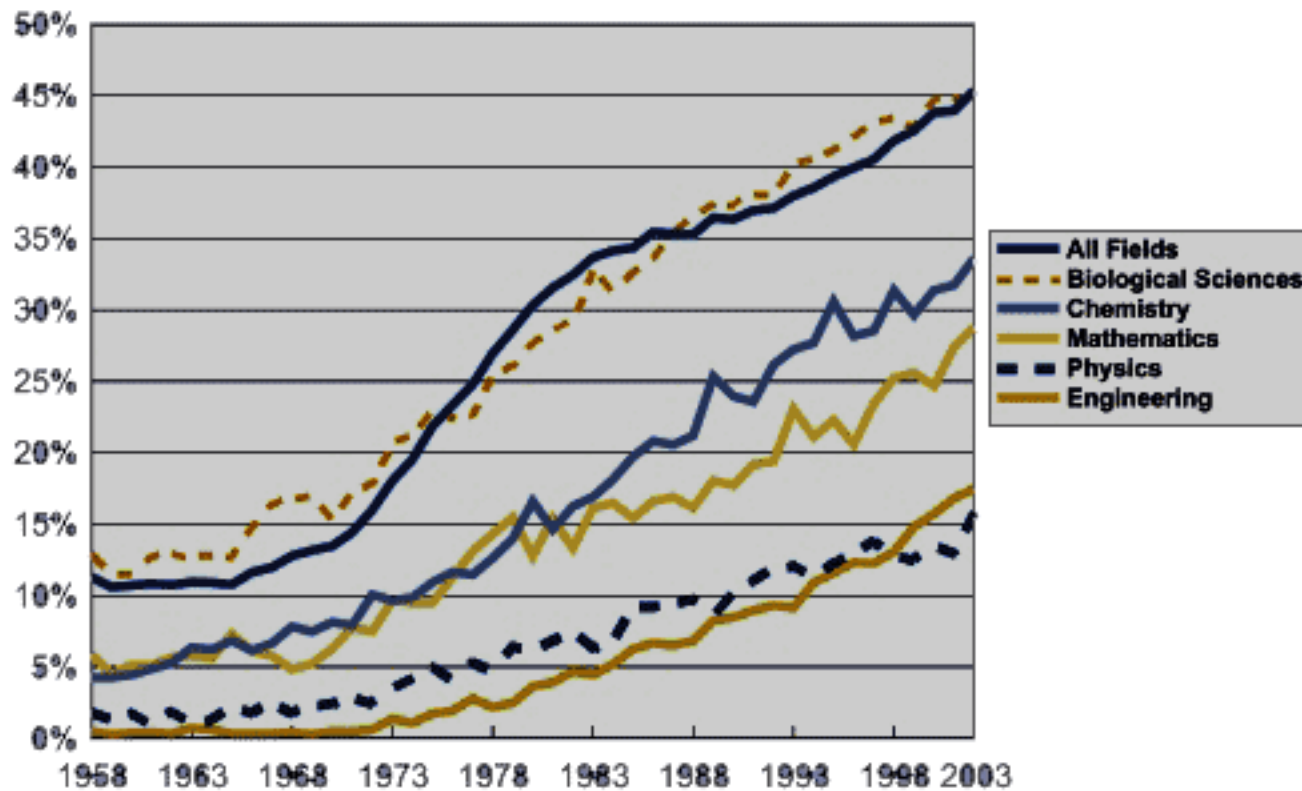
Myth: Women Don't Like Physics

Percentage Women in Physics, Europe/USA



Myth: Women Don't Have Innate Ability to Do Physics

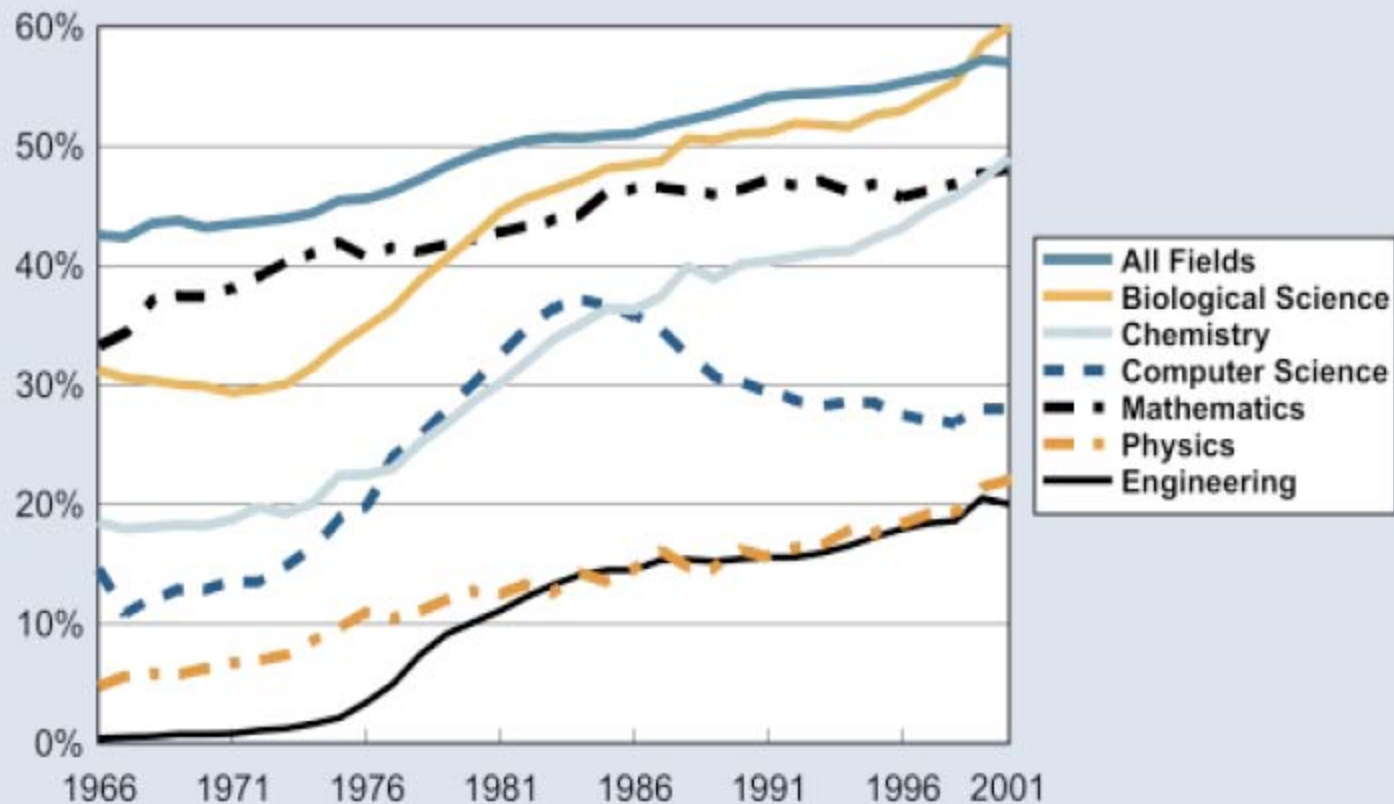
Percent Women Earning PhD in Various Fields



NSF; Compiled by AIP

Myth: Women Don't Have Innate Ability to Do Physics

Percent Women Earning BS in Various Fields

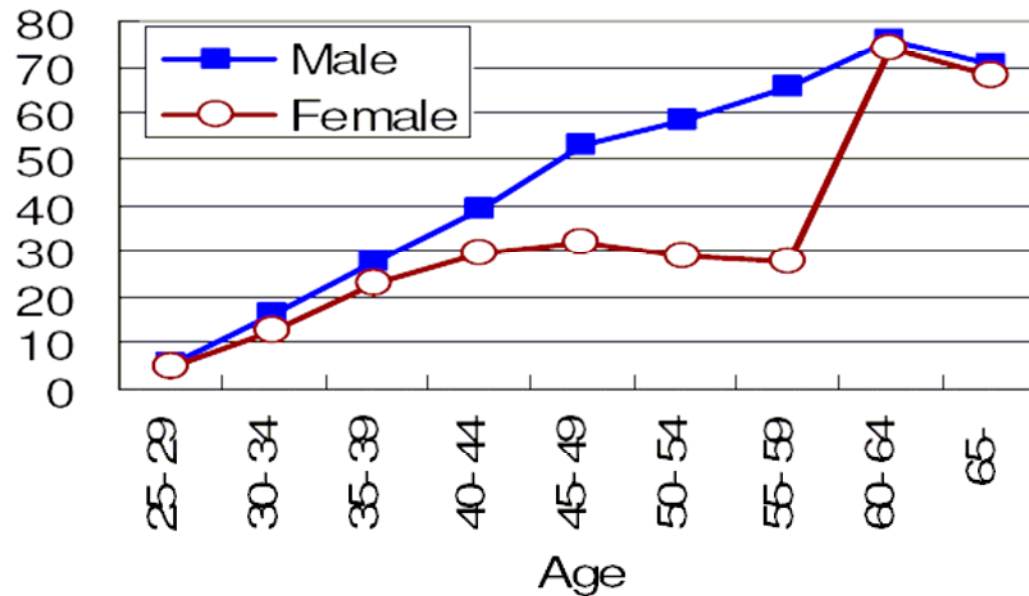


National Center for Education Statistics. Data for academic year 1999 not available.
Compiled by AIP Statistical Research Center.

Myth: Women Have Families

JPS/JSAP Survey on Status of WIP, 2002

Papers Published



Legacy of IUPAP conference

- Valuable exchange of views
- International network of women physicists
- **Resolutions** on key consensus views
- **Dissemination** by US team
- Further the ongoing international dialog (South Africa, 2011)



The end ...

For more info on conference: www.icwip2008.org

For info about the U.S. Delegation: www.uswip.org

Questions re: U.S. Delegation: questions@uswip.org