



A data analysis of women's trails among ICM speakers, illustrating the gender gap

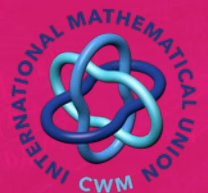
Marie-Françoise Roy

Emerita Professor, IRMAR, Université de Rennes

Chair of the IMU CWM (2015-2022)

, Exploring the International Mathematical Union

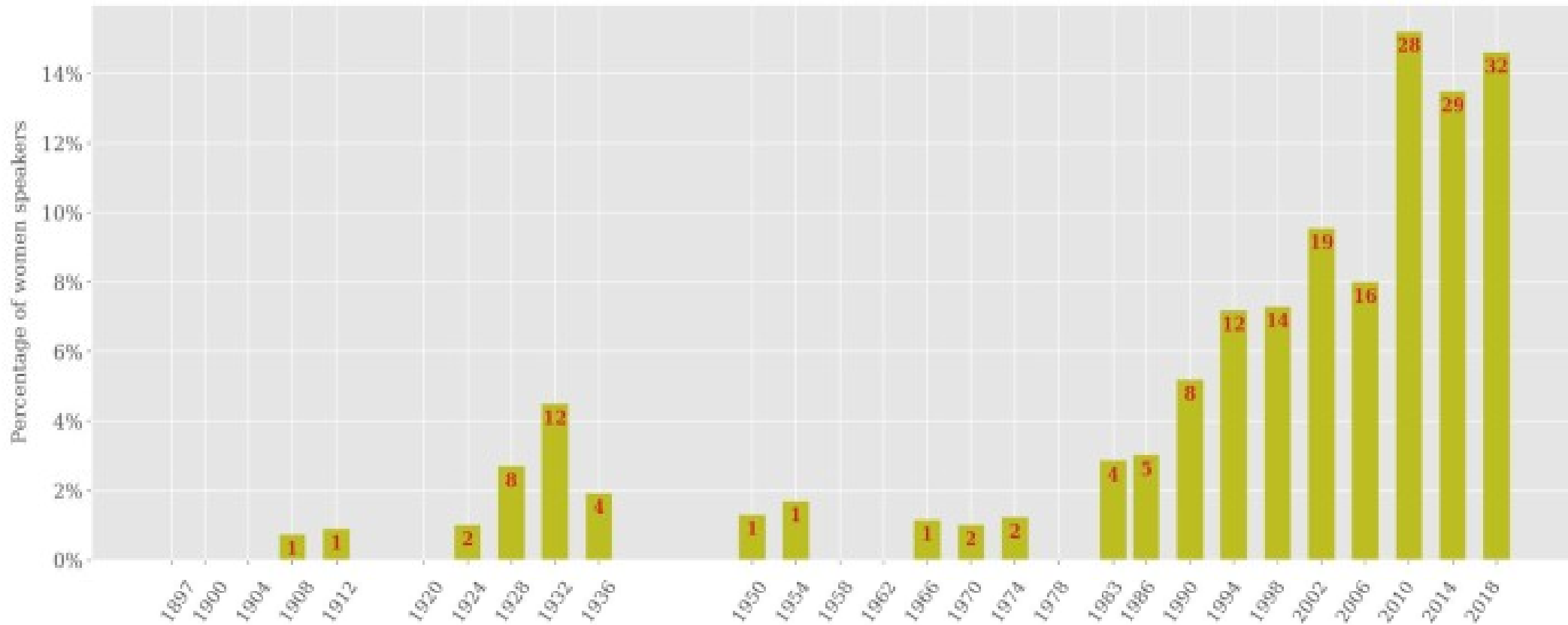
Wednesday December 14



International Congress of Mathematicians

How many women have been lecturers at ICM
in the past ?
What is their current proportion at vICM 2022?

