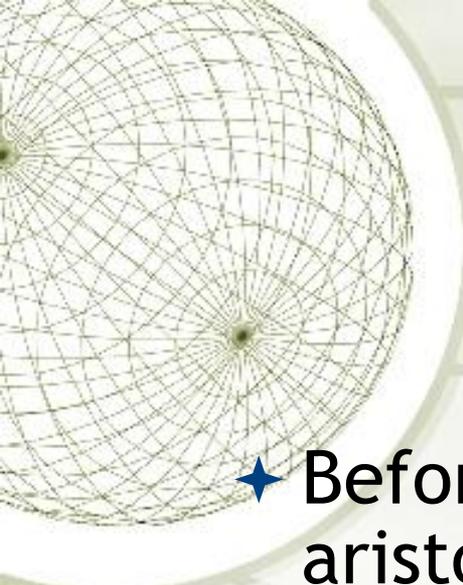


GIRLS IN SCIENCE IN FRANCE AND EUROPE

***Academy of Sciences of South Africa
PRETORIA
Tuesday 12 May 2010***

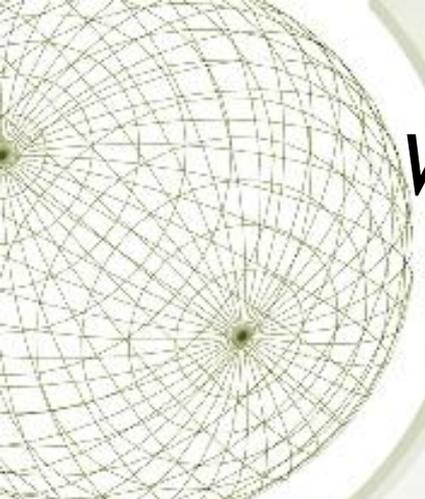
Odile MACCHI

**Emeritus Director of Research at CNRS
Member of the French Academy of Sciences**



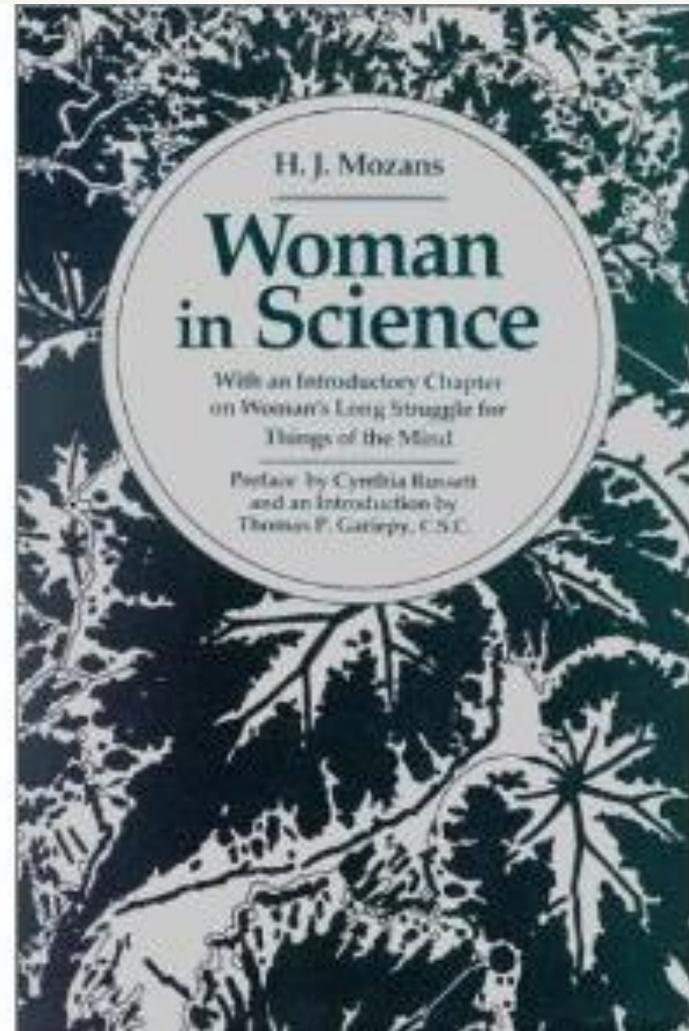
A LONG WAY FOR WOMEN IN SCIENCE

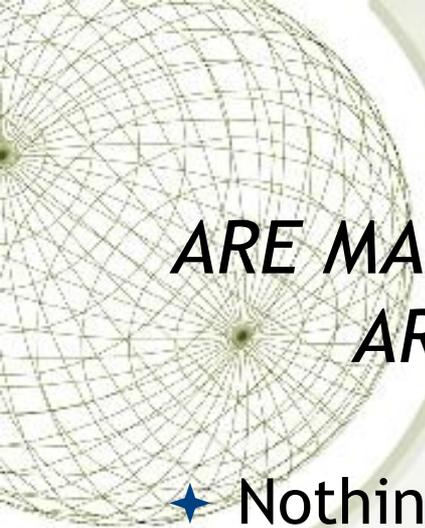
- ★ Before the 19th century a very few aristocratic women played a rôle of tutors, either wives or daughters of scientists
- ★ In the 19th century a few feminine colleges appeared in certain European countries (not France!)
- ★ Only after 1950, did things really begin to improve in Western countries: access to science education, PhD and career



WRITING ABOUT WOMEN IN SCIENCE: AN OLD TOPIC!

1913 H. J. Mozans, a Catholic Priest, invited women ‘to act in the scientific community and to break out the energies of half the population of the planet’.





***WOMEN ARE WONDERING:
ARE MATHEMATICS OF SOME CONCERN FOR US?
ARE THEY USEFUL FOR SOMETHING ?***

✦ **Nothing!**

It is mere beauty, as some wonderful music (J.-S. Bach)
And women love beauty

✦ **Everything!**

