



## Committee for Women in Mathematics

### CWM funded activity reports in 2020 and 2021

#### Summary

The International Mathematical Union Committee for Women in Mathematics sponsors a number of initiatives aimed at establishing or supporting networks for women in mathematics, preferably at the continental or regional level, and with priority given to networks and individuals in developing or emerging countries.

The 2020 initiatives were severely affected by the pandemic. Out of the eight approved initiatives, three were conducted in 2020, one was cancelled and five were finally conducted in 2021. The three initiatives conducted in 2020 were the May 12 initiative website, the exhibition project МАТЕМАТИКА and the activities from Indian Women in Mathematics. The initiatives of 2020 postponed to 2021 were the Career development workshop (Latin America), a School at Nesin village (Turkey), the meeting Women in SAGE (Senegal), and the Second Southeast Asian Women Mathematicians Meeting (Indonesia). In several cases, the original plans had to be modified to create virtual events. The 3rd Meeting for Latin American Women in Mathematics was cancelled.

In total, eight initiatives were approved for 2021. Seven of them took place: the May 12 initiative reporting mechanism, the travel in Russia for the exhibition project МАТЕМАТИКА, the activities from Indian Women in Mathematics, Thematic Mathematical activities in Latin America, Women in Mathematics a virtual event inside the International Mathematics Master (IMM), a CGD-Umalca on line workshop and the film «Words of women in mathematics in the time of Corona». Finally, AWMA's proposal for a special day for women in mathematics at the Pan African Congress of Mathematicians PACOM 2021 is postponed to 2022 since PACOM was delayed to 2022.

We are happy to report that in spite of the problems created by the pandemic, the organizers of the CWM sponsored events were able to overcome the difficulties and invent new ways of implementing initiatives, improving the connections between Women in Mathematics all over the world.

Marie-Françoise Roy and Neela Nataraj

## Initiatives from 2020<sup>1</sup>

### I. May 12, celebrating women in Mathematics in 2020

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

The May 12 initiative, celebrating women in mathematics worldwide on the birthdate of Maryam Mirzakhani took place for the second time in 2020 (see<sup>2</sup> for information about 2019 events).

The 2020 edition was a huge success that took very specific forms given the Covid crisis and the impossibility to meet physically in most places of the world.

We discuss the preparation phase, the individual screenings we made possible as well as collective events, mostly virtual, that took place.

**Preparation phase** . The May 12 website was made perennial and adapted to annual events, thanks to a funding coming from IMU CWM, EWM and AWM. It was ready at the beginning of 2020. See <https://may12.womeninmaths.org/>

**Individual screenings of Secrets of the surface, the Mathematical Vision of Maryam Mirzakhani through an agreement between Zala Films and the May 12 initiative.**

The one hour documentary film, produced by Zala Films with the Mathematical Sciences Research Institute was filmed in Canada, Iran and the United States and released in January 2020.

An agreement between the May 12 initiative group and Zala Films was quickly reached before we launch the May 12 initiative, in March 2020.

Initially the agreement was that a link to the film would be provided to organizers of collective screenings approved by May 12. But with the pandemic crisis, it was soon clear that many collective events would have to be canceled and Zala Films agreed to modify the agreement, so that individual screenings were also offered on the May 12 website. Applicants then received a link to screen the film, and they were asked not to disseminate it.

When the process started there were versions of the film only in English and Farsi, while French subtitles were on their way. We checked French subtitles and Zala Films produced a French version with specific links. The May 12 network also provided subtitles in Italian, Portuguese, Spanish and Turkish, and the corresponding versions were produced by Zala Films, with their specific links. Moreover, mistakes in the Farsi version were noticed and a text for corrected Farsi subtitles was provided. This new version is not implemented yet given that DVD with former English and Farsi subtitles had been already printed.

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<sup>1</sup> Reports provided by the organizers of the initiatives.

<sup>2</sup> For the 2019 events see <https://may12.womeninmaths.org/2019> as well as

May 12: Celebrating Women in Mathematics From One Idea to One Hundred Events Nikita Agarwal, Carolina Araujo, Petra Bonfert-Taylor, Mojgan Mahmoudi, Marie Françoise Ouedraogo, Olga Paris-Romaskevich, Marie-Françoise Roy, Elisabetta Strickland, and Andrea Vera Gajardo, Notices of the AMS, Volume 66, Number 11, pages 1879-1886.

The success was beyond any hope. More than 20,000 requests were received and the corresponding links were sent. The proportion of versions requested was as follows: English without subtitles: 37%, subtitles in Farsi: 34 % (requested from people not always located in Iran), in Spanish: 11 %, in French: 8 %, in Italian: 4 %, and in Turkish: 3%. People from 131 countries participated, with the following distribution by geographic zones : Asia: 39 % (Iran: 27 %, other Asian countries: 11 %), Europe: 27 %, Latin America: 10 %, North America: 20 %, Africa: 2 %, Oceania: 1 %, and 2 % with no country indicated.

Moreover, after the free screening process stopped, Zala Films received a huge number of streaming and DVD orders.

There was a survey conducted after the screenings. The number of answers was 1201, a small proportion (5,78%) of those who registered to get a link. It is interesting to analyze their answers but they cannot be considered as representative of the whole group. In particular, nearly 2/3 of the answers came from people having requested no subtitles, and only 10 % from those requesting Farsi subtitles, the bias coming in part from the fact that the survey was in English only.

The proportion of female viewers was 53 %, of male, 45 % and 2.00 % chose the option « Prefer not to respond ». Some (11%) had not received the link and some (16 %) had not been able to view the screening due to technical problems or for lack of time before the deadline.

