



Committee for Women in Mathematics

Report of the International Mathematical Union Committee for Women in Mathematics from 2019 to 2022

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1 Introduction

The Committee for Women in Mathematics (CWM) of the IMU was created by the EC in March 2015, with the following terms of reference:

- (1) To promote international contacts between national and regional organizations for women in mathematical sciences;
- (2) To maintain up-to-date content on the Women in Mathematics part of the IMU website and, with appropriate assistance from the IMU, to ensure its technical development;
- (3) To consider how best to facilitate electronic communications among the community of women mathematicians internationally;
- (4) To work with groups, committees and commissions of IMU on topics pertaining to women mathematicians and their representation;
- (5) To publicise, and where needed to suggest, working practices that ensure equal opportunities for women mathematicians in universities and research institutions, for example appropriate funding arrangements, family friendly policies and facilities;
- (6) To report annually to the IMU Executive Committee and to propose actions that would foster equal treatment of women in the mathematical community and lead to an increase in the representation of women in mathematics at all levels.

CWM identified a few well established national and continental associations for women in mathematics, such as the Association for Women in Mathematics (AWM - <https://awm-math.org/>) in the United States of America, the European Women in Mathematics (EWM -

<https://www.europeanwomeninmaths.org/>), the African Women in Mathematics Association (AWMA - <http://africanwomeninmath.org/>), and the Indian Women in Mathematics (IWM - <https://sites.google.com/site/iwmmath/>). On the other hand, there was a lack of organizations for women in mathematics in other regions, such as Latin America and most of Asia.

In 2016, CWM established its annual call, to fund initiatives for women in mathematics (up to 3K Euros per application), with priority given to regional and continental organizations in developing countries. The CWM annual call is launched on December of the previous year, inviting applications for funding for activities for women in mathematics taking place in the calendar year.

In its inaugural period 2015-2018, CWM has focused on developing regional networks for women in mathematics. In particular, a network for women in mathematics in Latin America was facilitated with the organisation of the first World Meeting for Women in Mathematics - (WM)² - in Rio de Janeiro in 2018 (<https://2018.worldwomeninmaths.org/>). The (WM)² was a satellite event of the ICM 2018, organised by CWM on the day preceding the ICM. With a focus on Latin America, the first (WM)² brought together around 350 participants, mostly women, from 51 different countries to celebrate women mathematicians, and to reflect on gender issues in mathematics, challenges, initiatives, and perspectives for the future.

More details on (WM)² are given below, and the complete report of can be found here: https://www.mathunion.org/fileadmin/CWM/Initiatives/short_report_wm2.pdf.

2 Committee Members in the period 2018-2022

The composition of CWM 2019-2022 is as follows.

- Marie-Françoise Roy (MFR), Université de Rennes 1, France, Chair;
- Carolina Araujo (CA), IMPA, Rio de Janeiro, Brazil, Vice Chair;
- Alejandro Adem (AA), University of British Columbia, Canada;
- Petra Bonfert-Taylor, (PBT) Dartmouth College, USA (web management till 2021);
- Tony Ezome (TE), USTM, Franceville, Gabon;
- Josephine Kagunda Wairimu (JK), University of Nairobi, Kenya;
- Neela Nataraj (NN), IIT Bombay, India (grant management);
- Motoko Kotani (MK), Tohoku University, Japan;
- Ekin Ozman (EO), Bogazici University, Turkey (CWM Newsletter management); and
- Cheryl Praeger (CP), University of Western Australia, Australia (reports management).

The liaison person between CWM and IMU EC was Carlos Kenig (CK), University of Chicago, USA, who was also IMU president in that term.

In addition, CWM had three special contacts:

- Betül Tanbay (BT), Bogazici University, Turkey (link to International Day of Mathematics - IDM);
- Julia Pevtsova (JP), University of Washington (link with (WM)² 2022 organizing committee)
- Sandra Kingan (SK), Brooklyn College (CWM twitter account).

In 2020 Natalia García-Colín (NGC), Université Libre de Bruxelles contributed to CWM website.

3 Activities funded by CWM annual calls

The CWM 2019 call received 40 applications that could be classified in four categories: Networks, Projects, Schools, Individual Support, and Workshops. After evaluation, CWM chose to support 7 projects, including 6 Networks in Indonesia, Argentina, South Africa, India, Dominican Republic and Cameroon, and 1 School in Tunisia. A total of about 500 people attended these events, and at least 2/3 of the participants were women.

The CWM call was reformulated in December 2019, specifically inviting application with one of the following aims.

- a) Establishing or supporting networks for women in mathematics, preferably at the continental or regional level, and with priority given to networks in developing or emerging countries.
- b) Organizing a mathematical school open to all with all women speakers and mainly women organizers.
- c) Organizing research workshops geared towards establishing research networks for women by fostering research collaborations during the event.
- d) Other ideas for researching and/or addressing issues encountered by women in mathematics.

