An invitation to the hall of fame On the trails of women among ICM speakers

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Hall of fame for mathematics

The International Congress of Mathematicians (ICM), inaugurated in 1897, is the greatest effort to strengthen international communication and connections across all mathematical fields. ICMs have historically hosted some of the most prominent mathematicians of their time. Receiving an invitation to present a talk at an ICM signals high international reputation of the recipient, and is akin to entering a "hall of fame for mathematics".

The relevance and long tradition of the ICM raises various questions regarding women's participation.

Individual trails

Women mathematicians attended the ICM from the start. The first woman invited to deliver a lecture was Laura **Pisati**. Sadly, she died young a few days before the 1908 congress in Rome. Her paper 'Saggio di una teoria sintetica delle funzioni di variabile complessa' was presented by a male colleague. In the report on the sectional meetings of the congress [2], she appears as the only speaker with first and last name listed, showing the singularity of women's presence in this circle at that time. Pisati, who had been listed as a member of the 'Deutsche Mathematiker Vereinigung' and the 'Circolo Matematico di Palermo', had already published internationally recognized papers. A list of her works can be found in [3]. Four years later, in 1912, Hilda Phoebe Hudson spoke as the first woman at an ICM presenting her work in the Geometry section of the congress.

Any difference?

Topics not balanced: Women are not equally distributed across mathematical sections. Their share is larger than 15% in Mathematical Aspects of Computer Science or Teaching and Popularization of Mathematics, but they are underrepresented in sections dealing with e.g. Mechanics or Probability & Statistics.

Age of recent women speakers higher: The average age for both genders is 44. However, before ICM-50, women speakers were on average 36 years old, 9 years younger than their male colleagues. Since 1950, their average age surpasses men's by almost 5 years.

- How **inclusive** has the congress been throughout its history?
- What factors have **positively influenced** the share of women?
- Who were the **first women** presenting their results at an ICM?
- Are there **significant differences** between the women and men speakers regarding **age**, country of residence or research areas?

Methodology

We have collected data from the following sources:

- Wikipedia: list of all invited speakers [1]
- Wikidata: gender, country of citizenship, date of birth, employer for individual speakers, as far as available
- Website of the IMU: list of speakers and the corresponding ICM sections; ICM proceedings
- Manually created list of all speakers at ICM 2018



Emmy Noether (front) at a steamboat trip during ICM-32. (ETH-Library, Zurich)

However, the positive trend in the early years of the ICM did not persist: as an example, it took almost 60 years until Karen Uhlenbeck became the second woman to give a plenary talk at an ICM.



The 1932 congress in

Zurich witnessed the first

plenary talk by a woman,

given by **Emmy Noether**.

representation of women

mathematical community.

within the international

This certainly marked a

milestone in the

No difference by countries: Speakers come from similar countries, independent of their gender. The overall distribution is as expected: the USA have the highest share, followed by some European countries and Russia, whereas almost no African country is represented.



Figure 2: Geographical distribution of all women speakers according to their country of residence.

Change needs action

For some individuals, in particular for all women speakers, we have manually checked the data and added missing information. Insights gained from statistical data analysis were further studied using qualitative research from the History of Mathematics.

The history in numbers

- Women make up just 5%: Of the 4120 invited talks, 202 were given by women.
- Peak in 1932: ICMs in 1928 and 1932 show a significant increase of women speakers.
- Improvement since 1990: Of all lectures delivered by women in the history of ICMs, 80% took place after the ICM in 1990 in Tokyo.
- 18 plenary lectures make up 4%: The ICMs in Beijing, Hyderabad and Rio de Janeiro featured a total of 10 plenary lectures by women.

before her plenary lecture in Kyoto. (Oberwolfach Photo Collection)

Advances and setbacks

The progressive spirit of the 1920s spurred the situation of women in science. **ICM-32 marks a pinnacle** in the history of ICMs, in quantitative terms as well as regarding the role of women: Emmy Noether gives a plenary lecture, various women's colleges and organizations of university women send delegates.

The reasons for the shortage of women speakers in the decades after WW2, and why it took 60 years to get back to ICM-32's numbers are manifold and will require further investigation.

Since 1974, associations of women such as the AWM have organized events during ICMs, often sparking discussions on the systematic omission of women as invited speakers. Various congresses in the 70s and 80s were accompanied by resolutions aiming to increase the number of lectures by women. As described in [4,5], whenever there was no explicit reminder, the members of the responsible committees forgot to include their female colleagues.

During the ICM-83, the topic was not raised, resulting in no invited women for the follow-up congress. The final list of speakers was corrected after presenting 25 qualified women candidates to the Executive Committee.

The engagement of Mary Ellen Rudin in her role as the head of the U.S. delegates at the IMU General Assembly in 1986 is an illustrative example of what can change when individuals in prominent positions pursue this topic. The president of the ICM-90 in Kyoto explicitly stated that the committees have followed Rudin's recommendation that subfields of mathematics, women & mathematicians in small countries should not be overlooked [6].

References



Figure 1: Bar height shows the percentage of women speakers per ICM. The numbers inside correspond to the total numbers of invited women.

[1] List of International Congresses of Mathematicians Plenary and Invited Speakers. In Wikipedia, The Free Encyclopedia. from https://en.wikipedia.org/w/index.php?title=List_of_International_Congresses _of_Mathematicians_Plenary_and_Invited_Speakers, retr.: 13.2.2018 [2] C. L. E. Moore, *The fourth International Congress of Mathematicians:* sectional meetings, Bull. Amer. Math. Soc. 15 (1908), 8-43 [3] Author profile of L. Pisati in zbmath.org. https://zbmath.org/authors/?q=ai%3Apisati.l, retr.: 20.7.2018

[4] C. Sadosky, Affirmative action: what is it and what should it be?. in: B. A. Case and A. M. Leggett (eds.), Complexities: Women in mathematics. Princeton, NJ: Princeton University Press (2005), 116-120

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[6] I. Satake (ed.), Proceedings of the international congress of mathematicians (ICM), August 21-29, 1990, Kyoto, Japan. Volume I. Tokyo etc.: Springer-Verlag (1991)

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