All human manufactured crafts rely on applied maths
And women care for welfare of others

✦ **Yes, definitely, maths are of great concern to women, ... just the same as to men!**

BACH THE MATHEMATICIAN

THE 'CANCRIZAN' CANONS

- ★ THE CRABE CANON.

Notice that the low voice is the same as the reversed high voice

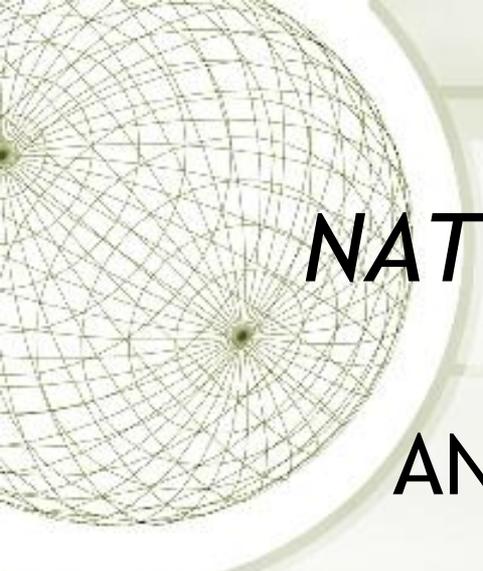
- ★ THE 'OFFERING' CANON IS STILL MORE WELL-KNOWN.

Crab Canon

J S Bach
Arr for 2 Guitars © Derek Hasted 1998

Downloaded from Derek Hasted's Guitar Ensemble Website at www.derek-hasted.co.uk

The image displays a musical score for the 'Crab Canon' by J.S. Bach, arranged for two guitars. The score is written in 4/4 time and consists of five systems of two staves each. The first system starts at measure 1. The second system starts at measure 5. The third system starts at measure 9. The fourth system starts at measure 13. The fifth system starts at measure 17. The score shows the intricate counterpoint of the canon, with the two voices moving in opposite directions. The key signature has one sharp (F#) and the time signature is 4/4.



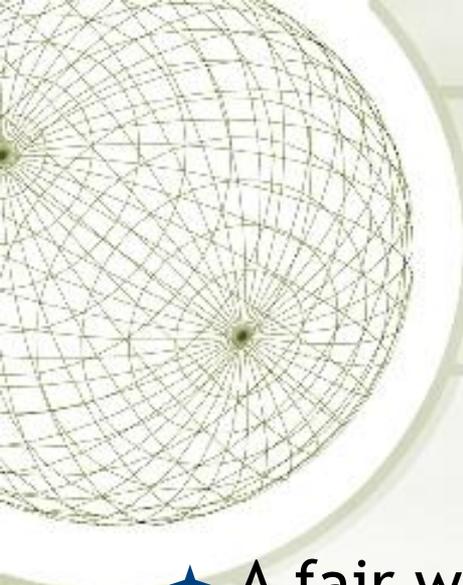
NATURE IS A MATHEMATICIAN!