Women lecturers at ICM



Percentage of women speakers per ICM Total numbers of invited women

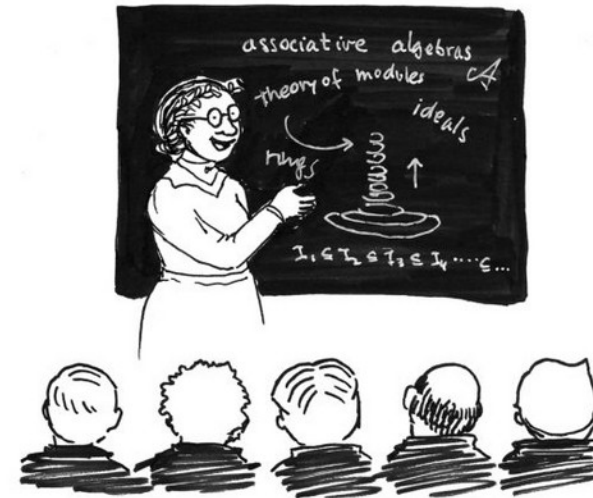
H. Mihaljevic, M.-F. Roy. A data analysis of women's trails among ICM speakers ³
(preliminary version arXiv:1903.02543v2). C. Araujo et als (eds.). World Meeting for Women in Mathematics 2018.
Association for Women in Matematics Series, Volume 20, Springer, 111-128 (2019).

First plenary lecture Emmy Noether 1932, Zurich

#Noethember
Constanza Rojas Molina

#Noethember Day 14

"Alfred Ackermann-
Teubner Memorial
Award for the promotion
of the mathematical sciences"