An overwhelming proportion, (99 %) of the people found the life and mathematics of Maryam Mirzakhani as shown in the film interesting. The aspect of life in Iran shown in the film was interesting for 94 %, while the aspect of life in the USA shown in the film was interesting for 90%. Only 7 % found the film too difficult from a mathematical point of view.

70 % of the respondents are connected to mathematics, from students (secondary school to Ph D studies) to professors at various levels, and 60 % of those connected with mathematics are Ph D students, holding a Ph D or are university professors.

Finally 2/3 of the respondents wished to receive news from the May 12 initiative in the future.

Zala Films expressed its satisfaction with the agreement since they had a number of VOD and DVD requests after this point activity with May 12 !

### **Collective May 12 2020 events.**

A total of 152 events have been published on May 12 website in 2020 , on top of the posts reporting the number of people who registered for individual screenings in the 131 countries involved.

A lot of enthusiasm was expressed by the events who reported to us on the nature and success of their activities, sending often full reports, links, pictures and videos. Among the 59 who reported, 55 events went virtual and took place all over the world.

Near all the virtual events included a screening of Secrets of the surface, which was suggested on May 12 2020 website, and a lot of them included a discussion about the film. The life of Maryam Mirzakhani and her scientific achievements were presented in many of the initiatives. Often the participants were professional mathematicians or students in mathematics but also high school students or even younger children who watched the movie at home with their family.

In many places, other activities were associated to the screening of Secrets of the surface: social media campaigns with photos, short reports or videos, production of videoclips promoting or celebrating women in mathematics, roundtables, events in YouTube channels dedicated to mathematics, discussions about the Gender Gap in Science project, celebration of Florence Nightingale, born on May 12 1820. Several events were international, with panelists from various parts of the world. Women in mathematics from industry took part of the activities as well as women working in interdisciplinary contexts. Some of the events dealt with the role of mathematics in epidemiological models, including the Covid crisis and others discussed how the gender gap was revealed and worsened by the pandemic.

Several organizers mention that they already participated to May 12 events the year before, or announced a follow up with the creation of women in mathematics groups. Local newspapers reported some of the events, and others reached an important number of people (more than 16 000 for one media campaign).

Let us end with a more detailed description of three of the events.

In Egypt, the first activity for the Egyptian Women in Mathematics Association (EWMA) as a part of the Egyptian Mathematical Society(EMS) took place virtually, the screening of Secrets of the Surface was associated with various speeches as well as a presentation of the Gender Gap in Science report.

In Brasil, the Gender Committee of the Brazilian Mathematical Society and the Brazilian Society for Applied and Computational Mathematics prepared a special edition of the societies' newsletter, called "Celebrando as Mulheres na Matemática em tempos de pandemia" and contained an introductory letter by the committee and interviews with 7 women working in projects related to mathematics and the pandemic.

In Spain, the Women in Mathematics Commission of RSME (Spanish Mathematics Royal Society) prepared two virtual escape rooms:

The rescue of the sorceress Omega <https://forms.gle/nHkmfZLbuXmvso4M6>: digital escape room specially indicated for students in the first years of elementary school.

The hallway of the remembered oblivion: <https://forms.gle/N4bTKmjB2pw6HraS9> digital escape room especially suitable for high school students.

They can be played in English, Spanish, Catalan and Galician. They have appeared in many social media and also newspapers and radio in Spain. They have been played by thousands of persons in Spain and we have received hundreds of congratulatory messages. Furthermore, this activity continues active and more people are playing everyday.

## **Conclusion.**

The 2020 events confirm that the May 12 initiative is promoting global networks among women in mathematics and more generally people involved in improving gender equality in mathematics. The realization that everyone is working towards the same goal, the celebration of women in mathematics through the organization of different events for May 12, makes the organizers and participants feel part of a world community.

May 12 coordination group

## II. МАТЕМАТИКА

**Title.** МАТЕМАТИКА (mathematics in Russian).

**Contact.** Olga Paris-Romaskevich. Address: 182 chemin de la tour de Millery 69390 Vernaison France. Mail: [olga.romaskevich@math.cnrs.fr](mailto:olga.romaskevich@math.cnrs.fr)

**Introduction.** In November 2019, I had an idea of a trip through Russia by train, in order to discover the stories of Russian female mathematicians. My nostalgia of Russia, my interest in mathematics, my engagement for the equality and love of trains meet together in this project. I also decided to do this project with my husband and collaborator Bertrand Paris-Romaskevich, whose photographs I like a lot. I have been additionally motivated by the enthusiastic support of CWM.

In this short document I describe the project and report on the progress we made since February 2020 when the project was officially launched.

**The project.** The project is called МАТЕМАТИКА (mathematics in Russian). The principal goal of this project is to give more visibility for the actresses of mathematics throughout Russia. We want to tell stories of ten women who contribute in an important way, directly and indirectly, to the research in mathematics as well as to present the context in which their work is done.

How the interviews go... Interview with Olga Kravchenko in Lyon, photo by Bertrand Paris-Romaskevich.

In Spring 2021, we hope to get on the train that will cross Russia, from Khabarovsk to Saint-Petersburg, with a goal to meet and conduct in-depth interviews with our heroines to understand the past, the present and the future of mathematics in their cities and in Russia.