AN EXAMPLE WITHIN BIOLOGY

ATGGCCAT

A<->T et C<->G

**This kind of protein folds itself in two
like an hair pinch!**



***I FEEL HAPPY AS AN APPLIED
MATHEMATICIAN WOMAN
I ENJOY MAKING DISCOVERIES***

I love applied mathematics

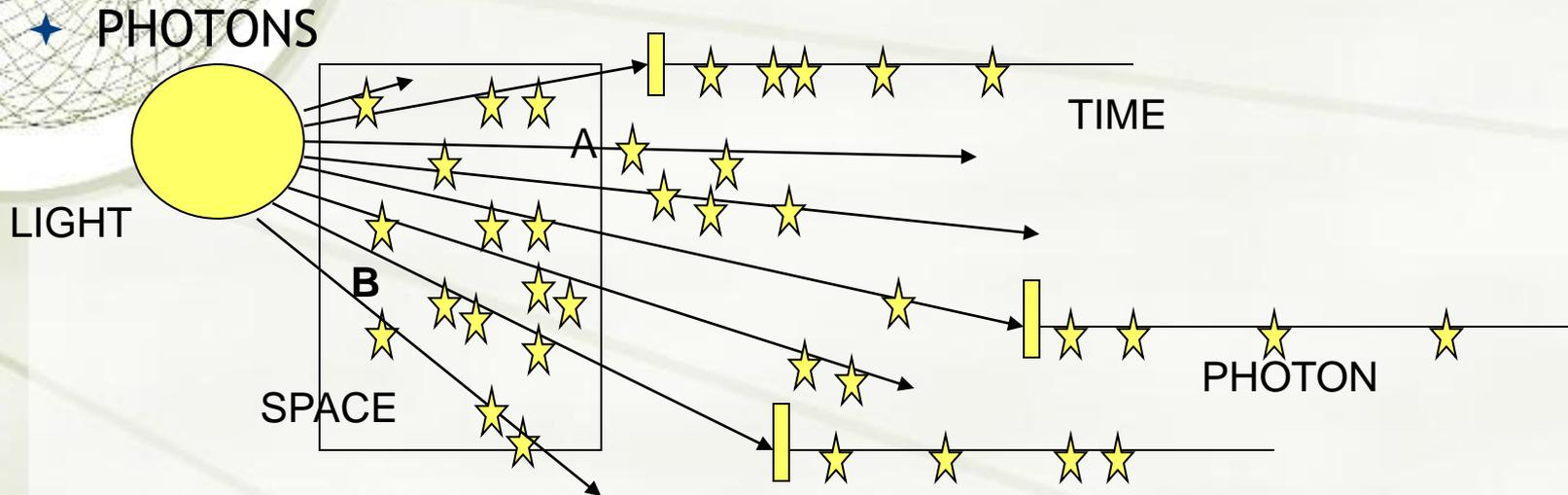
- ★ A fair way of thinking
- ★ And a fair way of acting

My expertise

- ★ Information theory
- ★ Signal and image processing
- ★ The random ‘beings’ which depend on hazard



EXAMPLE OF RANDOM POINTS



- Detect the photons one by one
- Compute the probability of a 'coincidence' in A and B
- Study the 'bunching' effect

EXAMPLE OF COMMUNICATION SYSTEMS



MODULATION

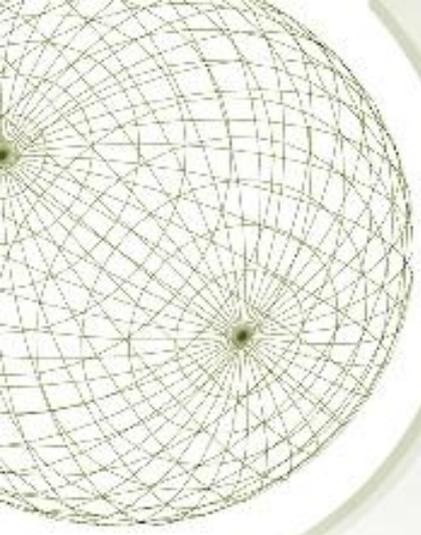


TRANSMISSION



DEMODULATION

- ✦ I studied digital communication as soon as 1970 and designed 'modems':
- ✦ First choose a good model for the messages and channels
- ✦ Demodulate accordingly
- ✦ Evaluate the error rate