1932 International Congress
of mathematicians
Zürich

Second plenary lecture

Karen Uhlenbeck
Kyoto 1990

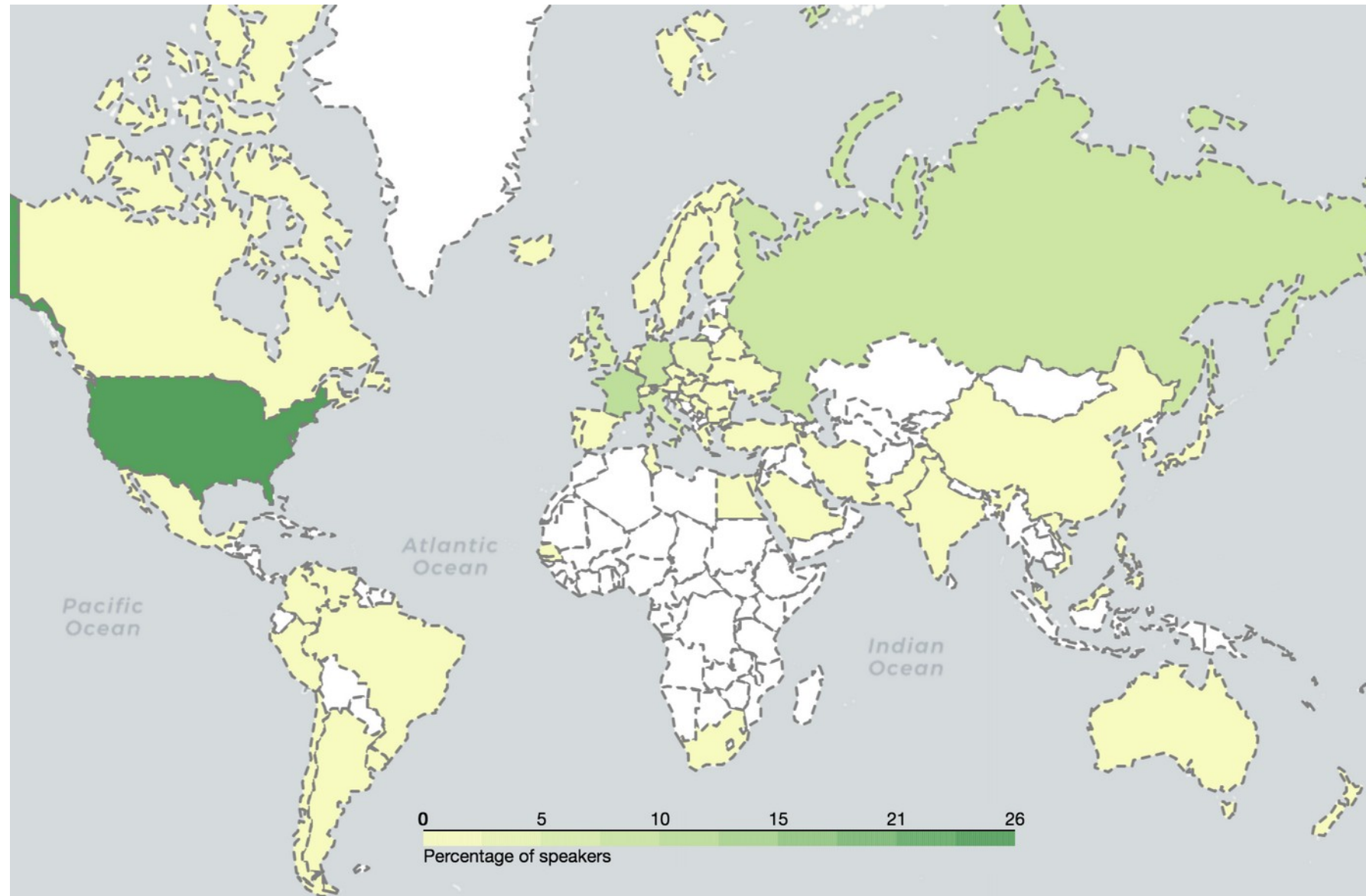


International Congress of Mathematicians

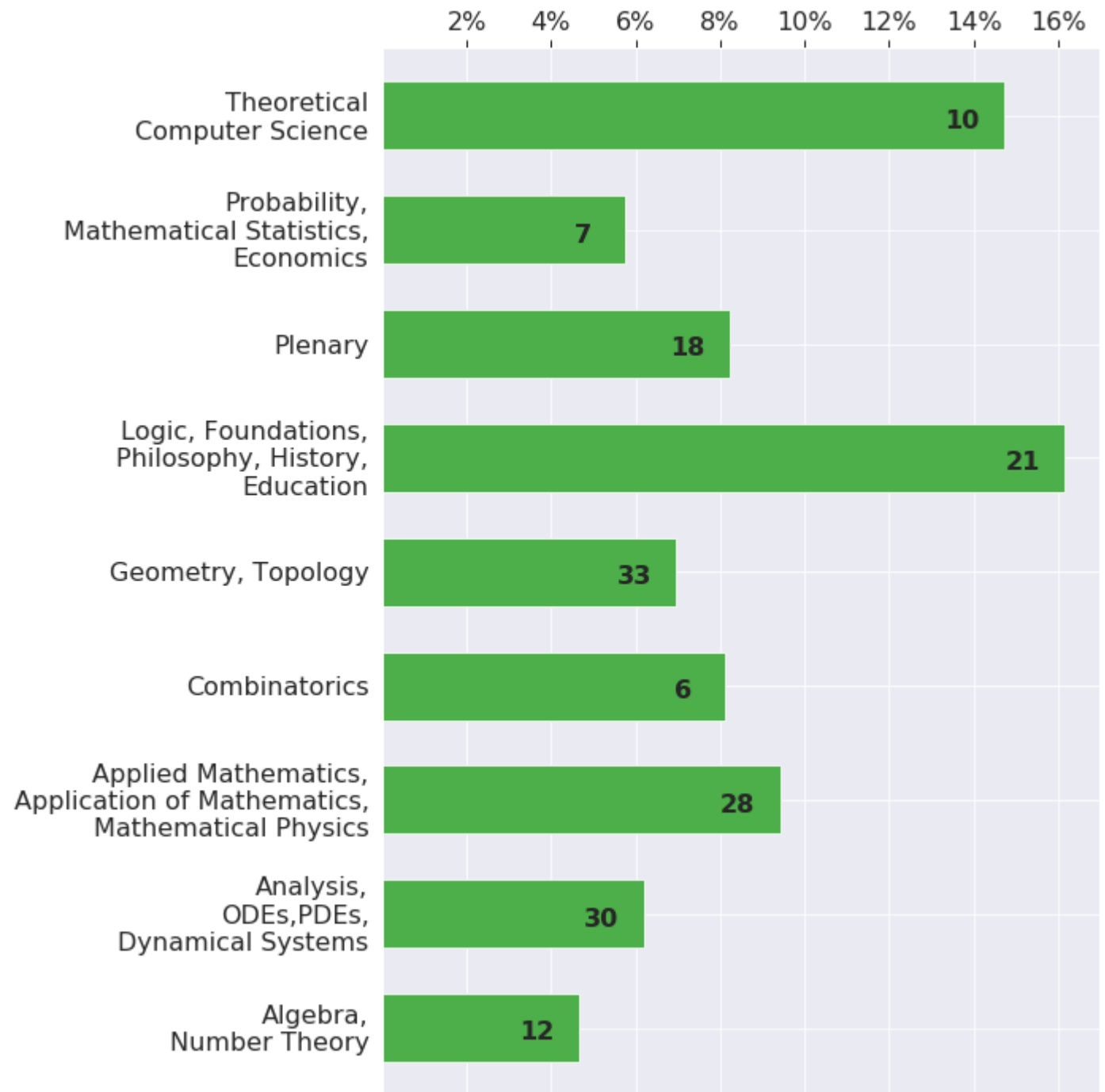
Recent ICMs : Rio 2018, Seoul 2014,
Hyderabad 2010 stable proportion around 15 %