The CWM 2020 call received 35 applications, of which 8 were selected to receive financial support. Six of them were projects of meetings, to take place in Chile, Colombia, India, Senegal, Turkey and Vietnam. The other two projects supported were the May 12 initiative, a project jointly organised by several regional associations of women in mathematics, and the exhibition project “*МАТЕМАТИКА, through a land of mathematics*”, to be inaugurated at (WM)² - World Meeting for Women in Mathematics, which was then planned to take place in Saint Petersburg in 2022.

Due to the COVID crisis, only three projects took place in 2020, and had to be partially redesigned. The May 12 initiative website was updated as planned, which turned out to be very useful when most of the activities became virtual. The preparation of the exhibition project, *МАТЕМАТИКА, through a land of mathematics* started actively, but the travel through Russia by train had to be postponed. The activities of Indian Women and Mathematics were adapted, in particular the Winter School for Young Women took place via Zoom.

Of the 5 remaining projects, one was canceled in Colombia, 2 became virtual, in India and Latin America, and 2 took place in 2021, the workshop Women in Sage in Africa, at AIMS, Senegal, and the meeting at Nesin village, Turkey.

The CWM 2021 call received 23 applications, of which 6 were selected to receive financial support. Those were: a project by the May 12 initiative to upgrade the reporting mechanism of their website; the second phase of the exhibition project “*МАТЕМАТИКА, through a land of mathematics*”; a project by Indian Women in Mathematics, and two mathematical activities in Latin America and Pakistan. Two extra activities were later supported by CWM in 2021: the film project “*Words of women in mathematics in the time of Corona*” and a CGD-UMALCA workshop in the scope of the Latin American meeting of CWM ambassadors. AWMA’s proposal for a special day for women in mathematics at the Pan African Congress of Mathematicians PACOM 2021 was postponed to 2022 since the whole PACOM was postponed.

The CWM 2022 call received 31 applications, of which 10 were selected to receive financial support. The list includes the creation of the website of the AOWM (Asian and Oceanian Women in Mathematics) platform, and the update of the website of AWMA (African Women in Mathematics Association), as well as 3 regional meetings: the third Central Asian Women in Mathematics in Tadjikistan, the second Women in Sage in Africa workshop in Nigeria, and the Latin American and Caribbean Workshop on Mathematics and Gender at BIRS Oaxaca, in Mexico. The 5 other

supported proposals are national events to create networks in Gabon, Ghana, and Oman, the Indian Women in Mathematics activities, and the II Brazilian Meeting for Women in Mathematics.

More information can be found here :

<https://www.mathunion.org/cwm/cwm-initiatives/cwm-sponsored-networks-and-activities>

4 World Meeting for Women in Mathematics - (WM)²

After evaluating the positive outcomes of the (WM)² 2018, CWM decided to make it a regular one day satellite activity of the ICM, taking place on the day preceding the ICM, preferably in the same venue. A permanent website has been designed for future (WM)² editions (<https://www.worldwomeninmaths.org/>), while the website of (WM)² 2018 has been integrated to this permanent website.

4.1 The follow-ups of (WM)² 2018 in Rio de Janeiro

The proceedings book “*World Women in Mathematics 2018: Proceedings of the First World Meeting for Women in Mathematics - (WM)²*” was published at the end of 2019 as a special volume of the AWM Springer Series, dedicated to the memory of Maryam Mirzakhani. Edited by C. Araujo, G. Benkart, C. Praeger and B. Tanbay, it records the first (WM)² and the CWM panel discussion at ICM 2018. The first part of the volume includes a report of activities of the (WM)², and survey research papers from invited lecturers. The second part contains articles from the panelists of the CWM ICM 2018 panel discussion, which consider the historical context of the gender gap in mathematics, including an analysis of women lecturers in the ICM since its inception.

4.2 Virtual (WM)² 2022

The second (WM)² (<https://2022.worldwomeninmaths.org/>) was originally planned to take place in St Petersburg on July 5, 2022, the day between the IMU General Assembly and the opening of the ICM. The (WM)² 2022 was approved as an official satellite conference by the ICM Local Organizing Committee. It was granted significant funding (lodging, food, local expenses), together with meeting rooms (at the Expoforum where ICM was planned), and technical and logistical assistance. Funding was also available for the exhibition space, printing, and setting up of the exhibition “*MATEMATIKA, through a land of mathematics*”, which was to remain open during the ICM 2022. Chebyshev and Kovalevskaya awardees were informed that, after approved by the (WM)² organisation, they would receive an extra night of accommodation to attend (WM)².

Following IMU's decisions about the ICM 2022, the second (WM)² became a mostly virtual event taking place on July 1-2 2022, with a special joint session with the Probability and Mathematical Physics ICM satellite event, the “OAL Celebration”, on July 2nd 2022 in Helsinki. The date changed to accommodate the Ceremony for the IMU Prizes (Fields Medal, Abacus Medal, Carl Friedrich Gauss Prize, Chern Medal Award and Leelavati Prize) on July 5 2022.

