

GENDER ISSUES IN THE EV AND OTHER STORIES

Giulia Pancheri INFN - Frascati



FROM NEW ORLEANS 2008 APS FORUM ON INTERNATIONAL PHYSICS SESSION

Einstein's quote, " Science is not a high status activity except as an admission card into the community of modern countries "

I would say therefore that

for **women** to be left **out of science** means to be left **out of the modern world**.

There have been many women in physics in the last century (and in the other sciences) but they are still a minority.

<http://www.ucla.edu/~cpw/>



4/24/08

A

The society

- In the Middle ages women education, rich and poor alike, was essentially done by and through the Church convents
- The distruction of convents, as Church's property, by the part of Henry VIII, brought the disappearance of such educational system and, thus, for a long time, the disappearance of ANY educational system dedicated to women
- Universities like Oxford (St. John 's College for example) and Cambridge, where women were not admitted as students, were then enriched and made more powerful by the wealth confiscated to the convents
- After the Renaissance, there is the birth of modern states, where the central power (from a King or a Queen) substitutes the power of individual princes and their courts

4/24/08

APS-FIP

And the birth of Modern Science

- During the Middle Ages, the great seats of learning were mostly in the convents and the Abbeyes, with famous women known through Europe, both in Germany and England.
- Modern Science start with Galileo Galilei through the inductive-deducting system of approaching the natural world
- The process to Galileo moves the Science from the South to the North of Europe, since the process signal the Church's difficulties with freedom of thought
- The new method with the necessity of reproducing the experimental reasults need a structured system of laboratories and teaching and thuis universities start acquiring more power
- In the protestant countries, Science opasses from the courths of great novbles, like Ticho Brahe, to the Universities themselves

MODERN SCIENCE PROSPERED IN THE
UNIVERSITY SETTINGS IN NORTHERN EUROPE
BUT WOMEN WERE NOT ALLOWED TO ENTER

Examples of (mostly **non**) access to higher education :

- In the USA
- In England
- In Sweden
- In Poland
- In Italy : a counterexample

EXAMPLES OF UNIVERSITY ACCESS POLICIES IN NORTHERN EUROPE AND THE UNITED STATES

In the USA

- The first public schools were founded in Boston in 1642, but girls were not admitted until 1789 and only to read and write (no math)
- Harvard College was founded in 1636 for "ye Indian and English youth" but women were not admitted
- The first women's college was Vassar college, founded in 1865
- At Harvard, Radcliffe College was officially incorporated in 1894, but women were not allowed to attend classes with Harvard students until 1943 (full merger only in 1999) and until 1967 girls were not allowed in some of the libraries (for instance Lamont Library) to avoid distracting the boys...

EXAMPLES OF UNIVERSITY ACCESS POLICIES IN NORTHERN EUROPE

In Poland (from *M. Krawczyk*)

- At the Jagellonian University in Krakow in the Philosophy Department in 1897/98 there were 94 women admitted as “free students” who did not have to pass the Matura
- University of Warsaw : The University was founded in 1816, women were admitted to the University after the first World War as the University reopened at the end of the war.
- The first woman professor at University of Warsaw was Cezaria Baudouin de Courtenay-Ehrenkretz, Professor of Ethnography in 1934.

EXAMPLES OF UNIVERSITY ACCESS POLICIES IN NORTHERN EUROPE AND THE UNITED STATES

In Sweden (from *T. Sjöstrand*)

- 1870: women acquire the right to take "student exam", the official finishing exam of the "high school" (gymnasium) level of studies, that defined the standard of learning required to be admitted to universities in the first place
- 1873: women acquire the right to study and take exams at the universities, with the exception of theology and law, which followed much later
- 1880: the first woman is admitted to Lund University (she acquired a medical degree in 1892, as the second female doctor in the country)

EXAMPLES OF UNIVERSITY ACCESS POLICIES IN NORTHERN EUROPE AND THE UNITED STATES

In the United Kingdom

- At Cambridge the first women's Colleges were founded in 1869 (Girton) and 1872 (Newnham)
- At Oxford the first women's College, Lady Margaret Hall, was founded in 1878
- At Durham the first female enrollment in the University was in 1896 (from *M. Pennington*)

WHAT IS HAPPENING NOW?

- Some actions by the EU commission
- Some statistics from high energy physics
 - CERN
 - ATLAS
 - INFN
- Some personal idea about things to do for positive changes

WHAT HAPPENS NOW?

OUTLINE

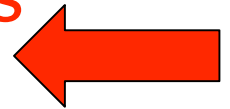
1. The EU Commission
2. EU gender trends in S&T
3. What is happening in EU
4. Examples from high energy physics
5. Longevity vs. seniority

EU GLOSSARY

- European Community(EC) :
 - the Member States (MS)
- European Union (EU) :
 - MS + Community Institutions
- European Council sets the political guidelines:
 - EU heads of State + President of the EU Comission
- Institutions of the European Community

EC INSTITUTIONS

- EU Council of Ministers :
overall governance designated by Member States (MS) Governments with
presidency rotating through MS every 6 months
- EU Parliament :
consultation and co-decision with the Council of Minister
selected by people in each MS
- EU Commission : designated by MS, is the
executive body, and normally lasts 5 years
- Court of justice
- Court of Auditors



THE EU COMMISSION

- Is the effectively the **governing** body, proposes policy, responsible for implementing and managing Community programs
- The Commissioners are **27**, one for each MS and each **commissioner** is responsible for a Directorate-General or an area of work
- Directorates are managed by a **Director General**, which is a permanent staff

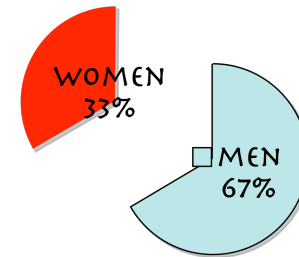
THE EUROPEAN COMMISSION

- The Commission
 - 27 Commissioners for all facets of EU life
 - 9 of them are **women**
 - Commissioner for Science and research