Proportion at vICM 2022?
Over 20 %

Geographical distribution



Thematical distribution



Maryam Mirzakhani

Received the Fields Medal in Seoul
in 2014

Died in July 2017

May 12 initiative decided at (WM)²

Rio de Janeiro 2018

Celebrating women in mathematics





#May12

Celebrating women in mathematics

<https://may12.womeninmaths.org/>

Olga Alexandrovna Ladyzhenskaya

Invited lecture ICM Moscow

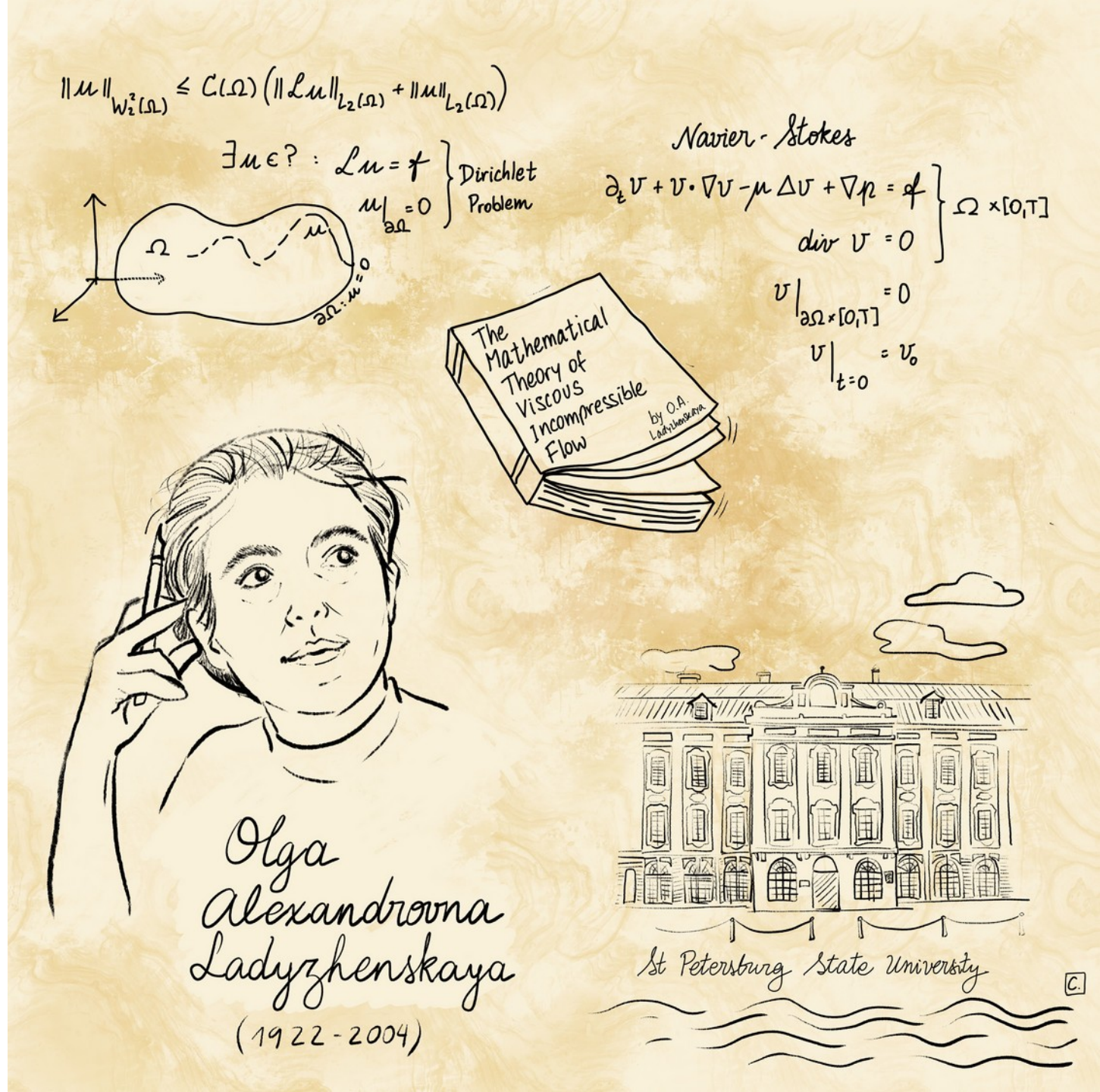
1966

ICM Emmy Noether lecture

1994

Constanza Rojas Molina

For v(WM)² 2022





Olga Alexandrovna Ladyzhenskaya
A 30 minutes I film by Ekaterina
Eremenko

*Subtitles in english and russian and also
french, italian, persian, portuguese,
spanish and turkish (May 12 initiative)*