The Scientific Committee of (WM)² 2022 was composed of:

- Igor Krichiver (Columbia University, USA and Skoltech Center for Advanced Studies, Russia)
- Ari Laptev (Imperial College London, UK)
- Ragni Piene (University of Oslo, Norway)
- Cheryl Praeger - chair (University of Western Australia, Australia)
- Senjo Shimizu (Kyoto University, Japan)

The Organizing Committee of the (WM)² 2022 was initially composed of:

- Carolina Araujo (IMPA, Brazil, vice-chair of CWM)
- Alisa Knizel (Columbia University, USA)
- Neela Nataraj (IIT Bombay, India, member of CWM)
- Marie Françoise Ouedraogo (University of Ouagadougou, Burkina Faso)
- Ekin Ozman (Bogazici University, Turkey, member of CWM)
- Olga Paris-Romaskevich (Lyon, France, CNRS)
- Julia Pevtsova - contact person (University of Washington, USA)
- Marie-Françoise Roy (Université de Rennes, France, chair of CWM)
 - Natalya Smorodina (St. Petersburg Department of Steklov Mathematical Institute and St. Petersburg State University, Russia)
 - Tatiana Suslina (St. Petersburg State University, Russia)
 - Andrea Vera-Gajardo (Universidad de Valparaíso, Chile)
 - Dongmei Xiao (Shanghai Jiao Tong University, China)

Natalya Smorodina and Tatiana Suslina stepped down from the (WM)² OC on March 17 2022. Kaie Kubjas and Kirsi Peltonen (Altoo University, Finland) were invited to join the (WM)² OC. They both accepted the invitation, and played a significant role in the organisation of OAL Celebration on July 2nd 2022 in Helsinki.

A bilingual English-Russian website had been created for (WM)² 2022. When the event became virtual, the Russian version of the 2022 website was removed.

The first session of (WM)² 2022 was entirely virtual and took place on July 1st 2022. The program featured four plenary online lectures by distinguished female mathematicians from the region where (WM)² 2022 was originally planned to take place: Mina Aganagic, Eugenia Malinnikova, Natalia Vladimirovna Maslova, and Maryna Sergiivna Viazovska. It also includes a panel discussion entitled “*Girls and Mathematics: reflections and initiatives*”, devoted to the memory of Yulia Zdanovska. The panel was moderated by Ekin Ozman and Olga Paris-Romaskevich. It started by six short presentations by Luba Konova Sofia University, Bulgaria, Geetha Venkataraman Dr. B. R. Ambedkar University Delhi, India, Fadipe-Joseph Olubunmi Abidemi University of Ilorin, Nigeria, Kenneth Fan Girls' Angle, USA, Makiko Sasada The University of Tokyo, Japan, Laura Gomez Universidad Sergio Arboleda, Colombia and continued with a lively discussion.

To celebrate the 100th birthday of Olga Alexandrovna Ladyzhenskaya, a joint session was organised by (WM)² and the Probability and Mathematical Physics ICM satellite event on July 2nd 2022 in Helsinki: the “*OAL Celebration*”. The program included a premiere of a film about Olga Alexandrovna Ladyzhenskaya by Ekaterina Eremenki and the awarding the OAL Prize, with the presentation of the prize by Ingrid Daubechies, the announcement of the Prize Winner Svetlana Jitomirskaya, Laudatio by Artur Avila and Lecture of the prize winner.

The remaining activities originally planned for (WM)² 2022, namely the exhibition “*МАТЕМАТИКА, through a land of mathematics*”, the poster session and the group discussions, have been canceled.

More than 1100 people from more than 100 countries registered to v(WM)².

5 The scheme of CWM Ambassadors

CWM has established a list of special correspondents worldwide, called *CWM Ambassadors*, with the job of disseminating information received from CWM, as well as keeping CWM informed about activities and initiatives in their countries. The original list included 85 names from 55 countries in

2016. There are now 175 CWM ambassadors from 101 countries. The list is posted on the CWM website.

In 2020, CWM prepared a questionnaire to CWM Ambassadors, in order to evaluate how the scheme was working, and to receive suggestions of improvement. As a result of this dialogue, a network of CWM ambassadors has been facilitated, encouraging the exchange of experience and good practices between them. Virtual meetings of CWM Ambassadors by continent were organised in 2021. In Europe, it was organised jointly with EWM (European Women in Mathematics); in Africa, jointly with AWMA (African Women in Mathematics Association); in Asia, in combination with the creation of the Asian and Oceanian Women in Mathematics platform; in Latin American, jointly with CGD-UMALCA (Commission for Gender and Diversity); and the Pan-American meeting had participation from AWM (Association for Women in Mathematics) and GCD-UMALCA. A global gathering of CWM Ambassadors took place on February 11, 2022.