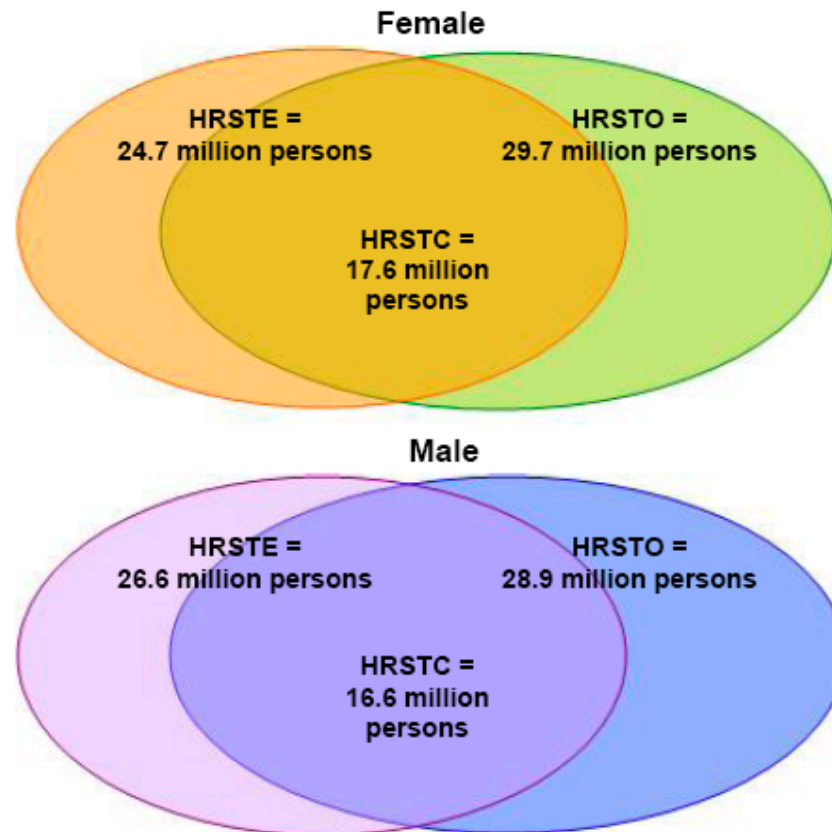
DG Research

EU COMMISSIONERS



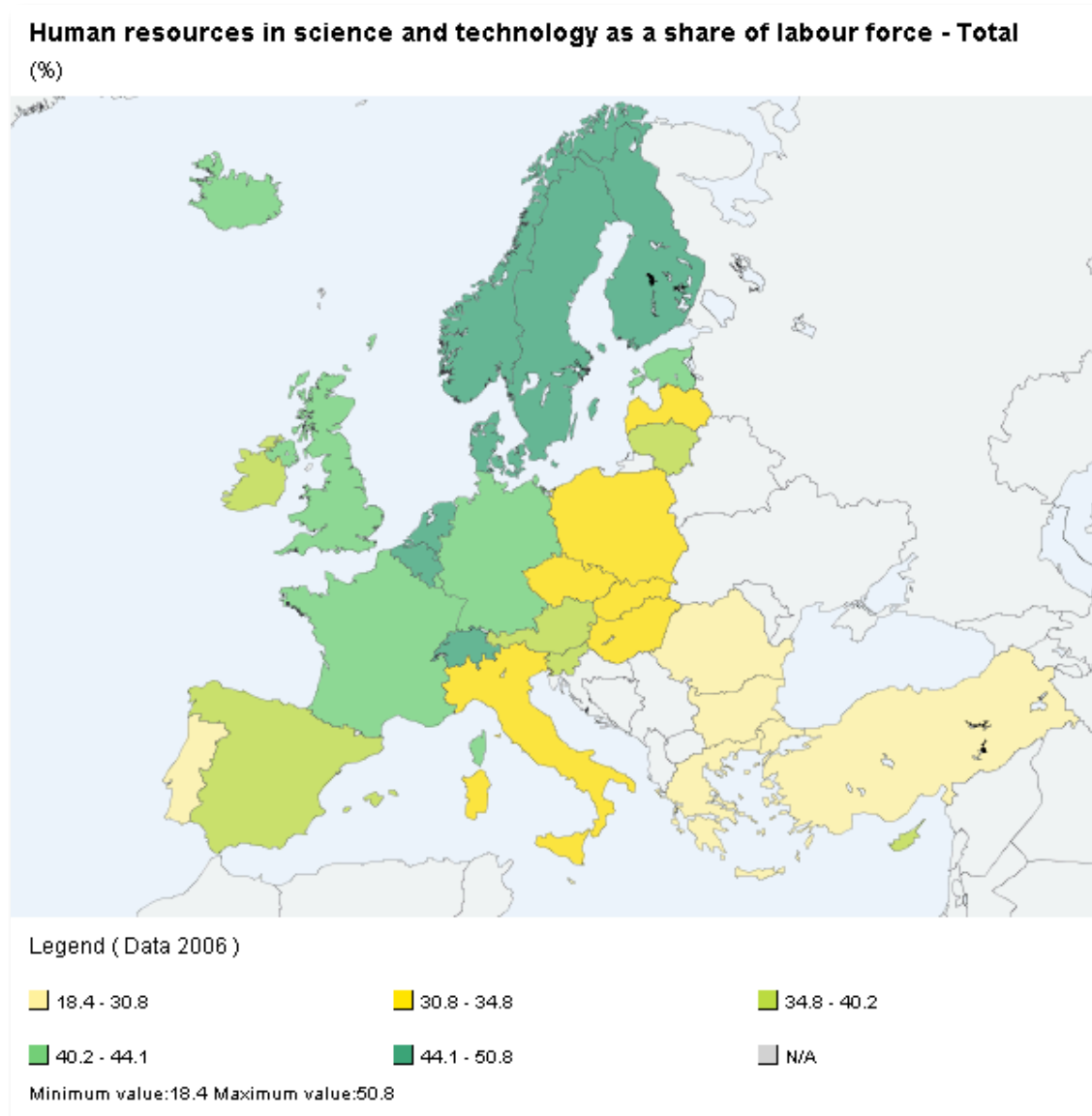
Employed human resources in science and technology (HRST) by sub-population and gender

Figure 1: Employed human resources in science and technology (HRST) aged 25-64 by sub-population and gender in the EU, 2006

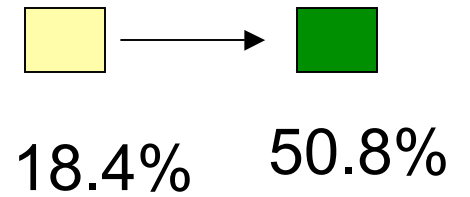


EU-27 estimates with 2005 data for BE and IE.
For definitions of HRST, see methodological notes (p. 7).