Svetlana Jitomirskaya

First winner of the OAL prize

**Joint session of the World Meeting for
Women in Mathematics (WM)² and the
Probability and Mathematical Physics
(PMP) conference
Helsinki 2022**

Maryna Viazovska

Received
the Fields Medal
in vICM Helsinki
in 2022



Proportion of women in math publications

What is the current proportion of women authors of mathematical research ?
How did it change in the last decades?

Methodology

The gender gap in science project, an ISC funded interdisciplinary project

- global survey of scientists
- publication patterns
- data base of good practices

THE GENDER GAP IN SCIENCE

A Global Approach to the Gender Gap in
Mathematical, Computing, and Natural
Sciences: How to Measure It, How to Reduce It?



A multidisciplinary and
multicultural project funded by the
International Science Council



@GenderGapSTEM



fb.me/GenderGapSTEM



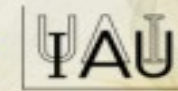
International
Science Council



International
Mathematical
Union
(IMU)



INTERNATIONAL UNION OF
PURE AND APPLIED CHEMISTRY



Gender
InSITE



IUHPST
International Union of History and
Philosophy of Science and Technology

Project 2017-2019

funded by ISC, lead by IMU and IUPAC

<https://gender-gap-in-science.org/>

Proportion of women in math publications

What is the current proportion of women authors of mathematical research ?
How did it change in the last decades?

Analysis of Academic Publications (millions of publications, since 1970)

- Steady increase of the proportion of women authors of scientific papers (10% to 27%)

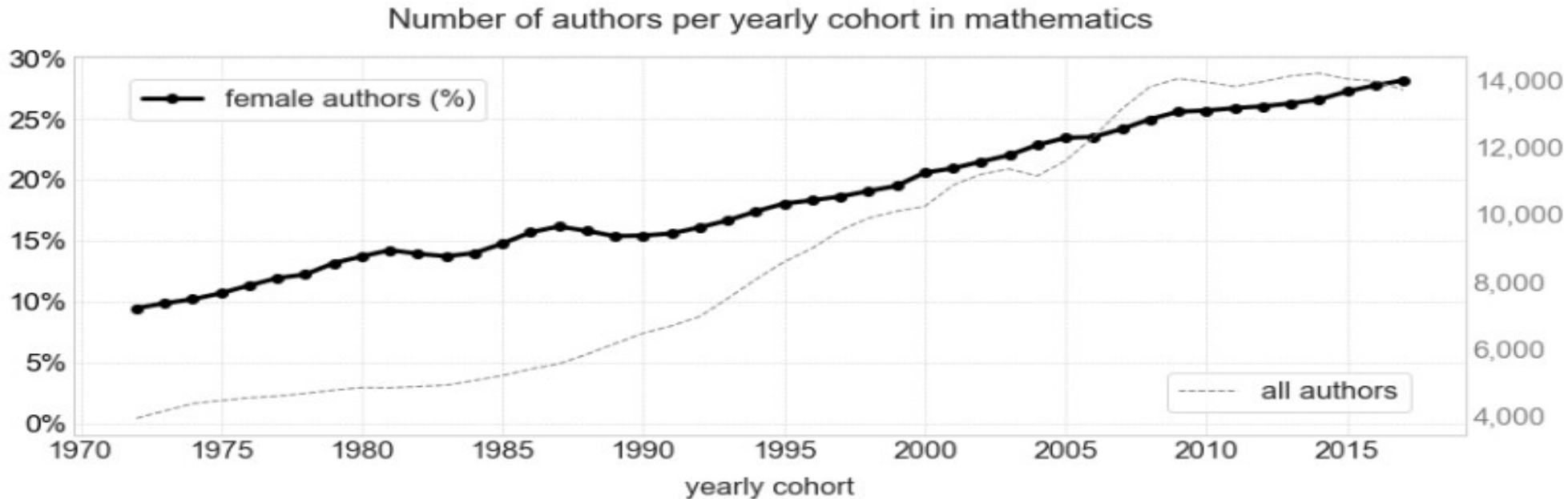


Figure 13: Number of active (publishing) mathematicians since 1970 and percentage of them that are women.