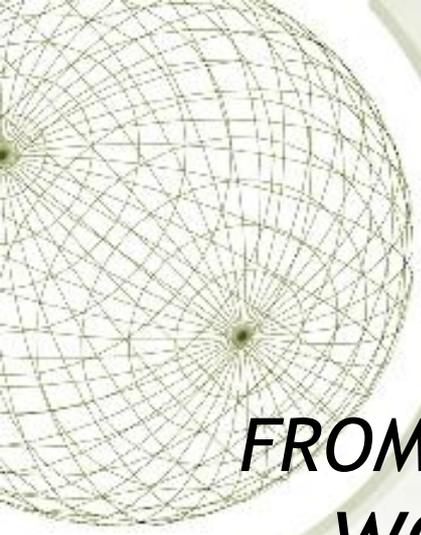


I ENJOY SHARING MY EFFORTS

*Science is made by teams,
just as other human activities!*

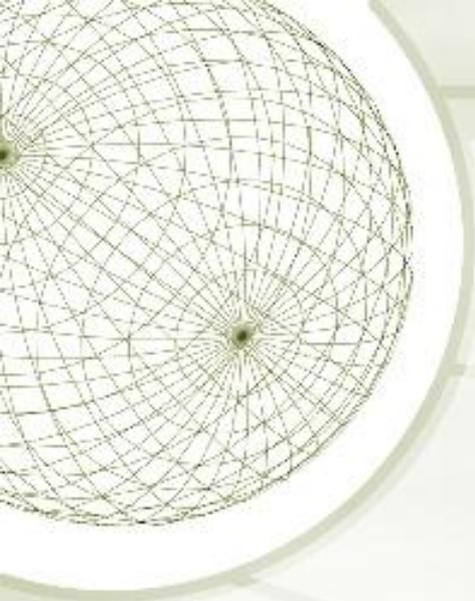
I feel happy

- ✦ **To teach**
transmitting my skills to young people
- ✦ **To form disciples**
sharing with them my enthusiasm
(just as I do with my children)
- ✦ **To be a member of a ‘community’**
Scientists love their ‘family’
- ✦ **To push imagination off the blackboard into action and
cooperate with engineers**



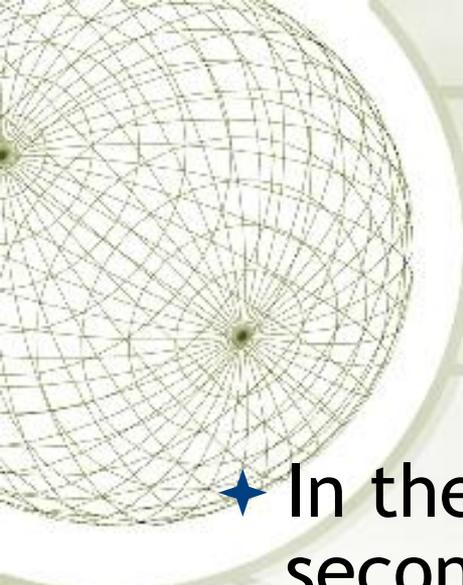
*MANY OTHER WOMEN
HAVING BENEFITED
FROM GOOD CONDITIONS SIMILAR TO MINES
WOULD HAVE DONE EVEN BETTER*

**SO WHY ARE THERE SO FEW
WOMEN SUCCESSFULL
IN SCIENCE ?**



AND DESPITE THE NOW WELL ESTABLISHED FACTS THAT

- ★ Variability of brains is rather relevant to the specificity of each person than to their sex
- ★ Mixity and diversity is a powerful lever to improve quality in any context, particularly in the professional area