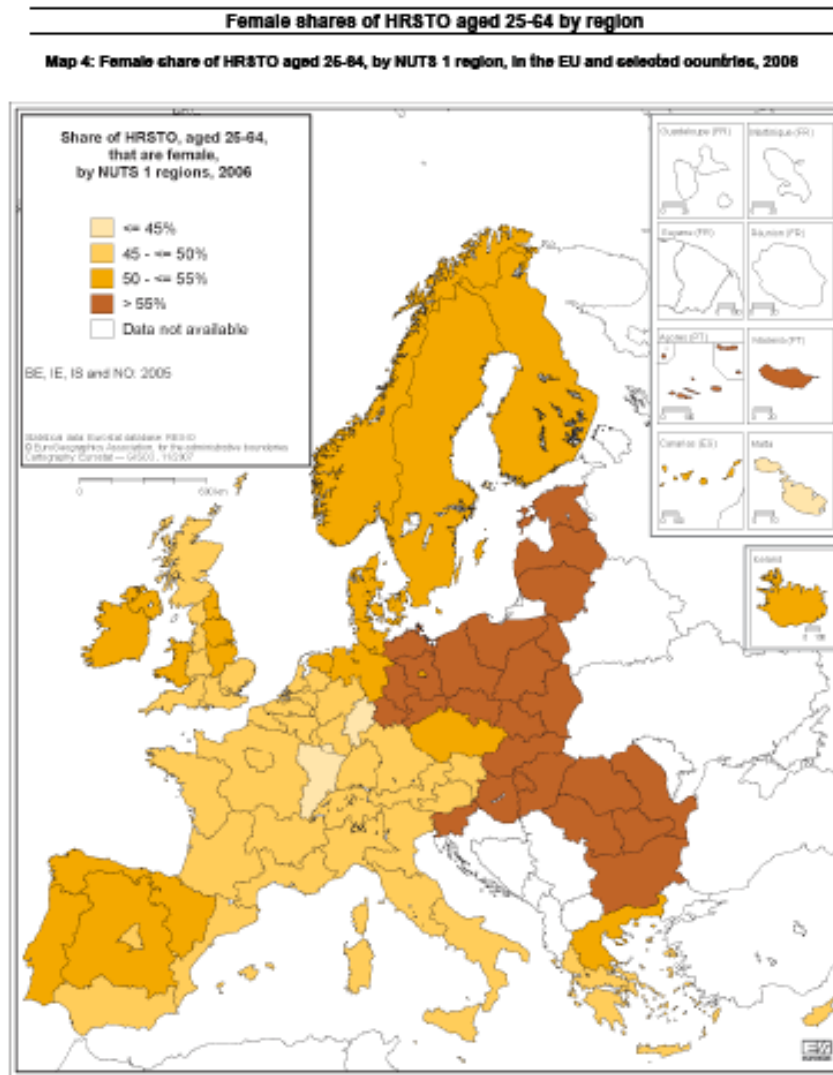
Source: Eurostat HRST statistics



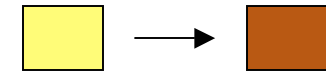
HRST as share
Of the labor force



HRSTO=Human Resources employed in S&T



Female share



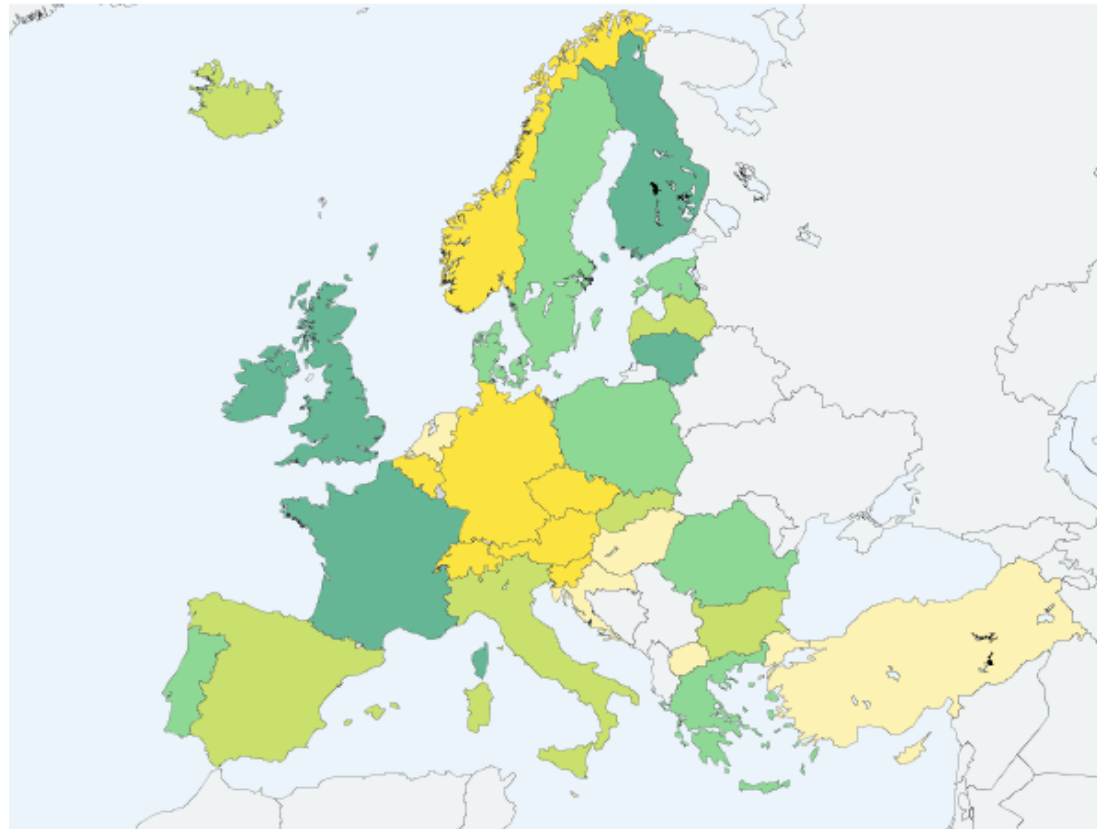
45%

>55%



Science and technology graduates - females

Female tertiary graduates in science and technology per 1 000 of female population aged 20-29 years



Legend (Data 2005)

2.1 - 3.8

3.8 - 6.0

6.0 - 7.6

7.6 - 10.7

10.7 - 15.0

N/A

Minimum value:2.1 Maximum value:15.0 eu25:8.2

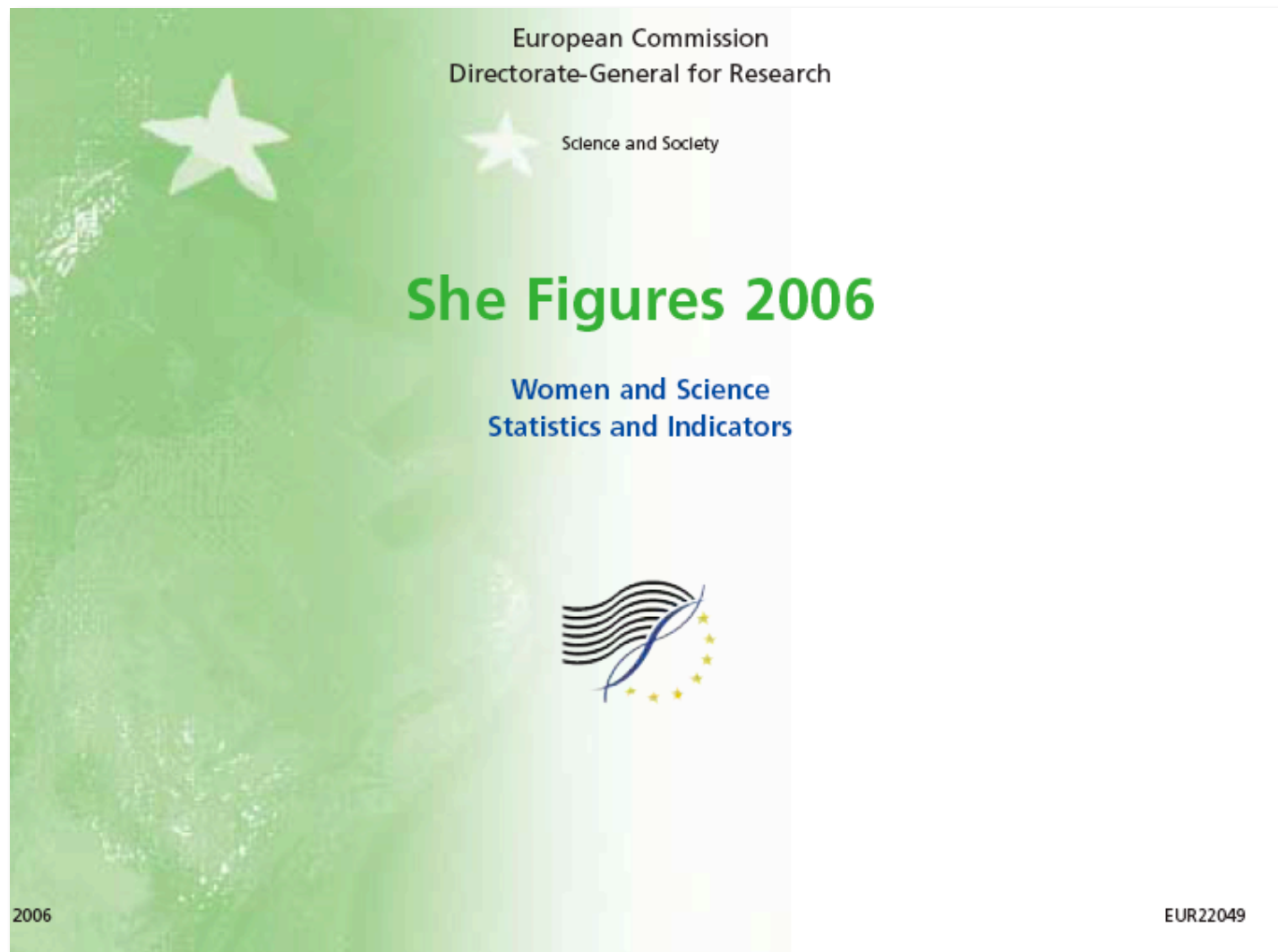
4/24/08

UNIT 5 OF THE DG-RESEARCH AND THE HELSINKI GROUP

- During the last year of Edith Cresson's mandate as a Commissioner of Science and Research in 1999, the spotlight was focused on **women in science** and a special unit was started, **unit 5** of the Research Directorate General, DG-XII
- A group of EU women **statistical correspondents** and scientists held their first meeting in **Helsinki**
- The **ETAN** (European Technology Assessment Network) report on Women and Science was prepared and published in early 2000
- In FP7(2007-2013) unit 5 is not present anymore, but its mandate is covered by the Science and Society Unit and EUROSTAT

WHY MORE WOMEN IN S&T?

- The rationale at the Commission level is that **Human resources in S&T (HRST) can sustain and increase Europe competitiveness in S&T**
- Women were identified as human potential for further development

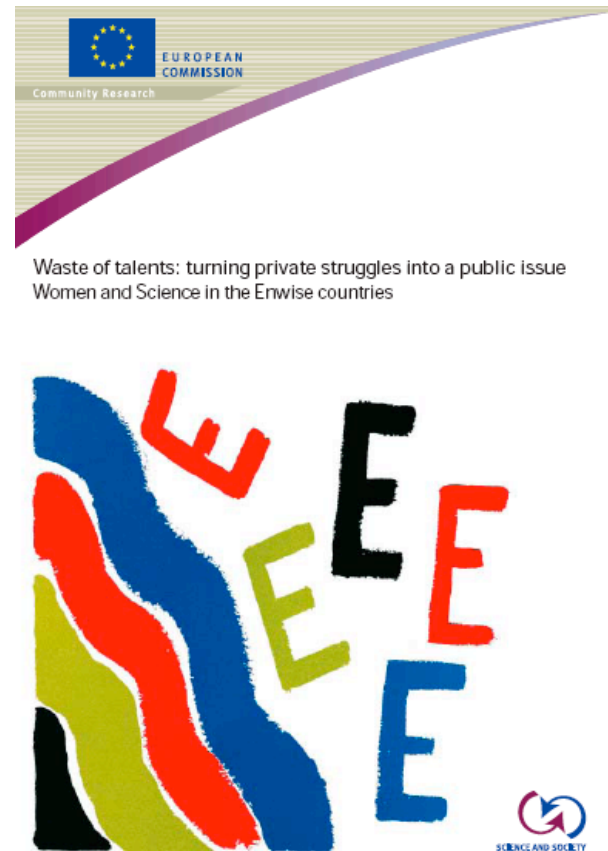


SHE FIGURES 2006 EXECUTIVE SUMMARY

- Across EU 29% of researchers are women
- Only 18% of researchers in Business & Enterprise Sector are women
- In higher education only 18% of highest academic grade are women
- In engineering and technology at the top only 5.8% are women