6 CWM in IMU activities

6.1 ICM panels

During the virtual ICM 2022, the panel “*Best Practices Towards a More Diverse and Inclusive Mathematical Community*” was jointly organised by IMU’s CoD (Committee of Diversity) and CWM: <https://www.mathunion.org/cwm/cwm-initiatives/best-practices-towards-more-diverse-and-inclusive-mathematical-community>. The panel was chaired MK (CWM) and Edray Herber Goins (CoD), with panelists CA (Brazil), Edy Tri Baskoro (Indonesia), Nira Chamberlain (UK), Anjum Halai (Pakistan), EO (Turkey) and MFR (France).

Moreover MFR was invited to participate in the CDC ICM panel in 2022 “Online International Cooperation in Mathematics: Challenges and Opportunities for Developing Countries”.

6.2 International Day of Mathematics (IDM)

CWM has been active in promoting the project of IDM even before its approval. This is reflected in the list of international and regional organisations supporting IDM, which includes the Organisation for Women in Science for the Developing World (OWSD), the African Women in Mathematics Association (AWMA), and the European Women in Mathematics (EWM). BT has been nominated by CWM and is a member of the IDM Governing Board (IDMGB).

It is worth noting that there is a very good visibility of girls and women within IDM activities. In particular, the choice of the special guest speakers for the online annual celebration, featuring sessions in English, Spanish, Arabic, Portuguese and French is very well gender balanced.

6.3 IMU News

CWM has a section in each issue of the IMU News.

7 Interdisciplinary activities

7.1 Gender Gap in Science Project (GGSP)

The project *"A Global Approach to the Gender Gap in Mathematical, Computing and Natural Sciences: How to Measure It, How to Reduce It?"* led by the IMU and the International Union of Pure and Applied Chemistry (IUPAC), was funded by ISC during the period 2017-2019 (with a budget of €100 000 per year in 2017, 2018 and 2019). CWM, particularly MFR, was in charge of the project on behalf of IMU. There were 9 other partners in the project: International Union of Pure and Applied Physics (IUPAP), International Astronomical Union (IAU), International Council for Industrial and Applied Mathematics (ICIAM), International Union of Biological Sciences (IUBS), International Union of History and Philosophy of Science and Technology (IUHPST), United Nations Educational, Scientific and Cultural Organization (UNESCO), Gender in Science, Innovation, Technology and Engineering (GenderInSITE), Organization of Women in Science for the Developing World (OWSD), Association for Computing Machinery (ACM). The budget provided by ISC was completed by contributions from the partners.

Years 2018-2019 were devoted to analyzing the results from the Global Survey of Scientists and the Joint data-backed Study on Publication Patterns, and to formulating recommendations to be proposed for implementation to the partners of the project.

The final conference of the project took place at ICTP, Trieste, on November 4-8 2019, with the following programme (see <http://indico.ictp.it/event/8731/> for details):

- Report on the findings and achievements of the project.
- Discussion and evaluation of the results of the project.
- Formulation of recommendations and discussion of new initiatives.

More information on the GGSP can be found at <https://gender-gap-in-science.org/>. A presentation booklet and presentation slides of the project in several languages are also available. <https://gender-gap-in-science.org/promotional-materials/>

7.2 Gender Gap in Science Book

In 2020, the Gender Gap in Science Book was finalized. It was edited by Colette Guillopé and MFR, illustrated by original cartoons of Lea Castor, and published on line with IMU copyright (<https://zenodo.org/record/3882609>). The book presents the methodology, results, activities and recommendations of the project, divided in the following chapters:

- A Global Approach to the Gender Gap in Mathematical, Computing, and Natural Sciences: Results and Recommendations, by MFR, Colette Guillopé and Mark Cesa;
- Measuring and Analyzing the Gender Gap in Science through the Global Survey of Scientist, by Rachel Ivie and Susan White;
- Measuring and Analyzing the Gender Gap in Science through the Joint Data-backed Study on Publication Patterns, by Helena Mihaljević and Lucía Santamaría;
- Some initiatives for Reducing the Gender Gap in Science: a Database of Good Practices, by Marilyn Goos and Regina Kelly;
- Impact of the Gender Gap in Science Project in Africa, Asia and Latin America, by Silvina Ponce-Dawson, Ile Gledhill and Mei-Hung Chiu; and
- Report of the Final Conference of the Gender Gap in Science Project at ICTP, by Colette Guillopé, and MFR.

The book has been downloaded more than 9500 times, and can also be printed on demand.