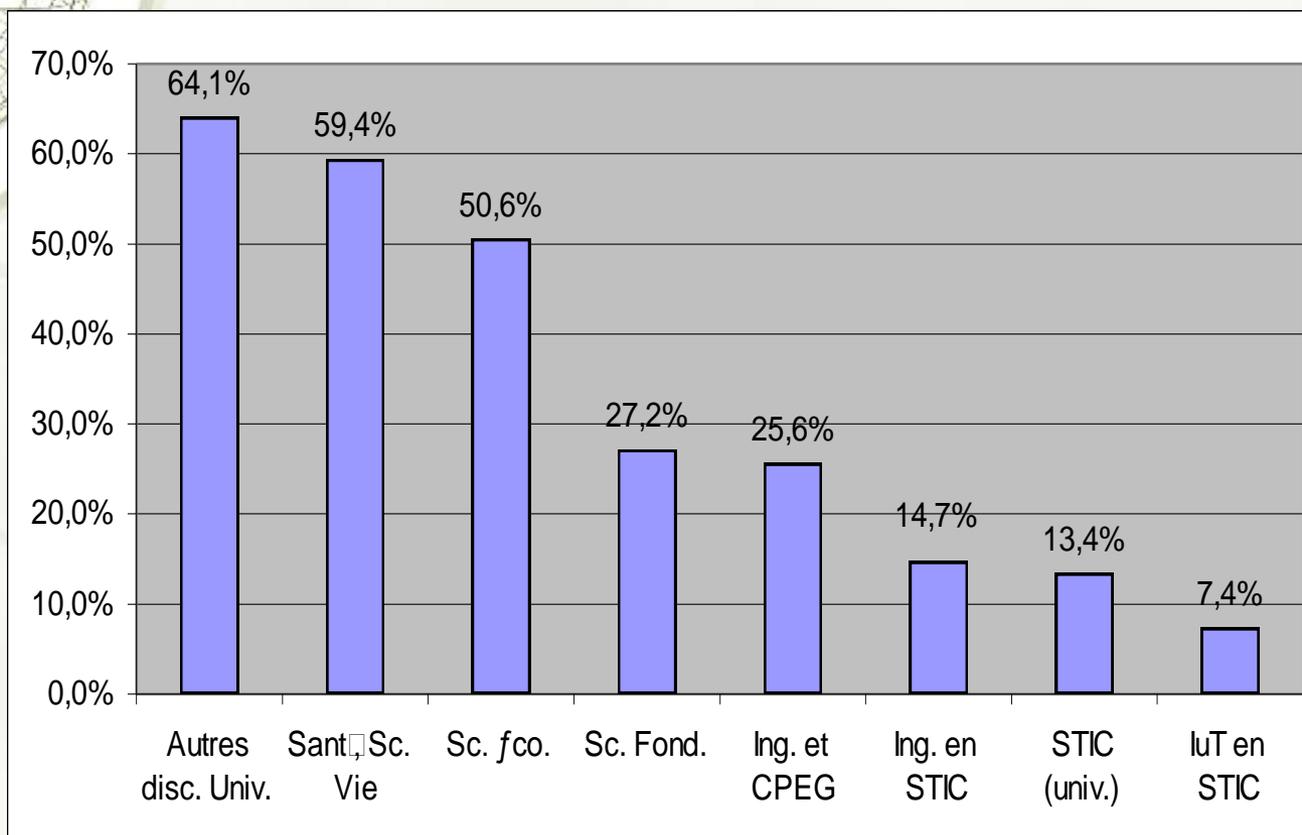
YET IN FRANCE

- ✦ In the scientific sections of the last year of secondary school, only 39% of girls
- ✦ The percentage of girls in scientific tertiary education remains low
- ✦ The percentage of computer scientists women is 28%.

It has decreased since 1995

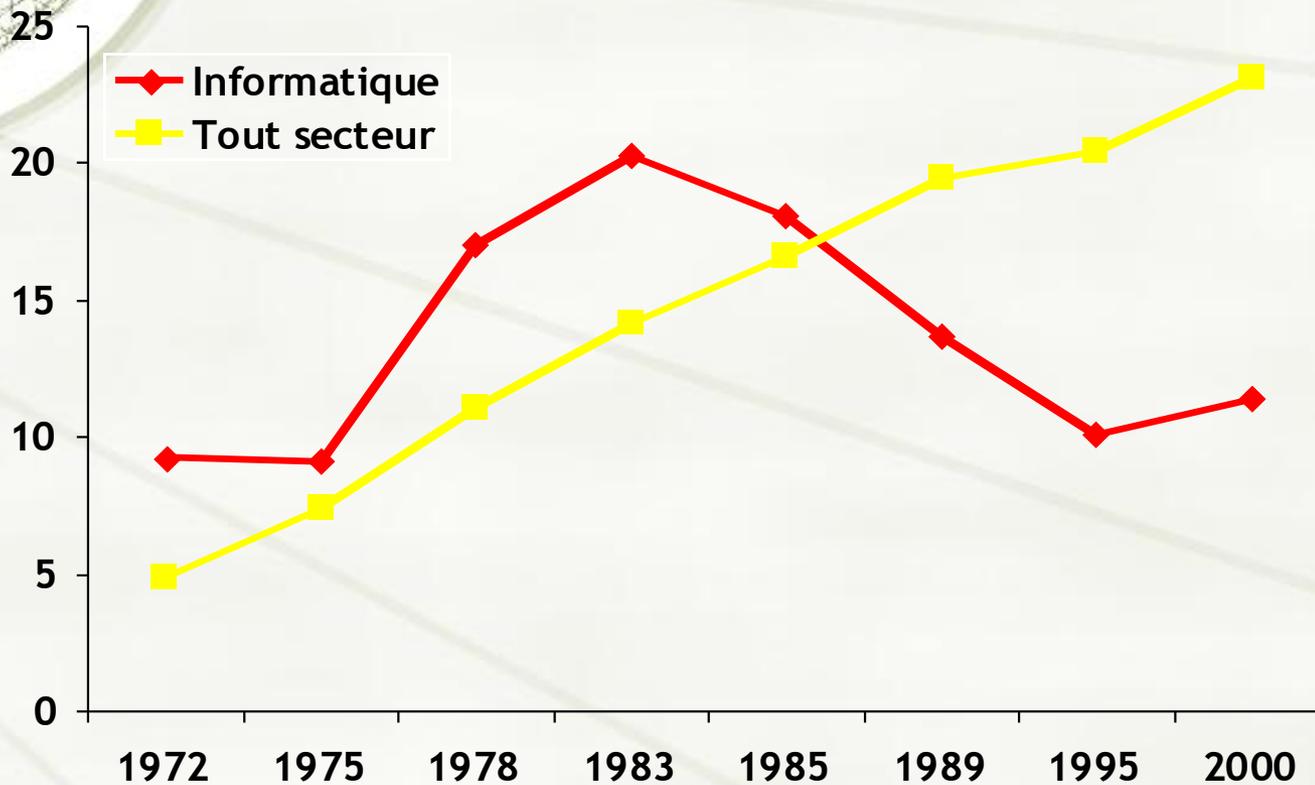
- ✦ Among academic people (professors or researchers in all disciplines and levels) only a third of women