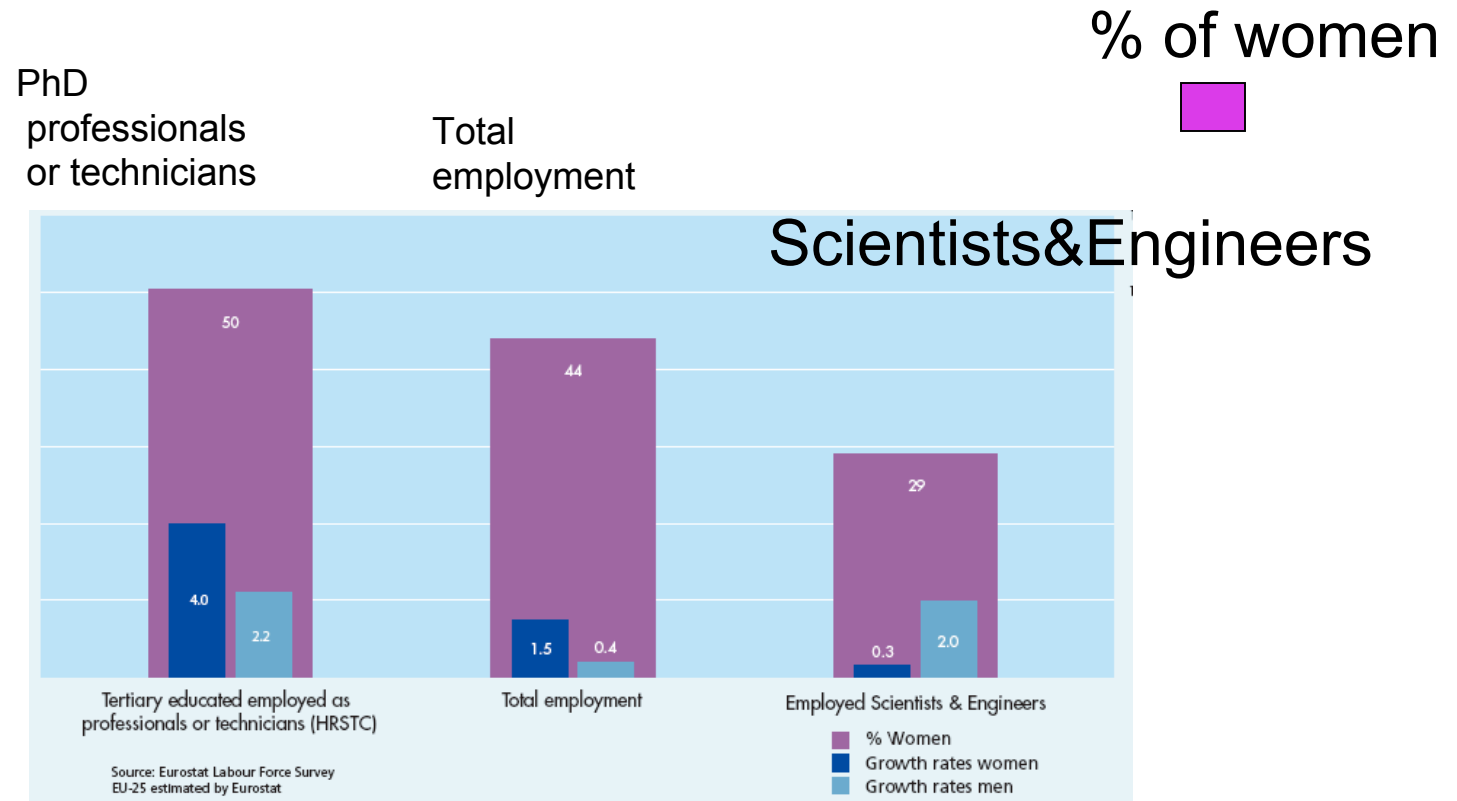
FOCUS ON EASTERN COUNTRIES

- The Enwise countries are
 - Bulgaria
 - Czech Republic
 - Estonia
 - Hungary
 - Latvia
 - Lithuania
 - Poland
 - Romania
 - Slovakia
 - Slovenia