7.3 Continuation of the Gender Gap in Science Project

All union and organization representatives in the GGSP wished the project results and its associated tools to remain available well beyond the end of the 2017-2019 period during which it received funding from ISC. In 2020 and 2021, data suppression techniques were employed, allowing access to the data collected through the Global Survey of Scientists to participating unions and partners of the project, as well as other research groups (upon approval by an ad-hoc mechanism), while protecting the privacy of the respondents to the survey. From March to August 2021, an internship project on the gender gap in math/applied math and the gender gap in science in Africa took place, funded by IMU and ICIAM. Similar studies have been launched for chemistry, physics, astronomy, and in Latin America. There have also been efforts to improve the long-term availability and maintenance of the tools of the project for the analysis of Publication Patterns and the Database of Good Practices. The Database of Good practices is currently hosted by IMU, and its final presentation is being finalized (<https://www.mathunion.org/cwm/gender-gap-in-science-database>).

7.4 Dissemination and implementation of the recommendations of the GGSP, inside IMU.

The recommendations in the report were kept short and direct on purpose. They were divided into three categories: recommendations for parents and educators, recommendations for scientific organizations, and recommendations for international unions. They have been distributed to the Adhering Organizations of the IMU for their information. The following questions remain: Is there a mechanism for the recommendations concerning international unions to be discussed inside the IMU and (hopefully) transformed into official recommendations of the IMU? And, more generally, what can be done by the IMU to help implement the recommendations for parents and educators, and for scientific organizations?

7.5 Standing Committee for Gender Equality in Science (SCGES)

After discussion inside the GGSP, the Standing Committee for Gender Equality in Science (SCGES) was created to further promote gender equality in science, by continuing and enlarging the work accomplished by the GGSP, supporting women and girls' equal access to science education, and fostering equal opportunity and treatment for females in their careers. This permanent organisation initially had 9 founding members, including the IMU. The IMU representatives in SCGES are MFR and CA.

SCGES met virtually for the first time in September 2020, and has met twice a year since then. Catherine Jami from IUHPST is the chair of SCGES, Guy Smagghe from UBS the vice-chair, and MFR the communication officer. SCGES participates actively in the group initiated by ISC, entitled Gender Equality in Science Collaborative. At the ISC GA on October 11, several unions including the IMU, led by IUHPST, organized a panel "*Gender Equality in Science: from a project to a permanent network of scientific unions*".

Starting in 2022, SCGES has coordinated the SCGES Webinar Series. This monthly event is promoted by its member organizations with the aim of creating exchanges and interactions related to issues around Gender Equality in Science among various scientific communities. The first session took place on February 16 2022, organized jointly by IMU and ICIAM on the topic of Gender Equality in Mathematics.

At the end of 2022, SCGES had 20 member organizations, and their number grows steadily.

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

SCGES Webinar Series: <https://gender-equality-in-science.org/scges-webinar-series/>

The two first annual reports of SCGES are available here

<https://gender-equality-in-science.org/2021/09/25/first-scges-annual-report/>

<https://gender-equality-in-science.org/2022/10/>

8 Remember Maryam Mirzakhani Exhibition

As a tribute to Maryam Mirzakhani, CWM created the Remember Maryam Mirzakhani Exhibition with 18 original A0 posters portraying Maryam Mirzakhani. The exhibition was created by Thaís Jordão (curator) and Rafael Meireles Barroso (designer). It was inaugurated at the (WM)² 2018 and remained open during the ICM 2018. After that, CWM agreed on the following rules for further displays of the exhibition. The materials are all held electronically by CWM, under the copyright of the IMU. Any institution, group of institutions, or venue interested in hosting the exhibition must obtain the agreement of CWM. A letter describing the context, location and dates must be provided, as well as a designated person in charge. This person is responsible for making sure that all the rules set by CWM are fulfilled. CWM provides the electronic files and each venue is in charge of printing them. Several copies of the exhibition can be shown simultaneously. A poster and flyer describing the exhibition are available in English and other languages (French, Persian and Turkish).

In 2018, CWM made agreements with the following institutions:

- The Stanford Mathematics Department, where Maryam Mirzakhani held a professorial chair. One copy of the exhibition will be permanently posted at various places in the mathematics building.
- The Fields Institute, during the Fields Medal Symposium 2018 in honour of Maryam Mirzakhani and the current and future impact of her work. The exhibition was shown 5-9 November at the Fields Institute and on 5 November at the MaRS Discovery Center during the Symposium Public Opening.
- The III Brazilian Congress of Young Research in Pure and Applied Mathematics and Statistics (III CBJME) in Curitiba, Brazil, 12-14 December 2018.