PERCENTAGE OF GIRLS GRADUATING IN EACH DISCIPLINE

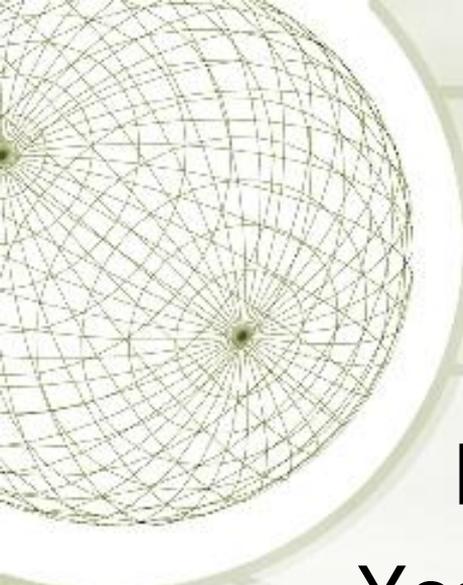


ANNÉE 2005

PERCENTAGE OF WOMEN IN HIGH ENGINEERING COLLEGES



Source C. Marry (2004), Une révolution respectueuse: : les femmes ingénieurs? Paris, Belin

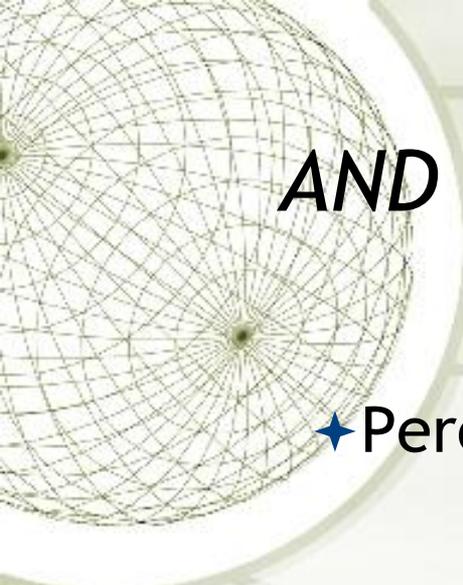


SIMILARLY IN BRAZIL

Distribution of researchers

Year	Women	Men
1995	39%	61%
1997	42%	58%
2000	44%	56%

It now remains approximately constant
(better than in France!)



AND IN THE EUROPEAN COMMUNITY (27 COUNTRIES)