**Creating Mathématiques Vagabondes.** The МАТЕМАТИКА project is a first project of the association Mathématiques Vagabondes (Vagabond Mathematics) that I have launched with my colleague and friend Marie Lhuissier on the 12th May 2020. This is a France-based association whose goal is to create art&math projects, as well as propose the space for meetings between research and art. Bertrand and myself have spend some time creating the entity of Mathématiques Vagabondes, developing its logo, and preparing its site (in French)

<https://www.mathematiquesvagabondes.fr>.

We also have created a Bank account of the association which will be used for all the budget of the project. On the 14th September, we have received 2000 EUR of CWM on this account. We hope that this support will permit us to cover the cost of the trip itself.

We also started preparing the site of МАТЕМАТИКА but it is now in a very preliminary version :<https://bertrand.tadaa.dev/matematika/en>

**Finding the heroines.** I have spent most of the time doing research (not in a sense I am used to, though...) in order to find and choose the heroines. This process involved writing many letters, and making Skype and telephone calls to interesting people who are involved in Russian research, mathematical education and olympiad movement around the country. This helped me a lot in order to find the heroines. I am in no way thinking that my choice is representative in any way of female mathematicians in Russia but I am happy with it.

Among the heroines, there are five researchers in mathematics, two teachers (related to olympiad movement in Kazan and Khabarovsk), one secretary of the dissertation commission, one secretary of the international laboratory in Moscow and several other institutions and one CEO of a large

company. I personally already know four of them (although, none of them very closely). The ages of heroines range from 36 to 57 years old. The cities represented : Moscow, Saint Petersburg, Nizhny Novgorod, Kazan, Samara, Ekaterinburg, Novosibirsk, Irkutsk, Khabarovsk. All of these cities except for the last two have more than 1 million inhabitants, and the last two have more than half-million inhabitants.

I have contacted all of the heroines by mail in the beginning of August. Six of them have already answered, showed their interest in the project and confirmed their participation.

I am now recontacting the other four heroines, and will find some other heroines in case one or more of these four heroines won't be available.

Here are the names and profiles of six heroines who have already agreed to take part in our project. My notes are quite chaotic but they give an idea of the profiles.

#### 1. Gayane Yur'evna Panina (Saint Petersburg)

Gayane Panina was born in Saint Petersburg (Leningrad at the time) in 1963, and stayed there throughout her entire career. She is a researcher in mathematics — she defended her PhD thesis in 1989 and her habilitation in 2007 on the theme Virtual polytopes. She has several PhD students — as far as I understand, all of them women. She is a part of Chebyshev Laboratory in Saint Petersburg. Her husband, Ivan Panin, is also a wonderful mathematician. They have three children together.

Gayane Panina is one of the lecturers that I had in my youth at the School of Modern Mathematics in Dubna that is held annually for school students and university students of the two first years. She is a wonderful teacher. I also remember her always taking some time off from math to go swimming. That made a strong impression on me at the time.

#### 2. Tatiana Vladimirovna Gruzdeva (Irkutsk)

Tatiana Gruzdeva is a secretary of dissertation soviet in Irkutsk and works in the Institute of System Dynamics and Control Theory of the Academy of Sciences. She knows from inside the Russian system of VAK (PhD and habilitation commissions), the system which is quite different from the international one. Tatiana holds a PhD in mathematics. Last years of Tatiana Gruzdeva's life were quite difficult — she lost her young daughter and then her husband. But she continues to work and fight. I never have met her personally.

#### 3. Olga Vitalyevna Pochinka (Nizhny Novgorod)

Olga Pochinka was born in Gorky (Nizhny Novgorod), and stayed there for all of her career. She is a researcher in mathematics, interested in qualitative theory of dynamical systems. She defended her PhD in 2004 and her habilitation in 2012 on the theme of Global dynamics of Morse-Smale cascades on 3-manifolds. At the present moment she is the head of the laboratory of dynamical systems at the faculty of informatics, mathematics and computer science in Nizhny Novgorod. She is also one of the main organisers of a satellite to ICM2022 conference Dynamical Systems. The atmosphere in the Nizhny lab (that I have visited once) is very lively, with a big team of great specialists and wonderful people reunited there.

#### 4. Natalia Vladimirovna Maslova (Ekaterinburg)

Natalia Maslova is a leading researcher in the Krasovskii Institute of Mathematics and Mechanics based in Ekaterinburg. She works in the domain of group theory (mainly of finite groups) and combinatorics. She studied in Ekaterinburg, defended her PhD there in 2011, and received a habilitation in 2019 from Novosibirsk University. She has many collaborations with researchers in

Novosibirsk, as well as international collaborations with Japan and England. She is a successful young Russian researcher who never left her mother city at Ural. I never have met her personally.

#### 5. Maria Dmitrievna Monina (Khabarovsk)

Maria Monina is working as a teacher of Mathematical lyceum in Khabarovsk, and at the same time is the leading worker and secretary of the Khabarovsk faculty, as well as the member of regional commission of All-Russian olympiad on mathematics in Khabarovsk region. She also holds a PhD in mathematics in number theory. She was referred to me as a key person for olympiad movement and mathematical education in Khabarovsk. She received Dynasty grant for best teaching in 2011 for her mathematical school in Khabarovsk. I never have met her personally.

#### 6. Galina Genadievna Lazareva (Novosibirsk)

Galina Genadievna Lazareva works in computational and applied mathematics. She has been a very active vice-dean of the faculty. She is an only woman who is a member of the mathematical department of Russian Academy of Science ! Even though now she passes lots of time in Moscow, in the RUDN University, she also continues to work in the University of Computational mathematics and mathematical geophysics in Novosibirsk. Her family lives in Novosibirsk — she has three children.