In 2019, CWM made agreements with the following institutions:

- Canadian Mathematics Society's Winter Meeting hosted by York University, December 6 to 9, 2019.
- Fields Day @ Queen's, Canada, on November 19, 2019.
- INMOST, a science museum affiliated with the Ministry of Science, Research and Technology in Iran. INMOST will run a permanent exhibition on the scientific achievements of Maryam Mirzakhani at the beginning of September 2019 for about 5 years, including the exhibition "Remember Maryam Mirzakhani".
- University of Rennes, France, October 14 to December 15.
- II Festival da Matemática (II Mathematics Festival) in Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, in Brasil, from August 7 to 10.
- The Stanford Mathematics Department, USA, May 13 to 24.
- MSRI, Berkeley, USA, May 12 to end of August.
- The Fields Institute, Canada, May 10-17, 2019.
- Nesin Mathematical College, Turkey from May 15 to 29.
- Istanbul Mathematics Festival, Galatasaray University Ortaköy campus, Turkey, on May 4-5.
- University of L'Aquila & Gran Sasso Science Institute, L'Aquila, Italy, May 9 to 23.
- Lund University, Sweden May 8 to 15.

- University of Sao Paulo, Brasil, May 1 to 31.
- The Association for Women in Mathematics (AWM), US, Research Symposium April 6-7.

In 2020, CWM made agreements with the following institutions:

- Virtual Heidelberg Laureate Forum from 21 to 25 September, with a virtual reality approach to the exhibition, a panel discussion Theorems and Initiatives inspired by Maryam Mirzakhani <https://av.tib.eu/media/49561> , and the projection of the film Secrets of the Surface.
- Dipartimento di Matematica 'Levi-Civita' Padova, Italy, 10- 25.
- Arizona State University, Celebrating Women in Mathematics and Statistics event March 26-27.
- Maison Internationale de Rennes, France, March 10 to 17.
- Department of Mathematics at the University of Ottawa, Canada, March 6-13. The posters were introduced by Prof Sara Maloni (Virginia), whose presentation was the first annual Distinguished Women in Mathematics Colloquium at the University of Ottawa.
- Federal Paraná University (Curitiba, Paraná, Brasil), starting February 11th to celebrate the International Women and Girls in Science Day, in the framework of the "Meninas na Matemática: Procuram-se Arletes" project.
- Universitat Politècnica de Catalunya (UPC) in Barcelona, Spain, 10th February to 24th April 2020. Several activities will be organized around this exhibition, taking advantage of the celebration of the International Day of Women and Girls in Science (11 February), the International Women's Day (8 March) and the International Day of Mathematics (14 March).
- Joint Mathematics Meeting in Denver, USA, January 15-18, 2020, organized by The National Academy of Sciences' U.S. National Committee for Mathematics.

Due to the Covid crisis, classical exhibitions were not possible in 2021. However, CWM had an agreement with the Australian Research Council Centre of Excellence for Mathematical and Statistical Frontiers (ACEMS), at Queensland University of Technology (QUT), which displayed the exhibition at "The Cube" in Brisbane, using the multiple high resolution screens offered by The Cube. On May 12 2021, the exhibition was opened for the general public throughout the day.

In 2022, CWM approved the Maryam's Museum request to host Remember Maryam Mirzakhani Exhibition permanently. Maryam Mirzakhani's family and the Foundation of Maryam Mirzakhani - a charity organization supporting talented girls continuing their study - have prepared a place in Taleghan, Maryam's mother's hometown, for a museum named *Maryam's Museum*, intended to show some of Maryam's belongings. It also made agreements to show the exhibition

- live at "V Simpósio Nacional da Formação do Professor de Matemática - ANPMat" at the Federal University of Santa Maria (UFSM), Brazil from 4 November to 6 November, and at campus Canoas of the Federal Institut of Rio Grande do Sul (IFRS) for the event XI Feira das Cidades e V Festival Literário do IFRS Canoas from 21 November to 25 November.
- on line at the Mathematics University of the Univeristy of Rosaro, Argentina's virtual event on May 12, with the exhibition, the screening of the film Secrets of the Surface and a roundtable,
- the "Tutam Tutam Mathematics" festival May 14-15, aimed at increaing interest in mathematics and bring mathematics lovers together at Galatasaray University. More than two thousand high school and university students attended the festival.

9 CWM and May 12 - Celebrating Women in Mathematics

During the (WM)² 2018, the Women's Committee of the Iranian Mathematical Society proposed that May 12, which is the birthday of Maryam Mirzakhani, become a celebration day for women in mathematics. This proposal was approved by the participants of (WM)², giving rise to the "May 12 Initiative", led by several national and continental organizations for women in mathematics worldwide (European Women in Mathematics, Association for Women in Mathematics, African

Women in Mathematics Association, Colectivo de Mujeres Matemáticas en Chile, Women's Committee of the Iranian Mathematics Society, Indian Women in Mathematics). At the same time, the IMU was involved in an international campaign to have March 14 (Pi day) recognized as International Day of Mathematics by UNESCO, and there was concern that another international initiative involving the IMU would create confusion. For this reason, CWM was not directly involved in the establishment of the May 12 initiative, even though CWM members have been active members in the coordination group (MFR, CA, PBT) on an individual basis. In 2022, the Chilean collective was replaced by the recently created CGD-UMALCA.