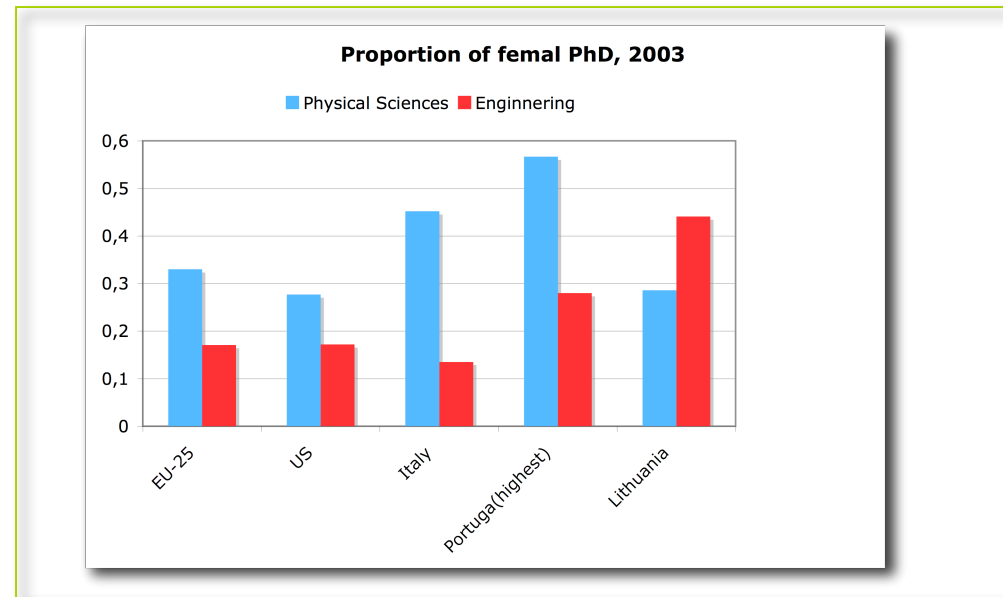


S&T STATISTICS

Employment

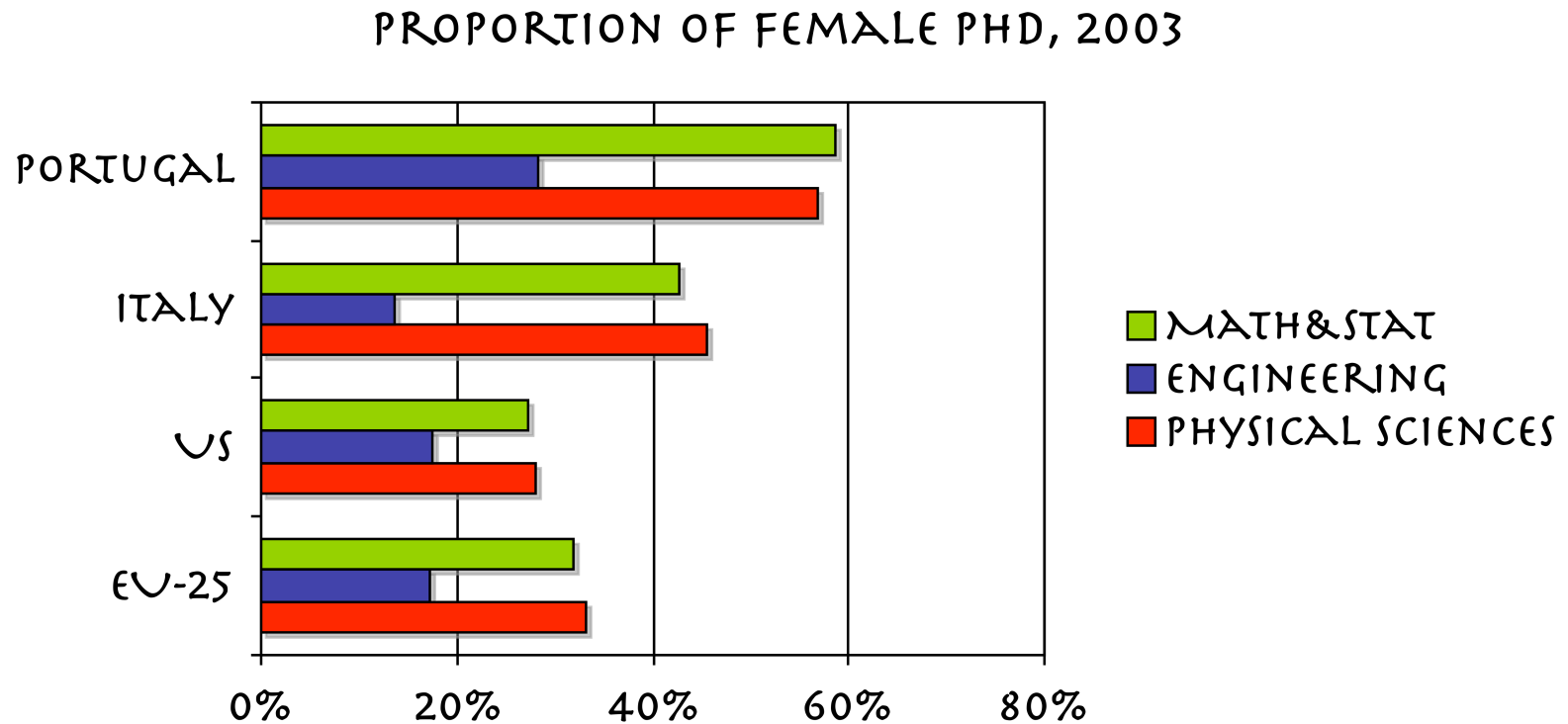


PHD GRADUATES IN PHYSICAL SCIENCE & ENGINEERING

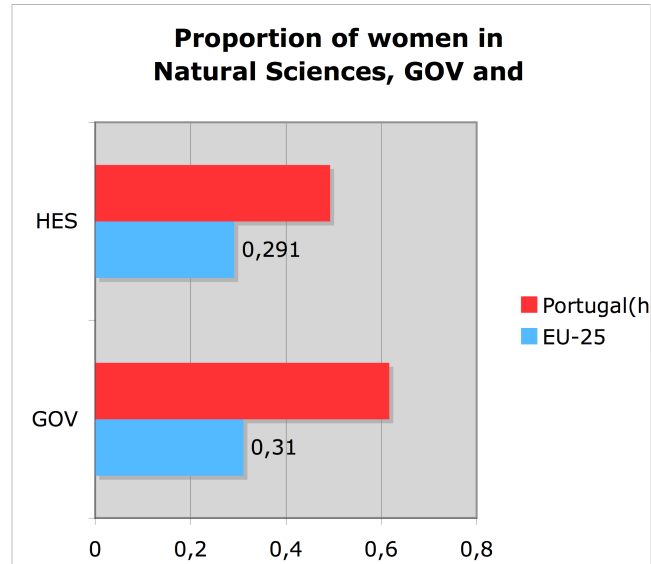


- Italy at 45% in physics
- Portugal more than 50% in physics
- Lithuania highest in Engineers

EDUCATION IN S&T



PHD EMPLOYMENT IN NATURAL SCIENCES IN THE EU

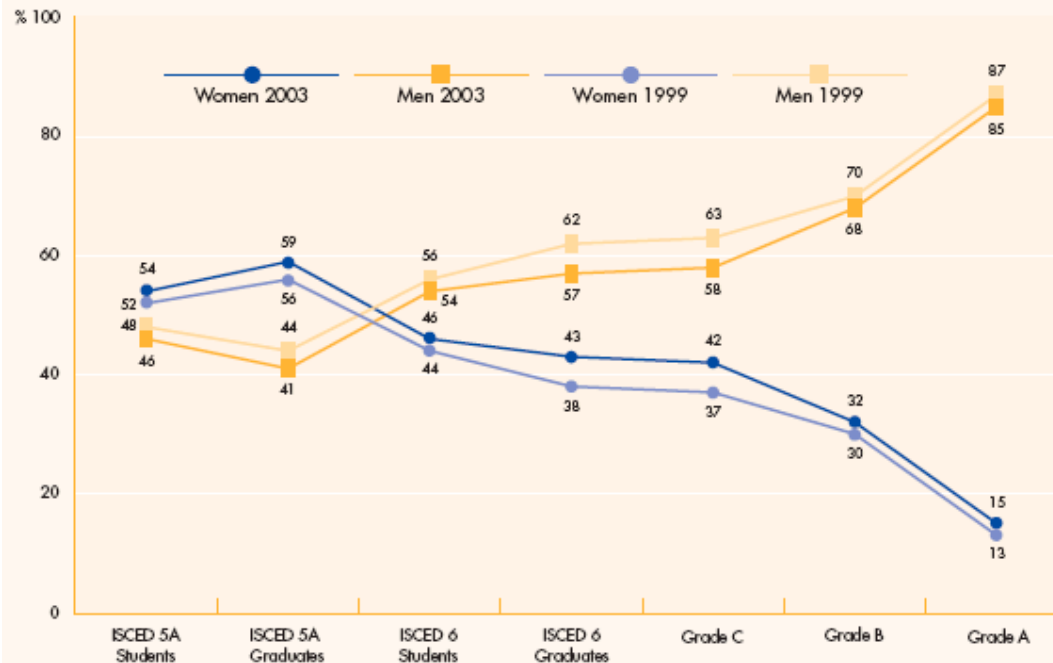


- Natural Sciences include life sciences, Math, Chemistry and Physics
- Highest numbers in Portugal
- Details are not available for all countries
- Source : eurostat S&T, DG research for EU-25

CAREER PATTERNS

- The scissor diagram
- Who reaches the top?

Figure 3.1: Proportions of men and women in a typical academic career, students and academic staff, EU-25, 1999-2003



Definition of grades:

- A: The single highest grade/post at which research is normally conducted
- B: Researchers working in positions not as senior as top position (A) but more senior than newly qualified PhD holders
- C: The first grade/post into which a newly qualified PhD graduate would normally be recruited

- ISCED 5A: Tertiary programmes to provide sufficient qualifications to enter into advanced research programmes & professions with high skills requirements
- ISCED 6: Tertiary programmes which lead to an advanced research qualification (PhD)

Source: Eurostat Education data, DG Research, WIS database seniority Grades.

2003

ISCED5A Students:

Data unavailable: FR

Exceptions to the reference year: LU: 1999; EL: 2002

ISCED6 Students:

Data unavailable: FR, LU, DE, SI

Exceptions to the reference year: EL: 2002

Grade C, B, A:

Data unavailable: IE, LU

Exceptions to the reference year: CY: 2002; FR, PT: 2001; EL: 2000

NL: FTE; SI: Data estimated; FR: Grade C unavailable

1999

ISCED 5A Students:

Exceptions to the reference year: BE, PT: 2000; EL: 2002. Data unavailable: FR

Exceptions to the reference year: PT: 1998; BE: 2000; CY: 2001; EL: 2002.

ISCED 6 Students:

Data unavailable: DE, FR, LU, SI

Grade C: Data unavailable: FR, Exceptions to the reference year: AT: 1998;

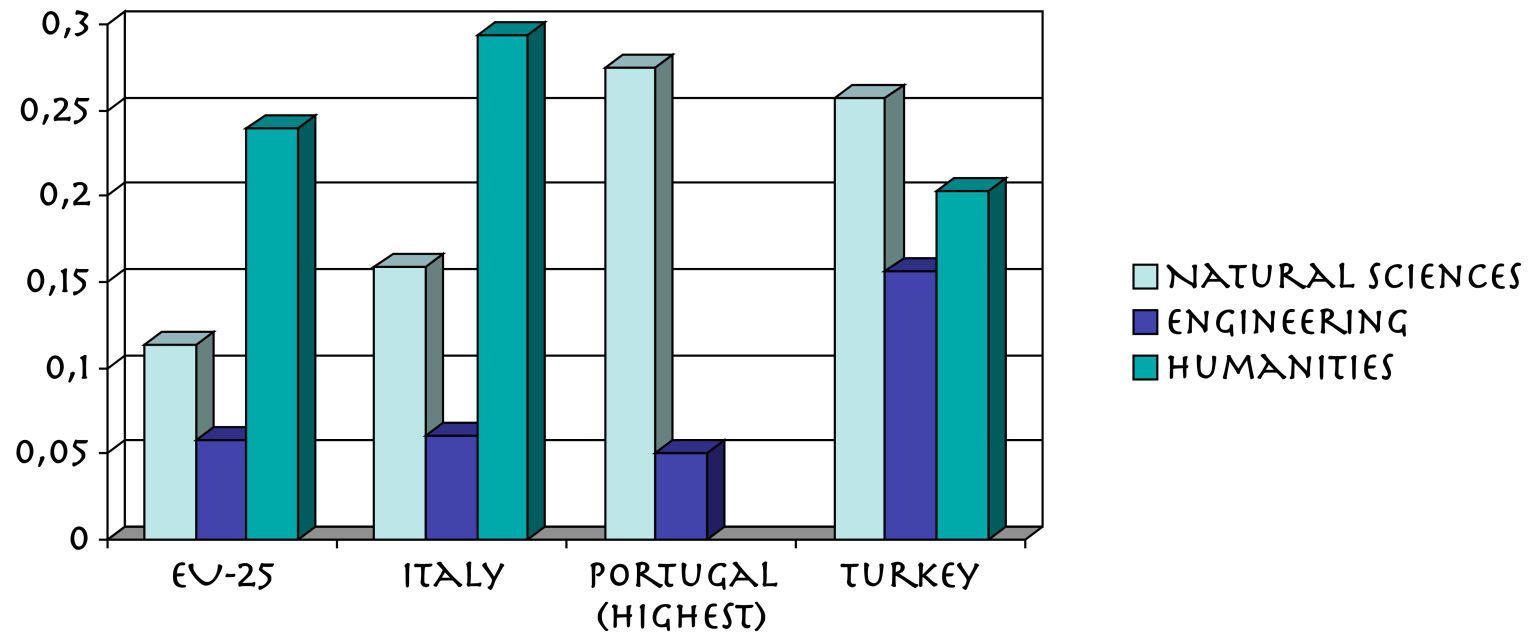
PL: 2000; FTE: NL, BE (FR)