**Preliminary interviews.** In order to prepare ourselves to the interviews, we have started conducting the interviews with mathematicians here, in Lyon. I wanted to work on my journalism skills. In this way, Bertrand could also continue practicing photography. Even though I still have a feeling that I have a lot to do in order to precise the concept of the exhibition and the contents of the posters, I think we have already learned quite a lot and are ready for the trip !

For now, we have conducted three preliminary interviews, and we will possibly continue doing them. I have found them very useful for the preparation, and interesting in themselves.

Here is a description of the interview with Olga Kravchenko

Olga Kravchenko is a researcher in mathematics and algebraist in the University of Lyon 1, and she is Russian! We hence did an interview (on the 5 August 2020) with her in Russian, which was harder for Bertrand but it also went well. I find it important to train to do interviews in Russian since it is what we will have to do when the real trip would start ! Even though it is not very easy to find Russian female mathematicians in Lyon...

I have recently finished the final draft of the interview, and send it to Olga for her confirmation.

She worked on it as well — she did some adjustments, respecting the transcript of the 1-hour interview that I made before. The transcript is of 10 pages.

I am happy that Olga took an active part in the writing ! Today I received her version, I will work on it this month and I hope to translate it into French soon in order to also post this interview on the site of Images des Mathématiques. I would also love to publish it in Russian (its initial language) or in English but for now I do not know where I could do it !

**Present moment considerations.** Conditions of the present year are harsh. Initially, we planned our trip in the middle of April 2021— beginning of June 2021. Now, with uncertainty of travel, I am not sure that buying the tickets in 2020 is a good idea. For now, we still plan the trip at the initial dates but it may be rescheduled to Autumn of 2021. But we will surely do it next year. I hope that CWM would agree for us to “keep” the financing of 2020 in order to be able to use it in 2021.

We are also searching for the additional financing of the project, in order to be able to cover the work on design of the exhibition, and living in the hotels along the road. I also have to ask my employer (CNRS) if I could leave for the project trip for 2 months, and still be able to get paid. I hope that it will be possible, and in this case at least one of us can be paid along the trip.

We also hope to edit a book with the pictures and stories we collect from the trip. We hope that CWM will be able to help with the publishing of it, and that the book may be sold at ICM.

Olga Paris-Romaskevich

### **III. Report of Indian Women in Mathematics**

#### **Follow UP Winter School for Young Women Via Zoom**

**Goal of the Workshop.** To give young students who attended the winter workshop in Mathematics for Young Women in December 2019 at IISER TVM broader exposure and mentor them for their further career path.

**Eligibility.** Students studying in third year BSc or integrated BS-MS courses and who had attended IWM Winter School for Young Women at IISER TVM in December 2019 were given the opportunity to participate in this workshop.

**Funding.** The workshop was funded by CWM and NBHM. Selection Procedure: After the program which was held in December 2020. A list of 30-35 students from the participants was shortlisted who seem to be bright, hard working and can be further trained. Initially the program was scheduled to run for only these students. However due to pandemic and travel restriction it was thought that only students residing in Kerala will be called and the program will be run in IISER TVM. Due to the current pandemic situation, the offline version of the program could not be conducted. Many students responded that due to college examinations/ classes they would be unable to attend the workshop physically. All the students who had attended last year's program were asked for the availability and possibility of them attending the workshop if it is run in online mode. Among them 45 students replied to the message and were willing to join it if it was online. So we decided to conduct the meeting online from 20th December to 29th December 2020. Daily 3 hours of lecture was planned and tutorial was planned on every alternate day. The timetable was sent to the students 3 days in advance.

Finally a total of 30 students (including some IISER TVM students) joined the Zoom meeting and 20 among them were regular and attended most of the lectures and the tutorial sessions.

#### **Details of the Academic Activities.**

Resource persons and Topics Covered :

- Prof. Moosath K SUBRAHAMANIAN, IIST Thiruvananthapuram (Single variable Calculus)[3 lectures]
- Prof. B V LIMAYE, IIT Bombay (Multivariable Calculus) [4 lectures]
- Prof. Anita NAOLEKAR, ISI Bangalore (Linear Algebra) [2 lectures]
- Prof. Lakshmi Lavanya RAMAMURTHY, IISER Tirupati (Multivariable Calculus) [3 lectures]
- Prof. Nandini NILAKANTAN, IIT Kanpur (Linear Algebra) [ 2 lectures]

- Dhanya RAJENDRAN, IISER Thiruvananthapuram (Ordinary Differential Equations) [2 lectures]

### **Course and Program Structure.**

Each resource person gave 1.5 hour lectures on the topics assigned to them. Apart from lectures 5 tutorial sessions [3 for calculus and 1 each for linear algebra and ODE] were run with the help of PhD scholars at IISER TVM. In all 10 PhD students were involved in conducting these sessions. They solved the assignments given by the instructors and also encouraged students to solve the assignment problems on their own, in the group. One tutorial session was also conducted in these topics and more than 10 problems were discussed in the in the night session. A total of three hours were spent on the lectures and one hour for the tutorial.

## **IV. Career development Workshop (Latin America)**

**1. Title.** Creation and launch of digital ecosystem for Witral Ciencia, Latin America, from October-December 2021 [https://en.wikipedia.org/wiki/Sunita\\_Narain](https://en.wikipedia.org/wiki/Sunita_Narain).

**2. Contact.** Andrea Vera-Gajardo, AV. Alemania 5970 depto 2020 Valparaiso Chile, [andrea.vera@uv.cl](mailto:andrea.vera@uv.cl).