The call for action sparked an overwhelming response, resulting in more than one hundred events being organized in its inaugural year 2019, showing that the initiative fulfils a strong need. Details can be found in the article *May 12: Celebrating Women in Mathematics - From One Idea to One Hundred Events*, published in Notices of the AMS, Volume 66, Number 11, 2019.

In 2020, the May 12 initiative website was updated with a support from CWM. Because of the Covid, the main activity was individual screenings of the one hour documentary film “*Secrets of the Surface, the Mathematical Vision of Maryam Mirzakhani*”, organized through an agreement between Zala Films and the May 12 initiative. With the pandemic crisis, it was soon clear that many collective events would have to be canceled and Zala Films agreed that individual screenings were also offered on the May 12 website. More than 20,000 requests were received from 131 different countries.

In 2021, the reporting mechanism on the May 12 website was improved, to make more visible the range of activities. This was made possible by funding from CWM. After the success of the screening of the film *Secrets of the Surface*, the May 12 initiative launched a collaboration with Rocco Films for screening their documentary film “*Picture a Scientist*”, a ninety-minute essay about hardships and difficulties faced specifically by women in academia. Individual screenings were offered through the May 12 website. Versions with subtitles in English, French, Spanish and Portuguese were provided. More than 2,800 requests were received from 108 different countries. Moreover, there was a total of 123 events registered on the May 12 website in 2021 (see <https://may12.womeninmaths.org/2021-list> for the complete list).

The campaign in 2022, recommended the free screening of the award-winning film "Women in science in Africa, A SILENT REVOLUTION" available (in english or in french) online here : womeninscienceinafrica.com/film. There were more than 150 events registered on the May 12 website in 2022 (see <https://may12.womeninmaths.org/2022-list> for the complete list).

10 CWM tools

10.1 CWM website and publicity

The CWM website <http://www.mathunion.org/cwm/> has been reorganized by MFR and updated on a regular basis, by MFR and PBT, with input from CWM members and ambassadors. In particular, information about relevant organizations and events are posted. It is worth noting the increasing number of countries which now have some form of organization for women in mathematics, see www.mathunion.org/organizations/by-country/. CWM is the only organization gathering such information internationally.

Given the workload required by the CWM website, and the little time that MFR and PBT have available for this, Birgit Seidel, the IMU archivist, has worked for CWM website for approximately

six hours a week starting in January 2021. CWM is very grateful for Birgit's assistance and it has led to great improvement for the CWM website and for CWM in general.

MFR and Caroline Series contributed with an article about CWM in the *Fifty Years of Women in Mathematics* book.

Roy, MF., Series, C. (2022). *International Initiatives for Women Mathematicians*. In: Beery, J.L., Greenwald, S.J., Kessel, C. (eds) *Fifty Years of Women in Mathematics*. Association for Women in Mathematics Series, vol 28. Springer, Cham. https://doi.org/10.1007/978-3-030-82658-1_92

10.2 Women in math and the COVID-19 crisis

In 2020, CWM received testimonies from CWM members, CWM ambassadors or other women in mathematics from different countries all over the world on the effects of the COVID-19 crisis in their lives. These brief contributions are available at the CWM website, together with a list of resources, including links to various texts related to the COVID-19 crisis and its impact on women in mathematics, and, more generally, in science. The text of the SCGES entitled "Standing for Gender Equality in Science in times of Covid-19" deserves special attention. See <https://www.mathunion.org/cwm/cwm-initiatives/women-math-and-covid-19-crisis>.

10.3 CWM Newsletter

The CWM Newsletter has been issued every six months since May 2019, edited by EO. The CWM Newsletter is sent electronically to CWM ambassadors, who then distribute it through their mailing lists, posted on the CWM website, and advertised in IMU-Net. Moreover, it is sent to various mathematical centers (MSRI, MFO, CIRM, etc), which are encouraged to make it available. A new page on the CWM website makes it possible to subscribe to the CWM Newsletter and the publication process of the CWM Newsletter has been fully integrated into the IMU website.

The usual content of CWM Newsletter is the following: Editorial, Interview with a CWM member, News from CWM, Other News and Announcements, and an invited External Paper. Here is the list of the special content:

- First issue on May 2019: Interview with MFR; Book Review: *Proceedings of (WM)²* by CA.
- Second issue on November 2019: Interview with PBT; article about Final Meeting of GGSP by Marina Menga; and article about Database of Good Practices by Merrilyn Goos (which was a part of the GGSP).
- Third issue on May 2020: Interview with CP; COVID-19 testimonies from CWM Ambassadors; article on the International Day of Mathematics (IDM) by Christiane Rousseau.
- Fourth issue on November 2020: Interview with NN; article about The Standing Committee for Gender Equality in Science (SCGES) by Catherine Jami, Chair of SCGES.
- Fifth issue on May 2021: Interview with MK; article "*AWM at 50 and Beyond*", by Georgia Benkart, Kristin Lauter and Sylvia Wiegand on the occasion of the 50th anniversary of the AWM.
- Sixth issue on November 2021: Interview with JK; article "*Initiatives for women in math in Japan*" by Makiko Sasada.
- Seventh issue on May 2022: Article about the program of (WM)²; interview with EO; article about Olga Alexandrovna Ladyzhenskaya by Panagionta Daskalopoulos.
- Eight issue on December 2022: Article by MFR on interdisciplinary activities for reducing the gender gap in science; presentation of CWM members for 2023-2026; article "*Towards mathematical outreach in phase with society*" by Olga Romaskevich.