Grade B: Exceptions to the reference year: AT: 1998; FR, PL: 2000; FTE: NL

Grade A: Exceptions to the reference year: AT: 1998; FR, PL: 2000; FTE: NL

SENIORITY IN S&T, 2004

PROPORTION OF FEMALE GRADE A STAFF



THE EU FUNDED RESEARCH

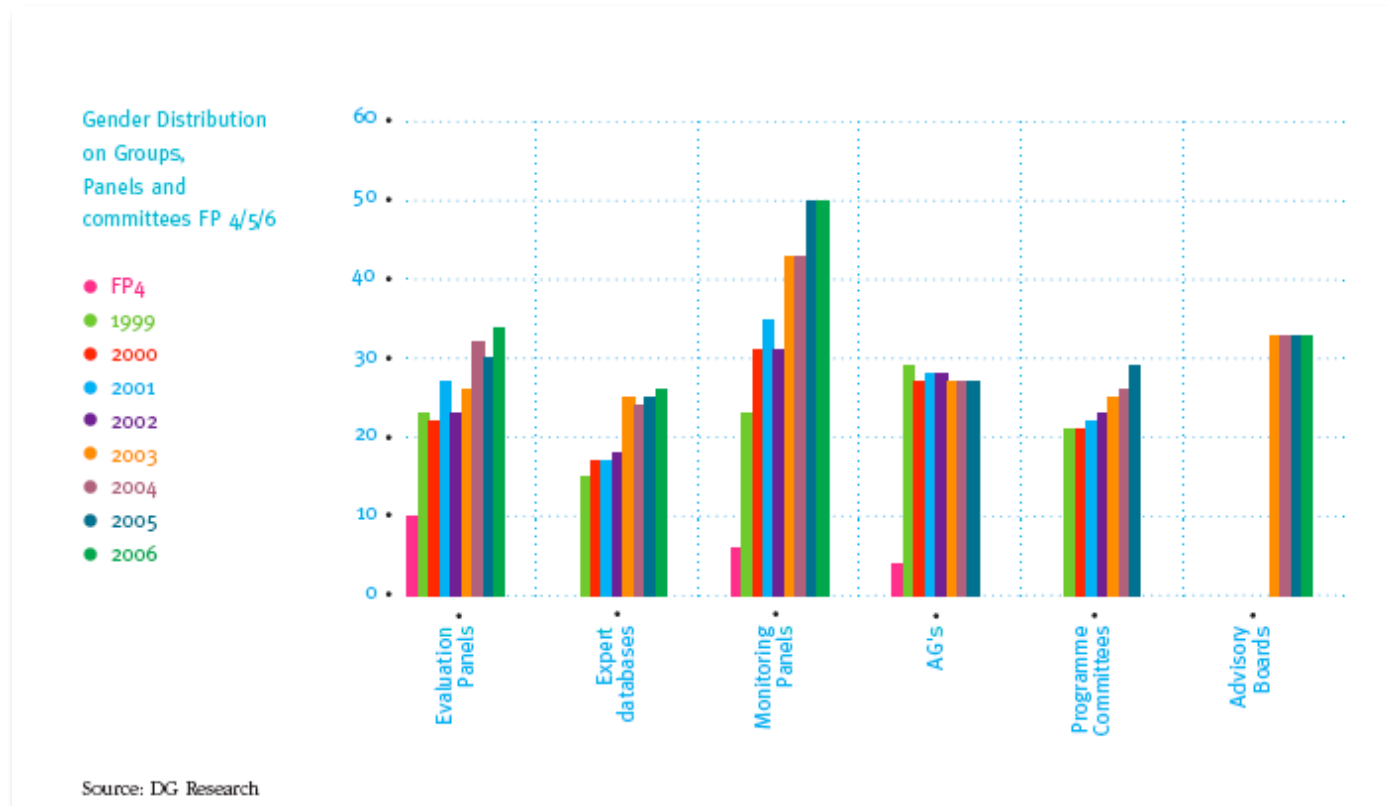
- The EU funds evaluate a large number of proposals in all fields of science and has become a very important funding source
- Among the type of projects there are
 - Individual grants and fellowships (Marie Curie)
 - Prizes
 - Research and Training Network grants - a structure “invented” by Bruxelles

THE RESEARCH AND TRAINING NETWORKS

- Networks of researchers, at least 3 different member states
- Typically 10-12 institutions from 5-8 different countries
- Average budget 4 Meuro for a 4 year period
- Chosen through an evaluation process resulting in a 10 % success rate

EV RECOMMENDATION : GOAL OF
40% WOMEN IN ALL SCIENTIFIC
PANELS

WHAT THE EU IS DOING TO EMPOWER MORE WOMEN IN S&T



- Aim to 40% presence of women in scientific panels
- Presently roughly 30%, even in physics
- Vademecum for project officers

EVALUATION PANELS

- Women are well represented at the evaluation level even in hard sciences, like physics
- Evaluation panels have a typical 30-40 % women presence
- Evaluators are chosen among a very larger pool where women are well represented : Europe is very large with many Government research Institutions and prestigious universities -> the pool is large

IS THE EVALUATION PROCESS GENDER BIASED?

- Evaluation panels are prepared by the **monitoring officer** and **panel chairs**, 30% of which at least are women scientists
- Not difficult since the independent expert evaluators are chosen among a **large pool of scientists** mostly from Europe, both universities and industry, and there are **many excellent women**

IS THIS POLICY EFFECTIVE?

- In general, the **evaluation** process, once launched, is **gender-blind** except that one of the evaluation criteria - typically ***impact or added value - includes*** a concern with equal opportunity
- In principle it can be used to promote projects which have women in prominent network positions, like node-scientists or members of the Executive Committee
- it does help to focus on the existence of **excellence among women scientists**

GENDER IN HIGH ENERGY PHYSICS

- CERN
 - DELPHI
 - ATLAS
- INFN in Italy
 - The Equal Opportunity Committee 1999 ->
 - The impact of 30% on Promotion Committees



Equal Opportunities at CERN



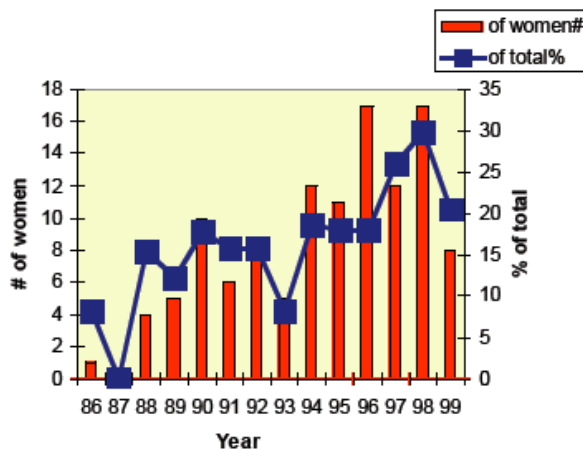
Tiziano Camporesi - Chair of the Equal Opportunities Advisory Panel

4/24/08

AT CERN

Women have appeared in the research job market lately

Number of women with PhDs per year



Study performed within the DELPHI experiment at LEP (more than 750 thesis over the life of the experiment!)