- ★ **Percentage of women among PhD**

 - For maths and computing 41%

 - For engineering, manufacturing and construction 25%

- ★ **Percentage of women in the academic and research careers: 30%, with**

 - grade C

 - 44%

 - grade B

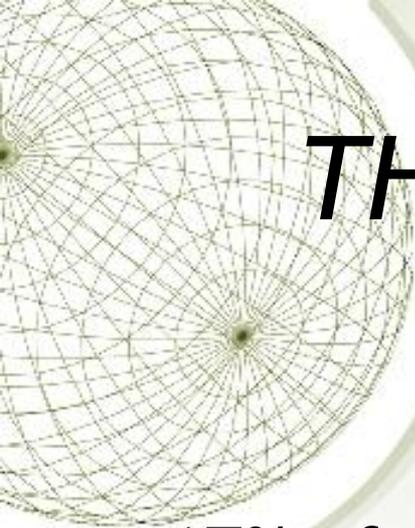
 - 36%

 - Grade A

 - 18%

- ★ **Women at the head of**

 - an Institution: 13%, a University: 9%

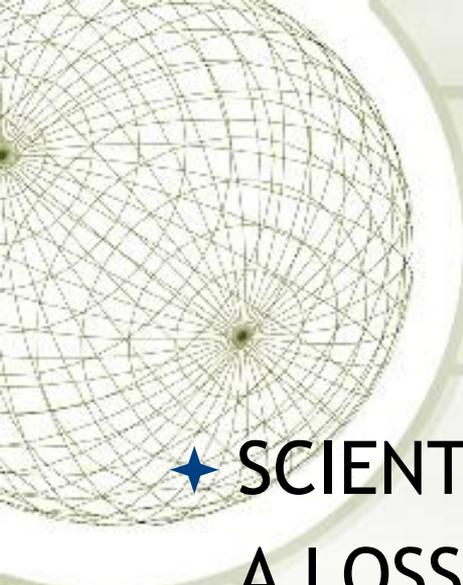


THE 6TH EC PROGRAM OF RESEARCH FUNDING

17% of the scientific coordinators for the 56.000 proposals and 11.000 funded grants in all disciplines are women (more for the smaller funding instruments), namely Science and society 34%, citizens and governance 28%, food and safety 27%, aeronautics and space 8%

Source The 'SHE FIGURS in science' program:

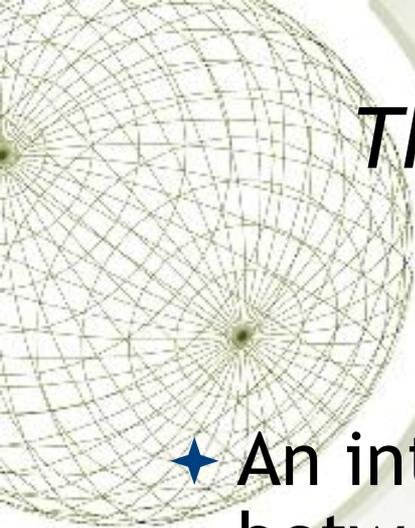
✦ <http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=126>



AS A RESULT

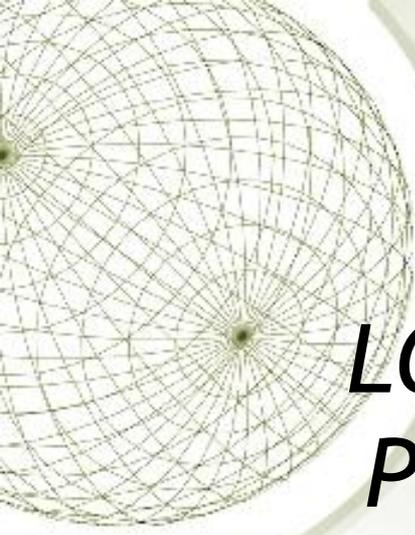
- ★ SCIENTIFIC JOBS ARE MISSING WOMEN,
A LOSS FOR THESE AREAS
- ★ POTENTIALLY BRIGHT WOMEN
ARE DEPRIVED OF SUCCESS IN SCIENCE

**OUR WORLD WASTES
MANY GIFTS OF NATURE**



THE FRENCH MINISTRY OF NATIONAL EDUCATION AND RESEARCH TAKES ACTIONS

- ★ An interministry agreement for equity between girls and boys, men and women
- ★ All levels of education contribute to promote equity between boys and girls
(statement of the Code of education)
- ★ The ‘Mission for parity’, a specific Department of the Ministry of education
- ★ A yearly report :
‘Girls and boys on the way to equity-
From primary to tertiary education’



UNESCO AND THE WORLD FIRM LOREAL RUN AN AMBITIOUS WORLD PROGRAM FOR WOMEN IN SCIENCE

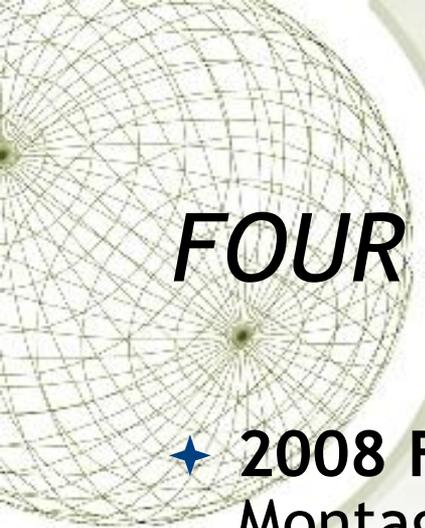
For instance each year

- ★ 7 fellowships of 20.000 \$ to young women researchers in Brazil (chemistry, biology)
- ★ 10 grants of 10.000 € to PhD girls in all disciplines in France
- ★ 5 very prestigious rewards to women, one per continent: 4 of them recently received the Nobel prize (later!)