### **3. What is Witral Ciencia ?**

We re-founded the group "Gender Gap In Science Latin America" and gave it a fantasy name. The new name is "Witral Ciencia". Witral is a Mapuche word (native people of Chile and Argentina) that means "loom".

Witral Ciencia is a non-profit organization made up of Latin American women scientists who have come together to generate spaces, cross-cutting dialogues and strategies to reduce the gender-gap of schoolchildren and Latin American professionals of all ages in STEM.

Our goal is to promote gender equality, inclusion and equity among people interested in the practice of STEM sciences, generating diversity and inclusion, as well as spaces, meetings and discussions for social, economic and cultural changes that allow an active, intercultural participation and Latin American leadership.

Our vision is of a society where networks among scientists are interwoven to promote diversity, inclusion and actively participate in equal rights and opportunities in STEM.

To realize our project and have visibility as an organization, we developed a plan to have an attractive website and social networks. Specifically, the steps for this process were:

- i. Feasibility study of website development by an external company: collection of proposals, quotations (3) and selection of company (interviews).
- ii. Website planning, requirements and scope of the project, target audience, visit of similar sites, collection of basic information of witral, networks, logo design.
- iii. Website development with content management, menu definition (describe tabs), description of networks and financing.

We finally decided to work with a Mexican company, who set up the website and our social networks (Facebook, Instagram and Twitter).

Website: [witralsciencia.org](http://witralsciencia.org) . Facebook, Instagram and Twitter: @witralsciencia

#### **4. Activities.**

In May 2021, Silvina Ponce was an invited speaker in the panel "The gender gap in science: how to measure it? how to reduce it?" organized by the Anillo Matemáticas y Género in conjunction with the Colectivo de Mujeres Matemáticas de Chile (both organizations in which Andrea Vera participates). The video can be viewed at the following link <https://www.youtube.com/watch?v=rw6uFCxORQM>

Witral members have systematically participated in various panels and lectures on gender and science issues. Some of them are:

"The gender gap in science in Latin America and the Caribbean. Some reflections", video presented at the I Latin American Congress of Evolution, CLEVOL 2021, Chile, November-December, 2021 (virtual participation).

"The International Union of Pure and Applied Physics (IUPAP) and its actions to increase gender inclusion and diversity in physics", invited talk at the III International Meeting of Women in STEM, Peru, October, 2021 (virtual participation)

"The gender gap in STEM. Differences and similarities across regions according to the 2018 Global Survey of Scientists", invited talk given at the webinar "Women in Science. Scientific underrepresentation aggravated by race and geographical distribution, and the impacts of the pandemic on scientific production", organized by the Condensed Matter Division of the Brazilian Physical Society, in the framework of the XIX Brazilian MRS Meeting, September 2021 (virtual participation).

Invited panelist at the plenary session on "IUPAP: What is it, how does it promote women in Physics?" of the 7th International Conference on Women in Physics, Australia, July 2021 (virtual event).

Invited talk at the forum "Trends in Physics Research in Latin America" of the 1st Guatemalan Congress of Physics, July 2021.

Two virtual presentations discussed the witral activities and engage young communities to interact with the website at the El Congreso Nacional de Física de la Sociedad Mexicana de Física, octubre del 2021 and the Red de Mentorías Chicas STEAM coordinated by Maloka (the interactive science and technology museum- Colombia).

Talk "What's behind the over-representation male overrepresentation in mathematics?" at the annual conference of the Latin American Interdisciplinary Gender Network.

**5. Conclusions and recommendations.** The launching of the website and social networks allowed Witral Ciencia to have a lot of visibility in our countries. This visibility will probably allow us to access more sources of funding to achieve our goals. Also, during 2022, Witral Ciencia will focus on finding more members and, if the conditions allow it, to continue the workshops for young women scientists.

## V. School at Nesin Village

**1. Title.** “Topics in Applied Mathematics” Nesin Mathematics Village-Izmir-Turkey, 26-29 November, 2021

**2. Contact.** Fatima Aboud, University of Diyala-Diyala-Iraq  
[Fatima.Aboud@sciences.uodiyala.edu.iq](mailto:Fatima.Aboud@sciences.uodiyala.edu.iq), [fatimaaboud@yahoo.com](mailto:fatimaaboud@yahoo.com)

**3. Details.** Number of attendees : 33 Number of women attendees : 18. List of Countries represented : France, Iraq, Jordan, Morocco, Turkey Yemen

**4. Context.** This activity has taken place in Nesin Mathematical village, the advantage of this place is that the village contains the classes, common place for eating and having tea and coffee break and the rooms, so it permits the participants to have different meetings during meals and at the evening after the dinner and at the tea time. Our activity has a context of a research school with some conferences and presentation of the participants. It comes after a long period of virtual activities, for this one of the principal goals of the school was to permit the participants and the lecturers to have a lot of discussion and meeting.

Some group of discussion for the participants who have the same field of research. Even for the participants via zoom, for example the master students of Fatima Aboud have assisted to follow the courses to benefit for their research subject of master.

There were some complications due to many PCR tests that were requested for the travel and also for the access to Nesin mathematical village. It takes some time and a special budget. Nesin mathematical village impose the condition to have a PCR negative even for the participants come from Turkey. The procedure of visa was changed with some extra fee to obtain the visa.

**5. Activities about women in mathematics.** A presentation by Fatima Aboud was made to explain to participants about CWM activities and the aim of organizing activities with just women in different committees. Some of female participants were so motivated to benefit from the different activities of CWM.