Proportion of women in top math journal

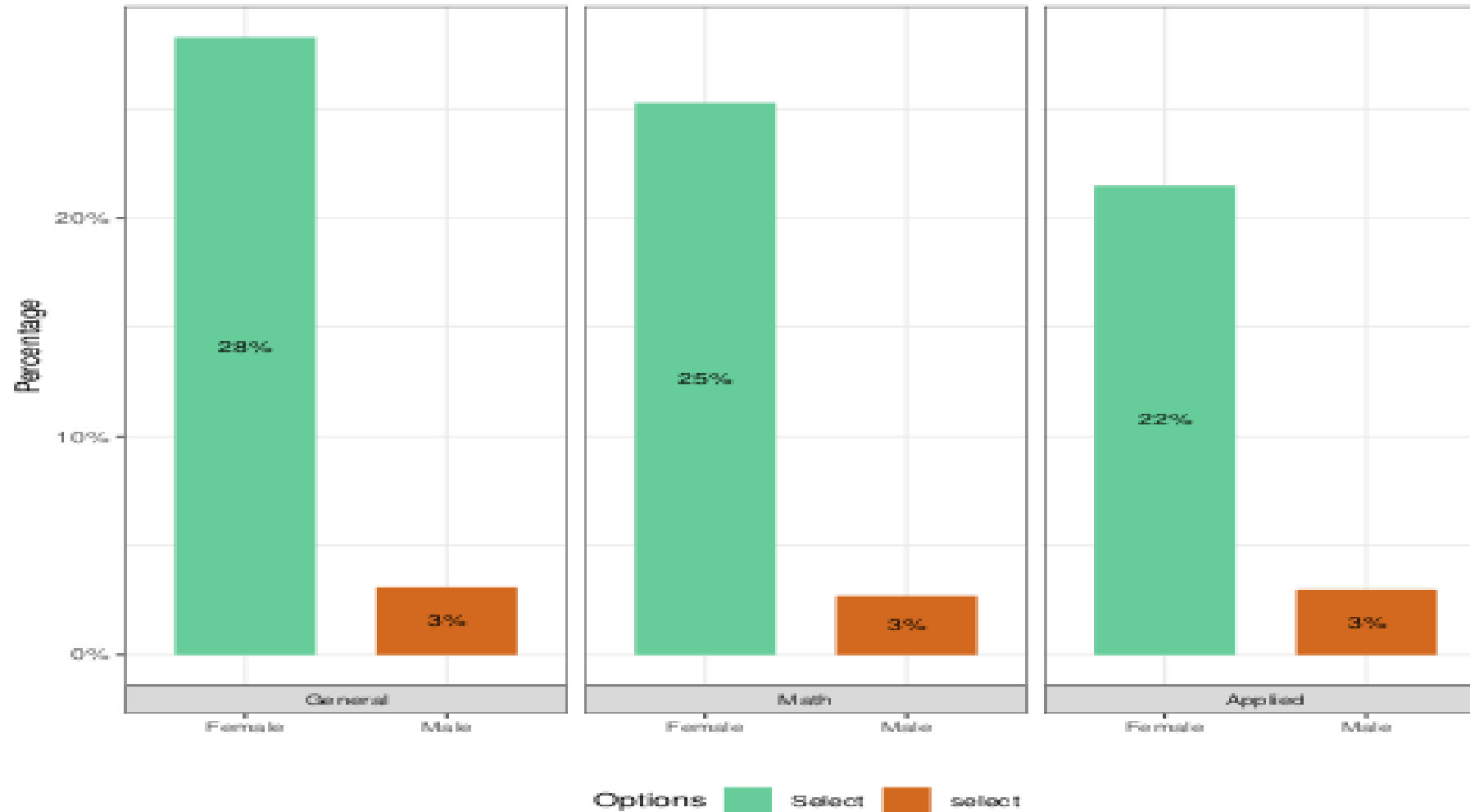
What the proportion of women authors in top mathematical journals ?
How did it change in the last decades?

Sexual harassment and discrimination

Is sexual harassment and discrimination towards women similar in mathematics and in other sciences?