2010 UNESCO-LOREAL AWARDS

- ✦ Europe: Anne Dejean-Assémat (France) “for the elucidation of the molecular and cellular mechanisms at the origin of certain cancers in humans”
- ✦ Africa: Rashika El Ridi (Egypt) “for paving the way towards the development of a vaccine against the tropical disease Schistomiasis/Bilharzia, which affects over 200 million people”.
- ✦ Asia-Pacific: Lourdes J. Cruz (Philippines) “for the discovery of conotoxins produced by certain marine snails that can serve as painkillers and pharmaceutical probes to study brain function”.
- ✦ North America: Elaine Fuchs (USA) “for the discovery of stem cells and key processes involved in skin development, maintenance and repair”.
- ✦ Latin America: Alejandra Bravo (Mexico) “for her understanding of the mechanism of a bacterial toxin that acts as an environmentally friendly insecticide”.



FOUR RECENT NOBEL PRIZES WOMEN

- ✦ **2008 Françoise Barré Sinoussi** jointly with Luc Montagnier for their discovery of "human immunodeficiency virus" (**Physiology or Medicine**)
- ✦ **2009 Ada Yonath** jointly with Venkatraman Ramakrishnan, Thomas A. Steitz "for studies of the structure and function of the ribosome" (**Chemistry**)
- ✦ **2009 Elizabeth Blackburn** jointly with Carol Greider and Szostak for having discovered how the chromosomes can be copied completely during cell divisions and how they are protected against degradation (**Physiology or Medicine**)

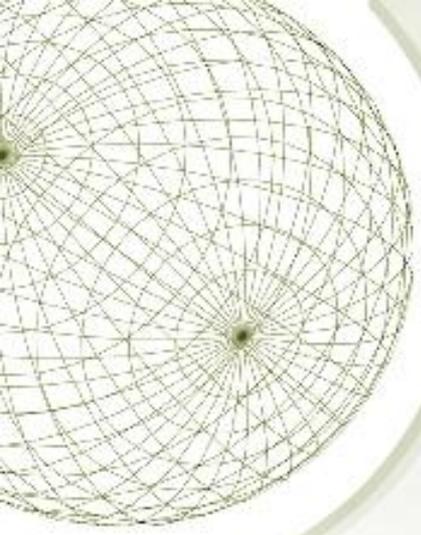


LISTEN TO WOMEN LAUREATES

UNESCO-LOREAL AWARDS, 2007

- ✦ Tatiana BIRSHTEIN: ‘The best beauty of science is its power for changing the world’
- ✦ Margaret BRIMBLE: ‘A discovery is a victory when it is shared’
- ✦ Mildred DRESSELHAUS: ‘It is love that motivates a scientific career’
- ✦ Lilia GARGALLO: ‘Women in sciences enjoy a gift of sensitivity’
- ✦ Ameenah GURIB FAKIM: ‘Decreasing children sufferings, one more reason to devote oneself to science’

I AGREE WITH ALL THIS, DON'T YOU?

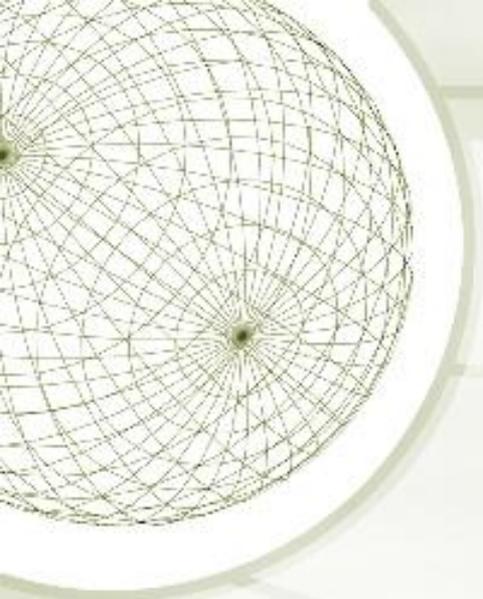


*BEING A MATHEMATICIAN,
AND COOPERATING WITH ENGINEERS*

Yes I had to struggle,
but it has made me happy.

And if indeed I struggled more than a man (?),
then I feel all the more happy.

THUS I AM PROUD TO BE A WOMAN



CONCLUSION

**LET ALL SCIENTISTS
EITHER WOMEN OR MEN
BE HAPPY WITH SCIENCE**

**LET THEM BE WITNESSES OF THE JOY
OF THE RESEARCH JOB**