### **6. Academic activities.**

- Adaptation techniques based on a posteriori error estimations: Mrs. Bergam Amal, MAE2D laboratory, University Abdelmalek Essaadi, Polydisciplinary Faculty of Larache, Morocco
- Non-linear eigenvalue problems: Theory and applications: Mrs. Fatima M. Aboud, Department of mathematics, College of Sciences, University of Diyala, Iraq
- Solving biharmonic equation by using control techniques: Mrs. Ghafrani Fatima : Faculté polydisciplinaire, Larache, Maroc
- Mathematical Modeling and Optimization: Miss. Adawiya Ali, College of Sciences, University of Diyala, Iraq [dradawiyaali@gmail.com](mailto:dradawiyaali@gmail.com)

**7. Conclusions and recommendations.** This kind of activities has a positive impact on the female young participants and motivate and inspire them.

## VI. Women in SAGE in Senegal, AIMS-Senegal

**1. Title.** Women in Sage in Senegal, Mbour Senegal, from (2021-09-20 to (2021-09-24)

**2. Contact.** Marie Françoise Ouedraogo, Université Joseph Ki-Zerbo, Burkina Faso, [omfrancoise@yahoo.fr](mailto:omfrancoise@yahoo.fr)

**3. Details.** Number of attendees: 32 Number of women attendees:25 , List of Countries (or States) represented: 7. Benin [4], Burkina Faso [2], France [5], Mauritania [1], Nigeria [4], Senegal [15], Togo [1].

**4. Activities about women in mathematics.** Prof. Marie Françoise Ouedraogo gave a talk to present the African Women in Mathematics Association (AWMA) and the Committee for Women in Mathematics (CWM) as well as the gender gap in science book. This was followed by a presentation of Prof. Elisa Lorenzo Garcia on CIMPA and a presentation of Dr. Bernadette Fall of AIMS-Senegal and opportunities offered by the network of AIMS and her experience as alumni of this institution.

**5. Academic activities.** The workshop consisted of introduction to the SAGE software and work on mini projects proposed by group leaders. The various projects include Mathematical Finance by Ini Adinya, Number Theory by Cécile Armana, Error correcting codes for cryptography by Sorina Ionica, Combinatorics by Viviane Pons, Algebraic Geometry by Anna Somoza

**6. Conclusions and recommendations:** After a series of workshops on women mathematicians in each region of Africa, AWMA decided to focus on scientific activities. This workshop was the first of a series of workshops on “women in SAGE”. The next one is planned at university of Ibadan, Nigeria in 2022.

Initially scheduled on July 2020, the workshop was postponed to 2021 because of the COVID19 pandemic.

In general we are in favour of making online events if needed because of the pandemic situation: an online event is better than nothing. But given the nature of our collaborative event and that one of its main goals is creating a network of young African female mathematicians, we believe that the in-person ingredient is fundamental. In this workshop one of the groups had the group leader attending online and even if the experience was overall positive, it was definitely less positive than the one had by the people in the groups running in-person. We have also learnt that the pandemic have different waves and that the situation may change quite fast, so one thing that we can do is trying to be as flexible as possible.

## VII. The Second Southeast Asian Women Mathematicians Meeting (SEAWM<sup>2</sup>)

**1. Title.** The Second Southeast Asian Women Mathematicians Meeting (SEAWM<sup>2</sup>), Indonesia and Bandung city, July 10, 2021 by online meeting using platform zoom

**2. Contact.** Prof. Dr. Budi Nurani Ruchjana, Department of Mathematics Universitas Padjadjaran, Jl. Raya Bandung Sumedang km 21 Jatinangor-Sumedang 45363-West Java-Indonesia, [budi.nurani@unpad.ac.id](mailto:budi.nurani@unpad.ac.id)

**3. Details.** 391 persons, 352 females and 39 males.

COUNTRY	PARTICIPANTS
BANGLADESH	6
BRUNEI	2
CAMBODIA	2
INDIA	1

INDONESIA	268
IRAQ	1
JAPAN	1
KAZAKHSTAN	1
LAOS	5
MALAYSIA	23
MYANMAR	1
NEPAL	1
OMAN	1
PHILIPPINES	13
SINGAPORE	1
TAIWAN	1
THAILAND	44
VIETNAM	17
CHINA	2
<b>TOTAL</b>	<b>391</b>

#### **4. Activities about women in mathematics**

The Second SEAWM<sup>2</sup> 2020 is a continuation of the First SEAWM<sup>2</sup> in Yogyakarta-Indonesia 30 July 2019 and Asian Women Mathematicians Forum (AWMF) 2016 in Bali-Indonesia 29 July 2016. The second SEAWM<sup>2</sup> is a realization of the participations of women mathematicians in developing mathematics and applications in various fields as well as the role of mathematics in human development in South East Asia.

The event was officially opened by the President of SEAMS (Southeast Asian Mathematical Society) 2020-2021 Prof. Dr. Maslina Darus from Universiti Kebangsaan Malaysia. In the Sharing Experiences of Women Mathematicians in ASEAN Countries and Asian-Oceanian Women in Mathematics session, moderated by Dr. Kiki Ariyanti Sugeng from the Department of Mathematics, University of Indonesia, this event presented speakers Prof. Dr. Motoko Kotani (a Committee of Asian-Oceanian Women in Mathematics, AOWM from Thoku University Japan), Prof. Em. Wanida Hemakul, M.Sc. (Chulalongkorn University Thailand), Prof. Dr. Berinderjeet Kaur (Nanyang University of Singapore), Prof. Dr. Dato Noraini Idris (University of Malaysia), and Prof. Dr. Indah Emilia Wijayanti (Gadjah Mada University, President of the Indonesian Mathematical Society/IndoMS).

