

American Physical Society

Around the World in 180 Minutes: Differences and Similarities among Women Physicists

March 16 - 20, 2009

The 3rd International Conference on Women in Physics:

Global Perspectives, Common Concerns, Worldwide Views



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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:**

why use only half the brain? (N. Chandra, India)
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)



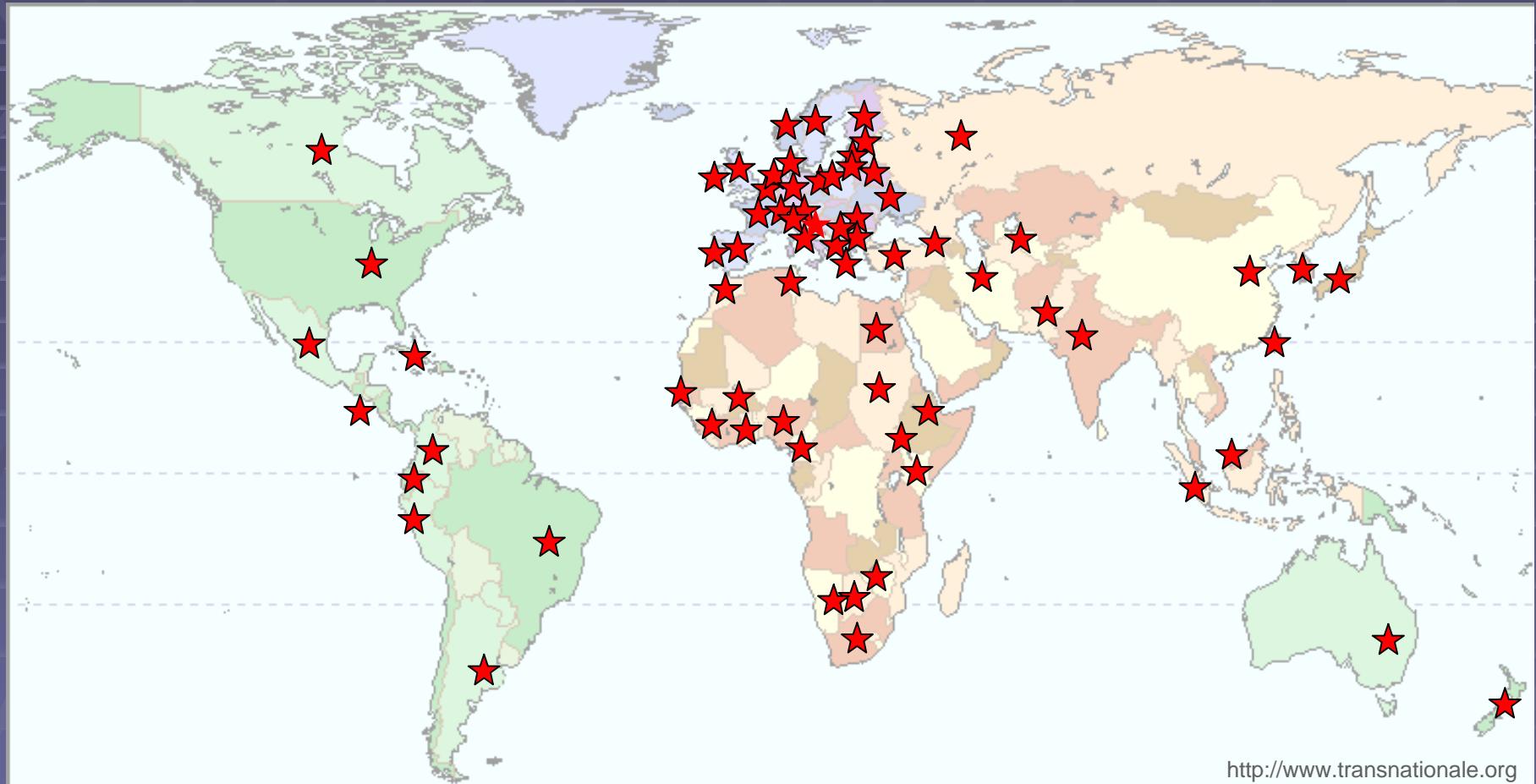
3rd IUPAP International Conference on Women in Physics

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, IUPAP)



Conference Program

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

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)
http://www.du.ac.in/college_teacher_details.html?id=83
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 outreach programs

● **Site visits assessing and improving the climate for women**

- Site visit program run by the U.S. APS
- Site visit program run by the U.K. IOP