Early 1980's: <5% women students. 2000: 25% of students are women

The CERN hiring statistics in recent years shows that these women physicist and engineers have equal chances (in fact slightly better) than their male colleagues

HIGH ENERGY PHYSICS IN A WORLD-WIDE EXPERIMENT



- ATLAS is a Large hadron Collider experiment with over 2000 high energy physicists from everywhere in the world and its gender composition sheds light on how different countries are represented in proportion of women scientists

ATLAS

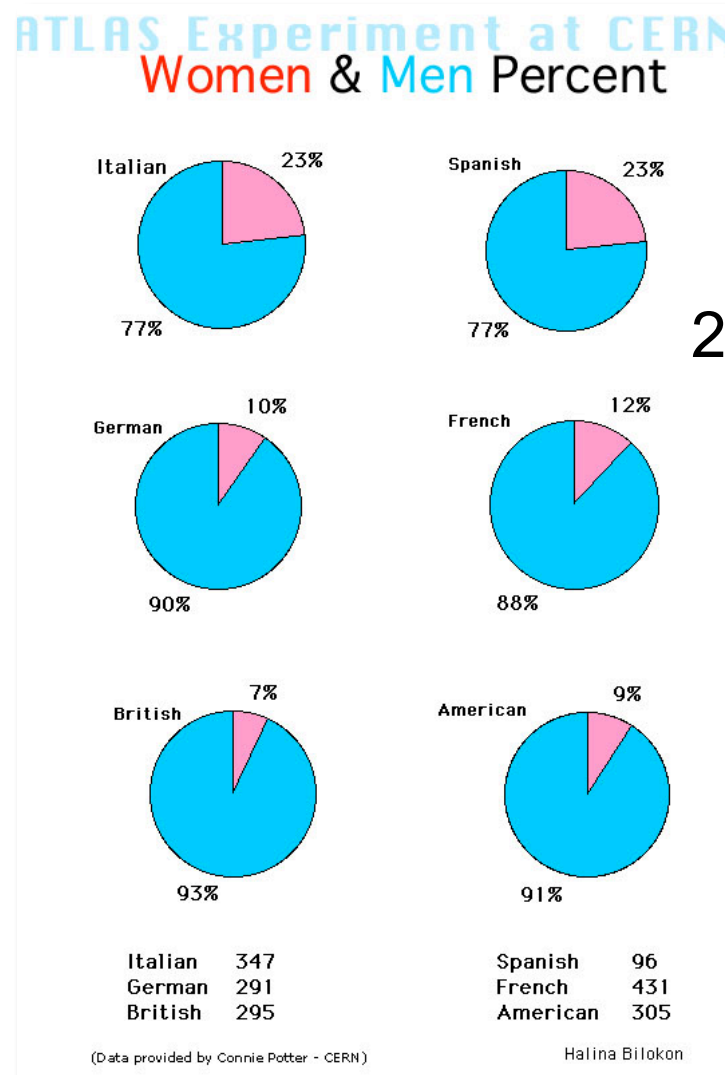
- Grand Total
- Physicist and other staff 2598
- Women 320
- Percentage of women 12.3%
- Men 2278
- Percentage of men 87.7%

HIGH ENERGY PHYSICS : THE ATLAS EXPERIMENT

<https://twiki.cern.ch/twiki/bin/view/Atlas/AtlasWomenPage?>

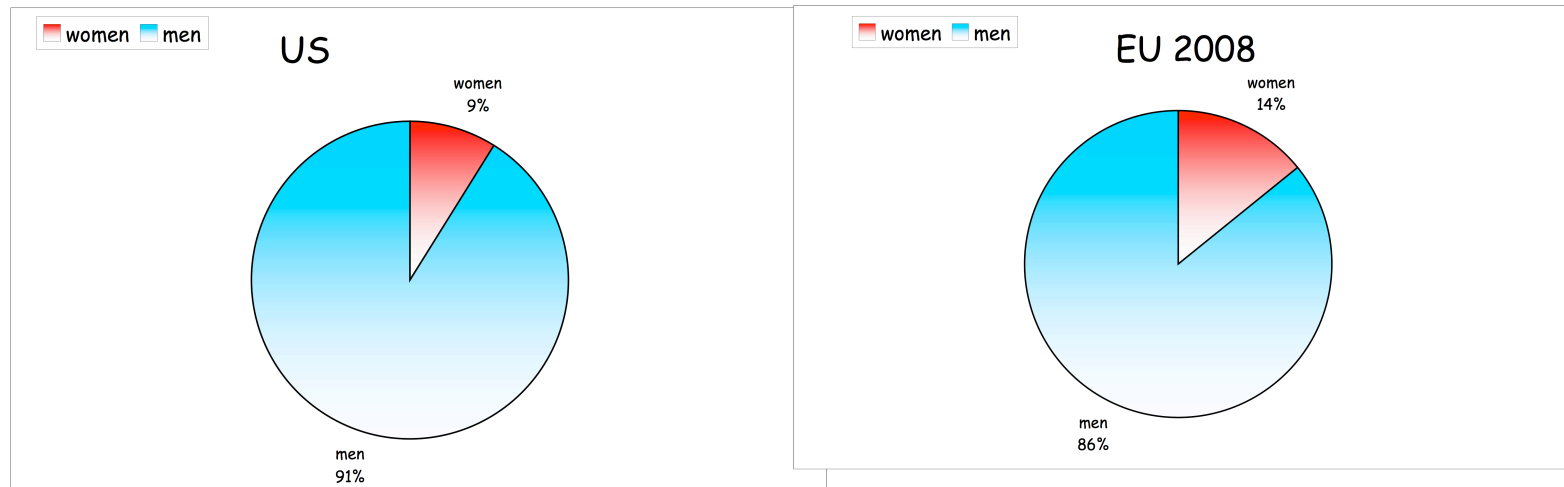
ATLAS GENDER DISTRIBUTION IN 2002

- ATLAS is a world wide high energy physics experiment
- ATLAS construction started 20 years ago to study proton-proton collisions at the highest ever reached center of mass energy in the c.m. system with the Large Hadron Collider, due to start at the end of 2008
- ATLAS is a frontier technological and scientific enterprise
- There are about 2000 physicists in ATLAS



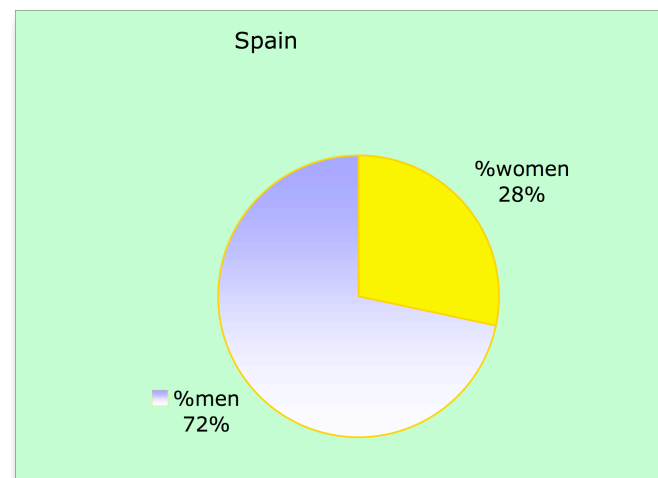
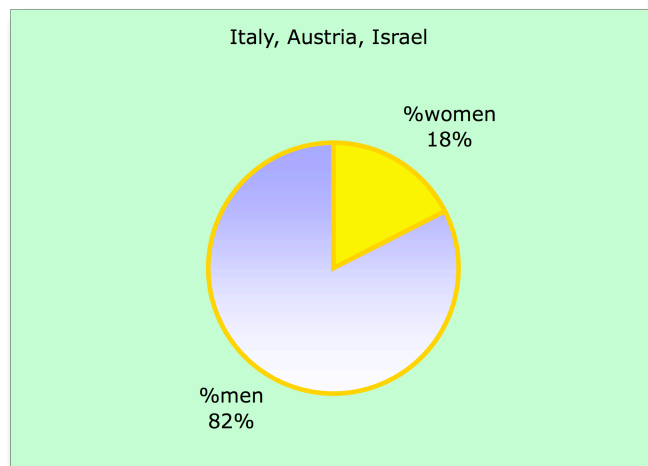
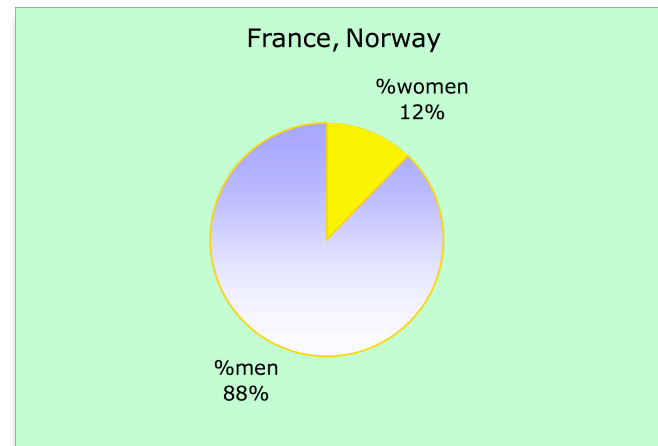
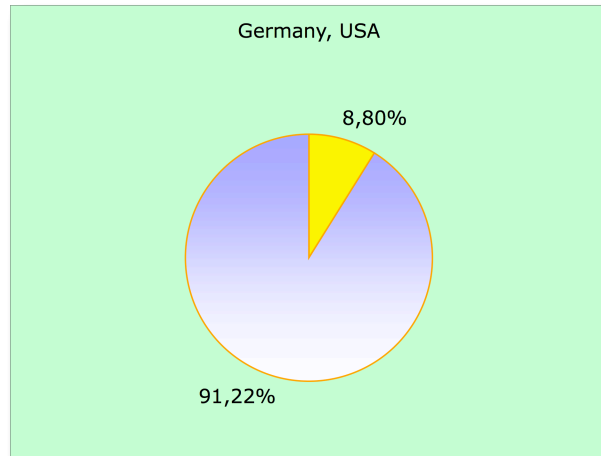
2002