#### **5. Activities about the dissemination of the recommendations of the gender gap in science.**

The result of the discussion of the second SEAWM<sup>2</sup> showed that there is no gender issue for women and men mathematicians in ASEAN countries. It have seen an increase in the number of women doing active research in mathematics despite some challenges. Although there is no apparent prejudice against women in ASEAN country and opportunities for growth are equally available to both men and women in mathematics, women still face gender-based obstacles which could restrict their growth as mathematicians. It should be more supported by the government and also from society for women mathematicians to increase the role of mathematicians at ASEAN countries.

#### **6. Academic activities.**

The second SEAWM<sup>2</sup> also launched the book "Southeast Asian Women Mathematicians CV Collection 2021" (see on <https://www.mathunion.org/cwm/resources/books-and-reviews>). This book is a collection of curriculum vitae of women mathematicians in Southeast Asian or ASEAN

countries to show their contribution not only to the academic field (local and international) but also to community service activities and social services in professional organizations in the field of mathematics that have been carried out both at the national level as well as international.

In this CV collection, 128 CVs of women mathematicians from 11 countries were collected. The launch of the book published by the publisher Unpad Press Universitas Padjadjaran was officiated by Prof. Dr. Maslina Darus (Universiti Kebangsaan Malaysia) as President of SEAMS 2020-2021. The 543-page book collection of women mathematicians' CVs with ISBN: 978-623-352-018-8 arranged by country in ASEAN and supported by CV data from 2 participants from China. This book can be found in the link at <https://www.mathunion.org/cwm/resources/books-and-reviews> and it can be downloaded at website <http://math.fmipa.unpad.ac.id/2021/10/28/book-of-cv-collection-women-mathematicians-asean-2021/>

**7. Conclusions and recommendations.** The participants of the SEAWM<sup>2</sup> 2021 concluded that the women mathematicians meeting should be done further in ASEAN countries inline with the activity of mathematicians both of women and men in international conference at a certain country each 3-4 years.

## Initiatives from 2021<sup>3</sup>

### I . May 12, celebrating women in Mathematics in 2021

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

The May 12 initiative, celebrating women in mathematics worldwide on the birthdate of Maryam Mirzakhani took place for the third time in 2021 (see<sup>4</sup> for information about 2019 and 2020 events).

The idea of celebrating women in mathematics on Maryam Mirzakhani's birthday, May 12, was proposed by the Women's Committee of the Iranian Mathematical Society at the World Meeting for Women in Mathematics in 2018 in Rio de Janeiro (Brasil). This initiative was approved by hundreds of attendees at the meeting. A few months later, six regional associations of women in mathematics around the world joined together to initiate the first celebration of May 12 internationally<sup>5</sup>. It is important to remark that this is the first and unique initiative linking regional organizations for women in mathematics worldwide.

The 2021 edition was very successful, with specific forms given the Covid crisis and the impossibility to meet physically in most places of the world.

In this report, we discuss the preparation phase, the individual screenings of *Picture a Scientist*, made possible through a collaboration of the May 12 initiative with Rocco Films as well as the collective events, mostly virtual, that took place in 2021.

#### **Preparation phase.**

The reporting mechanism on May 12 website was improved, in order to make the result of the activities more visible, thanks to a funding coming from IMU CWM. It was ready at the beginning of 2021 .

#### **Individual screenings of *Picture a scientist*, a collaboration of the May 12 initiative with Rocco Films.**

The documentary film *Picture a scientist* is a one hour and a half essay about hardships and combats of women in academia. It has been released in 2020. Following a big success of *Secrets of the surface* (film about life and work of Maryam Mirzakhani) screening for May12 in 2020, the initiative group for May12 in 2021 launched a collaboration with Rocco Films for the screening of their film *Picture a scientist*.

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3 The reports are provided by the organizers of the initiatives.

4 For the 2019 events see <https://may12.womeninmaths.org/2019> as well as

May 12: Celebrating Women in Mathematics From One Idea to One Hundred Events Nikita Agarwal, Carolina Araujo, Petra Bonfert-Taylor, Mojgan Mahmoudi, Marie Françoise Ouedraogo, Olga Paris-Romaskevich, Marie-Françoise Roy, Elisabetta Strickland, and Andrea Vera Gajardo, Notices of the AMS, Volume 66, Number 11, pages 1879-1886.

For the 2020 events see <https://may12.womeninmaths.org/2020> where the report Report-May122020.pdf can be downloaded

5 The coordination group of the May12 initiative includes representatives from the European Women in Mathematics, the Association for Women in Mathematics, the African Women in Mathematics Association, Indian Women and Mathematics, Colectivo de Mujeres Matemáticas de Chile and the Women's Committee of the Iranian Mathematical Society.

Individual screenings were offered on the May 12 website. Applicants received a link to screen the film for 3 days around 12 May 2021, and were asked not to disseminate it. Versions with subtitles in English, French, Spanish and Portuguese were provided. More than 2 800 requests were received and the corresponding links were sent, in 108 different countries all over the world.