Sexual harassment: Yes, it happened to me

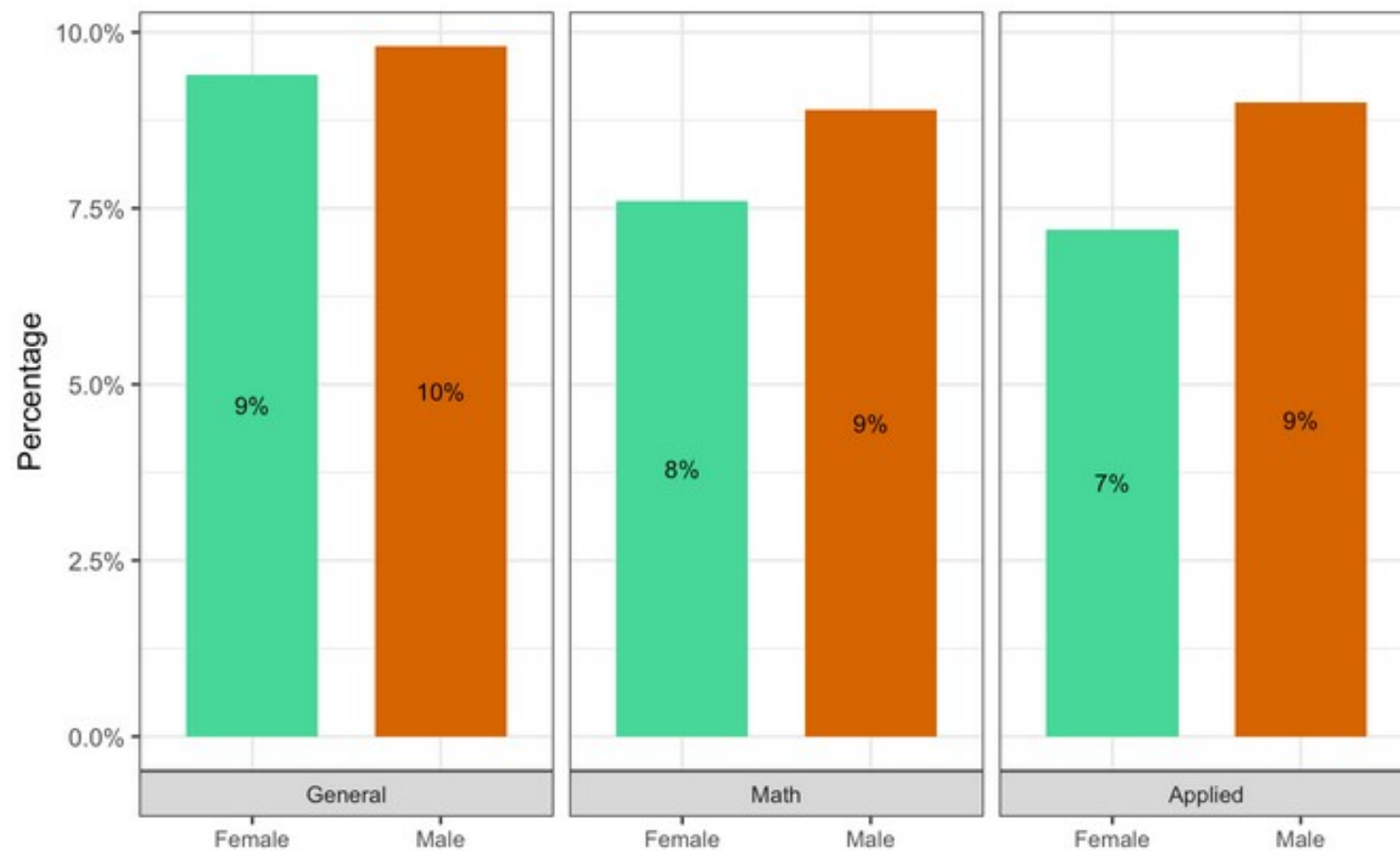
Fig. 1: Distribution of gender for General, Math and Applied-math samples



A women friendly community?

Is the mathematical community more or less women friendly than the other scientific communities ?

Who most encouraged you? Neighborhood, community or friends



More difficult question

How to define and promote best practices ?

Database of Good Practices



- Engage families and communities in promoting STEM careers to girls.
- Engage females in exploring socio-scientific issues.
- Promote social support for females, such as peer networks and mentoring by more experienced STEM researchers or professionals.
- Develop females' STEM leadership, advocacy and communication skills.