US VS EU IN ATLAS 2008



- Women from EU are present in larger proportion than from US
- Possibly also because of need to commute from US to Europe (family is a problem)

(SOME) WOMEN IN ATLAS(2008)



INFN (ITALY)

- In 1999 CPOs (Equal Opportunity Committees) were introduced in INFN as requested by law for any government supported institution in order to monitor gender inequalities

- 2000 S&T personnel
- Finances particle physics In Universities and Labs

- During my tenure as INFN National CPO Officer (1999-2002) the rule that 30% of all promotion and hiring committees had to be women was introduced and implemented

- In 1999 : women were 1% of most senior level researchers (1 woman)
- 2002 : 4%
- 2005: 7%

INFN RESEARCHERS (PHD PHYSICISTS)

Livello	Totale	Uomini	Donne	% Donne
I	110	102	8	7.3
II	223	176	47	21.1
III	253	197	56	22.1
Totale	586	475	111	18.9

ITALY : THE EQUAL OPPORTUNITY COMMITTEES

- Labour contracts in Italy for the private and public sector require the institution of Comitati per le Pari Opportunita' aka CPO's
- Each Committee publishes a yearly report on the status of women in the given institution and evaluate whether there are gender inequalities among the workers [INFN statistics come from the work of CPO]
- The CPO's propose actions to the management to overcome inequalities

SOME PROVOCATIVE
THOUGHTS ABOUT SENIORITY
AND LONGEVITY

SOME COMMENTS ON SENIORITY, SALARY AND LONGEVITY GAPS

- There is a **seniority** gap
 - Only 15% of highest academic grade are women
- A **pay** gap
 - Women earn 15% less than men on average
- A **longevity** gap
 - Women live ~ 6 years more than men

THE SENIORITY AND PAY GAP

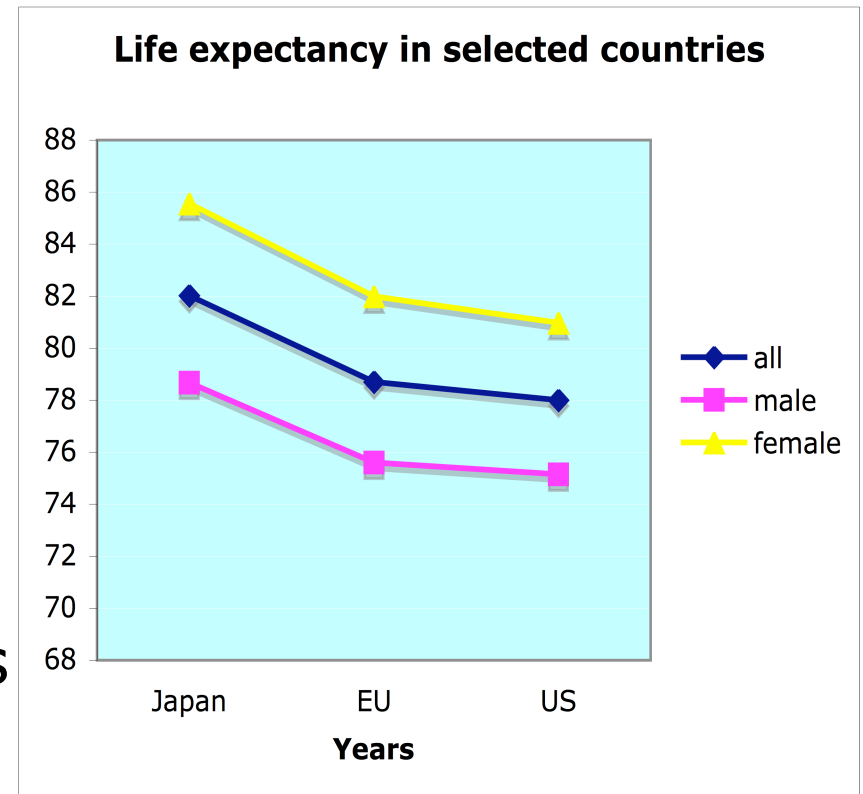
- How **promotion** works in S&T :
 - Promotion is often determined by brilliant and hard working individuals, the younger the better, of age between 30-40, when women are under bio-clock pressure
 - For the same reason the myth of great discoveries before 40 years of age penalizes women and delays their promotion
 - Because of this a woman is often promoted 5-6 years later than her corresponding male colleague
- > a **pay gap** is formed and because of fixed retirement age also a **seniority gap** which cannot be filled
- In EU, in Academia and Research Institutions age enforced retirement penalizes women who could perhaps reach highest seniority level

THE LONGEVITY/EMPLOYMENT ISSUE

- It used to be that only <40 years old could be hired as researchers **not true anymore**
- In all EU countries research institutions and University faculty have **strict retirement rules**, same for both men and women
- CNRS : 65 years of age
- CERN : 65 years
- Italy
 - Public Research Bodies like INFN : 67 (65+2)
 - University: 72 (70+2)
- UK : 65 years
- Etc. etc.

Life expectancy: indicating the potential return on investment in human capital

- *total EU : 78.7 years*
 - *male: 75.6 years*
 - *female: 82 years* (2007)
- *total US : 78 years*
 - *male: 75.15 years*
 - *female: 80.97 years*
- EU : Female-male=6.4years
- US : Female -male=5.8years
- Japan: Female-male=6.9 years



A CALL TO ELIMINATE THE FORCED RETIREMENT AGE FOR SCIENTISTS IN THE EU

- Forced retirement in high level S&T professions works in particular against women and should be lifted.
- But what about leaving the space to younger scientists?
- We should not worry whether a scientist is young or old, black or white, men or woman, what we need are **good scientists** who can do **good science**
- If women live longer, could it not be possible that also their intellectual life can be exploited for those more years (to theirs and society's advantage) ?

BT WHY IS THIS DIFFERENCE SO PERSISTING?

- **USA:** It has been attributed to young girls not choosing to take high school math and sciences
- Is not true in **Europe** where high school curricula are the same for boys and girls
- It is certainly tied to lack of encouragement and lack of mentors at University level

but

Is it possible that we, women scientists, are reluctant to dig deeply into the differences between men and women and thus fail propose some measures which would change this pattern?

CLOSING REMARK ON INVISIBLE BARRIERS

INVISIBLE BARRIERS: BOTH SHOULD GO AWAY!

The glass ceiling :

(an experience common to women professionals, scientists or otherwise)

As a woman advances in the profession, she finds at a certain point that the sky has a limit : she will not go beyond

The glass wall :

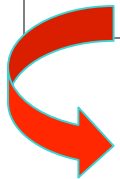
(experienced as member of Equal Opportunities groups)

It separates the world of women groups from the usual world

THE GLASS CEILING

A woman may become a professor, have a large number of well known publications, be as successful in what she does as her male colleagues, but unlike the same colleagues she may not be asked to chair Committees, to hold positions of power, to be called in the Academies, etc.

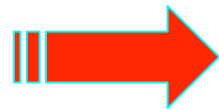
Often this happens since she does not know the rules : her success is not statistically significant and she has no access to peer counseling



Quotas may help
to force entrance in the Control Rooms
and learn the rules to win

THE GLASS WALL

- Very little of the discussions within women's committees leak through to the "other world", thus reducing the effectiveness of their actions



Women in the control room may bridge the gap

EXTRAS

4/24/08

ITALIAN NATIONAL POLICIES

1. National policies enforced through the Equal Opportunity Committees will be illustrated, with the specific case of the Affirmative Actions of Italian INFN Equal Opportunity Committee and their impact on hiring and promotion of women physicists.

Degrees awarded to women