● **Successful proposals and project leadership; Fund raising**

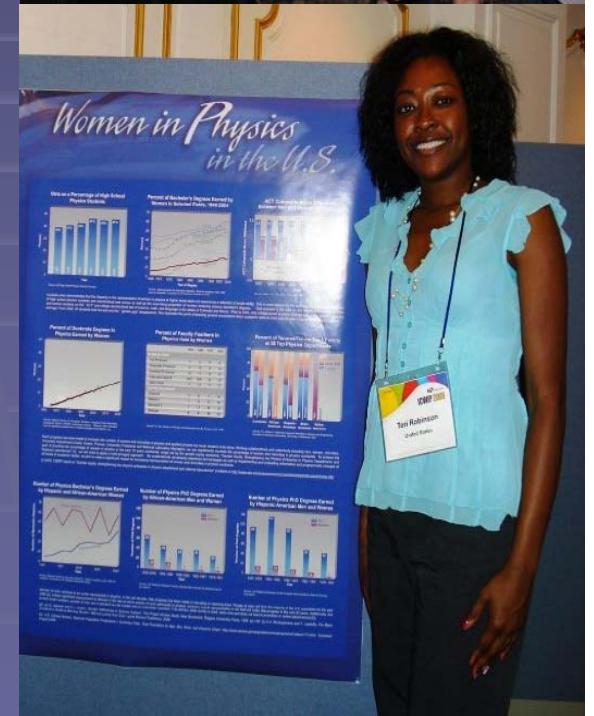
- Fundraising
- Grant Writing
- Project Leadership

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

● Brazil:

“... for a woman to enter in the fellowship program after the postdoc, ... she must have almost twice the number of publications when compared with the male researchers.”

● Pakistan:

“My parents do not allow me to join professional college because of co-education and my fiancé's parents do not like me [to receive] education with other boys. (More than 40% [women] students cannot pursue further education.)”

● 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.”

Excerpts From Posters and Papers

● Argentina:

“Starting last year, female CONICET scholars that have babies during the term of their scholarships are allowed to take up to 100 days off of paid leave and the term of the scholarship is extended for as many days as the duration of the leave.”

● France:

“... Other French distinctive features include: a favorable – although not perfect – social situation (low-cost public daycares and paid parental leave), and the fact that a large portion of women physicists are civil servants, hired for a permanent position in the public research system in their early thirties, after a short postdoctoral period.”

● Iran:

“More than 60% of university students are women in Iran. Generally women constitute a great majority of students who seek basic sciences and especially physics as their major of study. In Iran most of major universities have physics program[s] and physics is taught from secondary to post secondary education including undergraduate and postgraduate studies.”

Where Are the Problems?

Society and Image of a Scientist:



© 2002 Immersion Corporation

- 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?



<http://www.see-sciencecenter.org/>

Education, Teachers, and Schools:



- Lack of *knowledgeable* and *enthusiastic* teachers
- Teachers perceptions and prejudices: doubting girls' abilities (“gender schema”)
- 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:

- “Gender Schema:” 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



Meg Urry, Yale University

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
 - Overall productivity of women is equivalent to that of men (JPS Study)

"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."