10.4 Meetings of CWM

On September 12 2018 there was a hybrid meeting with past and future CWM members. The meeting took place at the London Mathematical Society premises, with six people attending in person, and ten people attending remotely. One major decision was to launch a new CWM call in 2019, with deadline December 15 2018. Serious disquiet has been expressed inside CWM about the results of the IMU EC elections producing only one woman on the new IMU EC, and also about the failure to award any prize to any woman at the ICM 2018. These concerns were shared by many people in the GA and the ICM 2018, and there was a strong wish to draw the attention of IMU EC to these two points.

The first meeting of the 2019-2022 CWM took place on November 9-10 2019 at ICTP, immediately after the final conference of the Gender Gap in Science Project. Eight members, as well as CK, EC liaison for CWM, attended and the two other members had previously discussed via skype meetings with MFR and/or CA. JP was invited in connection to (WM)² and ICM 2022, and Claudio Arezzo, head of ICTP Math Group, participated in a session. The program was as follows:

- presentation of CWM members and group picture;
- description of CWM's past activities since 2015;
- discussion about the Gender Gap Project and how to implement its recommendations inside the IMU;
- discussion about CWM future activities, including CWM call for activities in 2020;
- discussion about (WM)² in Saint Petersburg as satellite of ICM 2022.

A virtual meeting of CWM took place on October 5-6 2020. The 10 members and CK, EC liaison for CWM, attended, sometimes with connection problems (particularly in Kenya). JP was invited in connection to (WM)² and ICM 2022, and BT to inform CWM about IDM. The program was as follows:

- International Day of Mathematics (IDM);
- How can CWM help in the current situation?;
- CWM tools for communication;
- Follow up of suggestions by ambassadors;
- Information about (WM)² 2022, (WM)² 2018 website, new website;
- News: SCGES (Standing Committee for Gender Equality in Science), Continental networks in Latin America and Asia, Situation of activities funded in 2020;
- CWM Call 2021;
- Decisions and action list.

There was no CWM meeting in 2021.

A virtual meeting of CWM took place on January 11-12 2022, in order to make a collective decision about the activities to be funded in the 2022 call.

Finally a meeting between CWM 2019-2022 and CWM 2023-2026 took place on December 20 2022 in order to ensure a smooth transition between the two committees.

10.5 CWM operation mode and Liaison with IMU EC and Office

Most of CWM's work has been done by email. Skype and phone calls have also been used. The liaison with the IMU Executive Committee through CK has been regular and very positive. We would like to thank the members of the IMU office staff who have consistently been very helpful.

11 Executive summary

In its inaugural term 2015-2018, CWM has played an important role in promoting a regional network for women in mathematics in Latin America. This was facilitated by CWM funding provided to several regional activities, and the organization of the first World Meeting for Women in Mathematics in Rio de Janeiro in 2018. In September 2020, UMALCA has created a Commission for Gender and Diversity (CGD). The CGD-UMALCA has been a regular collaborator of CWM, and a focal point for associations for women in mathematics in Latin America.

In the beginning of the 2019-2022 term, CWM identified the lack of a continental organization for women in mathematics in Asia, and dedicated efforts to facilitate the creation of such an organization. A network Asian and Oceanian Women in Mathematics has been created, building on the Asian and Oceania meeting of CWM Ambassadors.

Created as a mailing list in 2016, the scheme of CWM Ambassadors has evolved into an active international network for women in mathematics in the last few years. Continental virtual meetings of CWM Ambassadors were organised in 2021, in collaboration with several continental organizations for women in mathematics, and a global virtual gathering of CWM Ambassadors took place early in 2022. There is great potential in this still-evolving network, and CWM should think about ways to better exploit this potential.

Based on the work done inside the Gender Gap in Science Project, CWM has a list of recommendations to ensure equal opportunities for women mathematicians in universities and research institutions. But there is currently no mechanism for these recommendations to be discussed inside the IMU and give rise to official recommendations of the IMU for itself and for its members organizations.

CWM's participation in the foundation of the Standing Committee for Gender Equality in Science is another action that deserves to be highlighted. The Committee's global and interdisciplinary structure offers diverse perspectives for collaboration that should be further explored.

Report by Marie-Françoise Roy and Carolina Araujo, Chair and Vice Chair of CWM