Recommendations to scientific unions

- Encourage the **diversification of scientific awards**, actively encouraging the nomination of women. Add **18 months per child to all age-limits in scientific awards** for people having taken care of children.
- Encourage the presence of women in editorial boards in your discipline and publish reports on the proportion of papers published by women. Use double blind reviews. Manage constructive feedback on submitted papers.
- Create a committee for women and/or gender equality, with an assigned budget line. Organize specific meetings to promote women's networking. Support women in writing better grant proposals. Develop websites on women in science, reporting all the news relevant for women in science such as success stories of female scientists, conferences or activities relevant to women in science. Encourage and advertise books and media written by women, biographies of women, and media releases.

Recommendations to scientific unions

- Welcome families in scientific activities. For scientific meetings that you sponsor or support, encourage taking care of all issues of family attending with children and putting a budget in place to offer childcare solutions.
- Actively promote gender balance at every level of your organization, including its leadership, committees and institutional events.
- In all outreach and educational programs and products, raise awareness about the gender gap and include specific actions and events that aim at reducing the gender gap. When role models are introduced, include diverse backgrounds, genders and ages and those who did not necessarily have a straightforward traditional career, including scientists not employed in academia.

GGS recommendations

Not considered inside IMU for discussion and possible approval.

In particular, age of Fields medalists for people who took care of children (i.e. women in most cases)

References

The gender gap in science website

<https://gender-gap-in-science.org/>

CWM website with the data base of good practices

<https://www.mathunion.org/cwm>

Gender Gap in Science Booklet

Summary of the project in
8 pages:

Currently in English, French,
German and Spanish, as well
as Chinese

(both simplified Chinese and traditional
Chinese characters)

*A Global Approach to the Gender Gap
in Mathematical, Computing, and Natural Sciences:
How to Measure It, How to Reduce It?*



The **gender gap** is the difference between women and men "in terms of their levels of participation, access, rights, remuneration or benefits". According to the UNESCO Institute of Statistics, **fewer than 30% of the world's researchers are women**, which reflects the existence of a clear gender gap in science. To truly **understand and reduce** it, it is necessary to identify the various factors that deter women from pursuing careers in scientific disciplines.

The project "A Global Approach to the Gender Gap in Mathematical, Computing, and Natural Sciences: How to measure it? How to reduce it?" contributes to this analysis from three complementary perspectives:

- The **Global Survey of Scientists** addresses issues related to missing role models, feelings of critical exclusion, harassment, or low participation and retention rates.
- The **Study of Publication Patterns** provides insights on the proportion of women as research authors or the presence of women publishing in renowned journals.
- The **Database of Good Practices** introduces a conceptual framework to analyze them, in order to provide evidence of effectiveness and impact.



Website of the project: <https://gender-gap-in-science.org/>

<https://gender-gap-in-science.org/promotional-materials/>

Keeping up the network

<https://gender-equality-in-science.org/>



Standing Committee
for **Gender Equality** in Science

Twenty-three scientific unions

Association for Computing Machinery (ACM) *

International Astronomical Union (IAU)*

International Council for Industrial and Applied Mathematics (ICIAM)*

International Federation of Societies for Microscopy (IFSM)

International Geographical Union (IGU)

International Mathematical Union (IMU)*

International Union for Quaternary Research (INQUA)

International Political Science Association (IPSA)

International Union of Biochemistry and Molecular Biology (IUBMB)

International Union of Biological Sciences (IUBS) *

International Union of Crystallography (IUCr)

International Union of Geological Sciences (IUGS)

International Union of History and Philosophy of Science and Technology (IUHPST)*

International Union of Immunological Sciences (IUIS)

International Union of Materials Research Societies (IUMRS)

International Union of Pure and Applied Chemistry (IUPAC)*

International Union of Pure and Applied Physics (IUPAP) *

International Union of Physical and Engineering Sciences in Medicine (IUPESM)

International Union of Psychological Science (IUPsyS)

International Union of Soil Sciences (IUSS)

Scientific Committee on Antarctic Research (SCAR).

Union Internationale de Spéléologie/International Union of Speleology (UiS)

Main activities

<https://gender-equality-in-science.org/>

Webinars organized by SCGES or by one or two unions

Annual report

Very few unions know the proportion of women in their scientific community

Astronomy 21% in western countries (EU and USA); below 20% in Africa, Asia, Middle East, Oceania, and Southern America.

Immunological Sciences around 60 %

Math about 30 %

Physics about 20 %

Questions for IMU

- OAL prize in the future ?
- May 12 Celebrating Women in Mathematics ?
- Discussing and implementing the recommendations of the Gender Gap in Science project ?