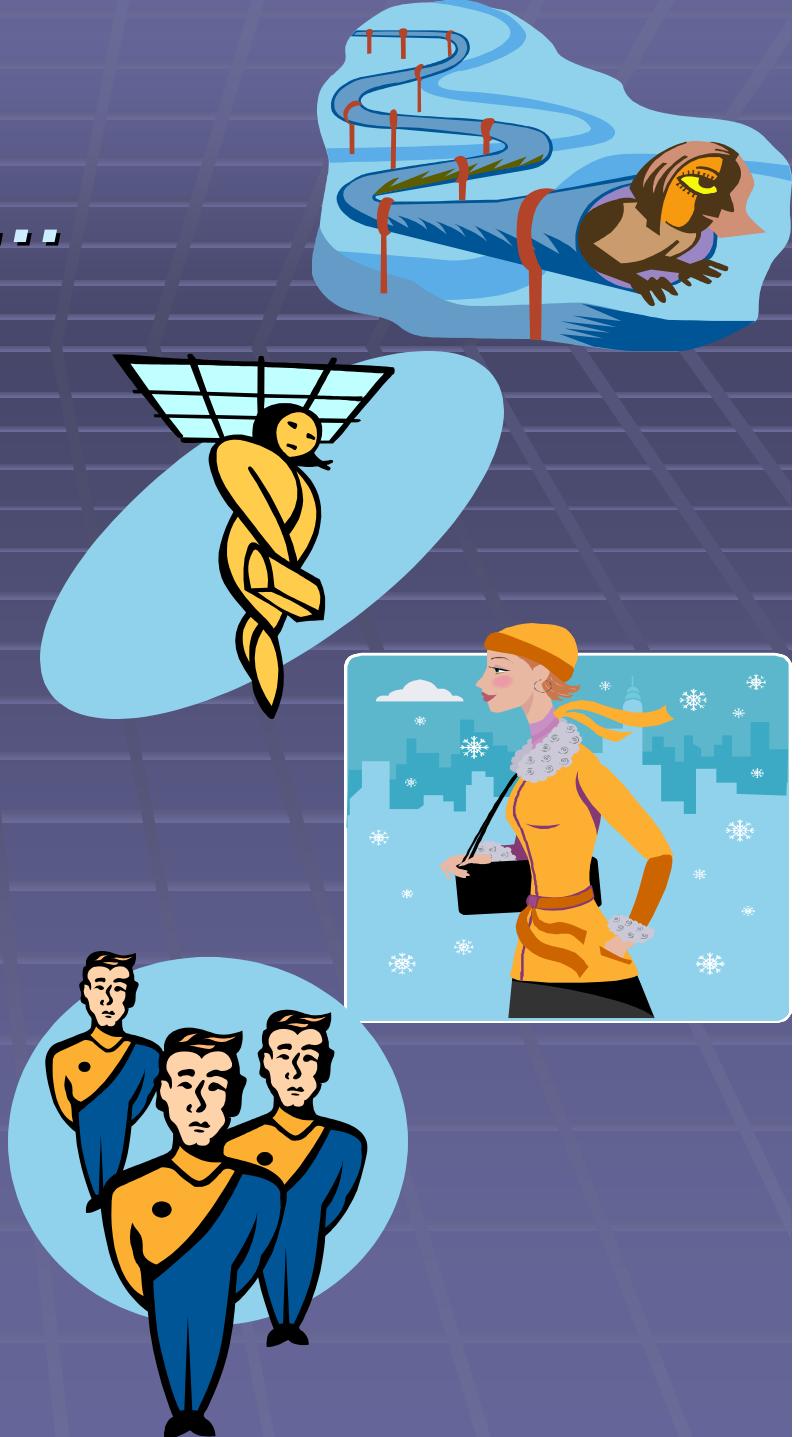
- Spanish Delegation

Meg Urry, Yale University

Other Issues

Metaphorically Speaking...

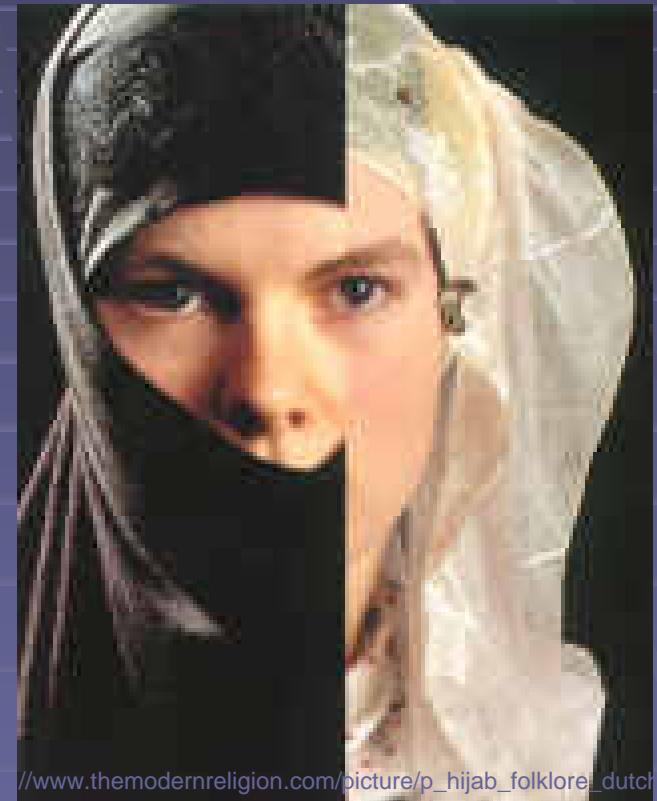
- “leaky pipeline”
- “glass ceiling”
- “chilly climate:” Unappealing hyper-competitive atmosphere -- “combat physics”
 - instead, collaborative approach
 - ambition, not elitism
- “cloning:” stereotype of successful physicist
 - lack of mentoring
 - lack of role models



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 human resources
- Insufficient financial resources
- Lack of equipment
- very low level of technology transfer
- Limited interaction b/n national partners
- Disconnected research activities
- No bibliometric indicator



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

Ndeye Arame Boye-Faye, Senegal

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 (Ceci *et al.*, Psychological Bulletin, March 2009):
 - 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

Legacy of IUPAP conferences

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



Meg Urry, Yale University

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

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