We conducted a survey after the screenings, and 189 people (6,72% of those who received the link of the film) responded to it. We are thankful for this feedback, and analyzed it with great interest, even though we do not consider them as representative of the whole group. In particular, the distribution by gender was different : 79% female to 19 % male for those who responded to the survey, with 72 % to 25 % for those who preferred not to respond. The distribution by geographical zone was also different. For those who responded to the survey : Europe 51,91 %, America 33,88 %, Asia 10,93 %, Africa 2,19 %, Oceania 1,09 % whilst among registered : America 37,76 %, Europe 33,60 %, Asia 22,57 % Africa 4,46 % and Oceania 1,61 %.

Not all of those who made the request to watch the movie were able to see it : some (4%) answered that they had not received the link and some (15 %) had not been able to view the film due to technical problems or for lack of time before the deadline.

An overwhelming proportion (above 85 %) of the people answered positively to the questions « Was Picture a Scientist worth watching ? », « Will you recommend Picture a Scientist to your friends and colleagues? ». While there are no women mathematicians in the panel of scientists appearing in Picture a scientist, more than 85 % of surveyed answered yes to « Do you believe that similar cases of abuse against women also exist in other scientific fields, such as mathematics or computer science? »

59 % of the respondents are connected to mathematics, from students (secondary school to PhD studies) to professors at various levels. 70 % of the respondents had not participated in the free screening of Secrets of the Surface organized by May 12 last year. Finally, 59 % of the respondents wished to received news from the May 12 initiative in the future.

There was a free contribution section at the end of the form and 78 out of 189 people contributed. Most of the answers were very enthusiastic about the quality of the film, its importance for the academia and STEM community, as well as on the scale of the whole society. The overwhelming part of surveyed found the film interesting, eye-opening and educational.

A very interesting observation is that emotional reactions (of those who responded to the survey) to the film were very varied and living on two opposite sides of the spectrum: some felt inspired by heroine's courage and collective spirit, and some found the film extremely depressing and disturbing. What can provoke so different reactions to the same material ? This is not an easy question to answer... Abuse and oppression were noted by many to exist in other professional environments : professional services/industry, and in the society as a whole. Most of the people who found the film disturbing, found it also worth watching and important.

Below we cite some of the comments in the free contribution section that we find thought provoking. We are very thankful to all who took the time to share their feelings and thoughts.

*- I absolutely loved it and it definitely made me really grateful for the progress that has been made in academic spaces but also motivated to be a part of true change in the future. (United Kingdom, Female, Undergraduate Student of Mathematics)*

*- I didn't show this film to my students because it dont promote the mathematical carreers of women. The image is too negative. (France, Female, Teaching mathematics in a secondary school)*

- I had to watch this film in several "sessions" - to see all that abuse and what these women went through was too hard to see all at once. It made me angry and frustrated by how my male partner reacted to the film. He could not believe that abuse like shown in the film is still happening. But it is! Sometimes it is very subtle, sometimes it happens by women as well. We cannot be too careful with that topic! (Germany, Female, Administration within mathematical institute)

- It opened my eyes. The list of things below the tip of iceberg was very relatable. I can recall them happening around me many times. It instilled in me very affirmatively that the problem is real and action, and nothing less than action, is necessary. (India, Male, Master degree in mathematics)

- One thing I liked about the movie is that it showed how much influence a supervisor has on the life of a graduate student, even many years later. While the movie focused on the case of a graduate student who was a woman, this is unfortunately the situation for some graduate students under the supervision of professors with abusing/bullying/denigratory personalities.

Another thing that I liked was that it showed the little things that are part of the discrimination against women and that many of us do not even realize. I think at this point most people know that women are paid less, but social conducts in a conference meeting, in emails, I think are overlooked. Overall, I think this movie is a great way of showcasing these abuses. I hope similar initiatives are taken to show similar situations which happen to other minorities as well. (Mexico, Male, Teaching mathematics at the university)

- Sadly reminded me of personal experiences... and therefore a very useful film. Some people think that university is harassment-free because it is peopled with relatively educated persons. But that's wrong! (France, Female, Holding a PhD in mathematics)

- It was sad to see how hurdles were created for a confident scientist to excel in her career. The film illustrated the case of female scientists in developed countries. Another side of abusive behaviour for women in science is that men as parents in developing countries never give equal opportunities to their female children. Girls get the message that science learning is not for them. (Zambia, Female, Teaching mathematics at the university)

- This film made me realise that as a white male I am very privileged in my working field while there are people around me, possibly even my partners, that are struggling to achieve their goals. And it shouldn't be like that. We are different, but diversity is welcome and we shouldn't be treated different. I really enjoyed *Picture a Scientist* and I think it's very important to continue with this campaigns, so that every one of us is aware of women and minorities situation in science. (Colombia, Male, PhD student in mathematics)

- I am very impressed by this film. The goal is to provide us new perspectives on how to make science itself more diverse and equitable. This is extremely important for the development of science. (France, Female, Teaching computer science at the university)

### **Collective events.**

A total of 123 events registered on May 12 website, on top of the 2800 people from 108 countries for which we received individual screening requests for *Picture a Scientist*.

See <https://may12.womeninmaths.org/2021-list>

Thirty five of the events provided a report about their activity. More information for each of these events is available on <https://may12.womeninmaths.org/feedbacks-2021>

May 12 initiative group

## II. МАТЕМАТИКА

**Title.** A three-year preparation of the exhibition МАТЕМАТИКА for (WM)<sup>2</sup> and ICM2022.

**Contact.** Olga Paris-Romaskevich. Address: 182 chemin de la tour de Millery 69390 Vernaison France. Mail: [olga.romaskevich@math.cnrs.fr](mailto:olga.romaskevich@math.cnrs.fr)

Activity in 2021: online preparatory interviews with the heroine (conducted in Spring, while trip had to take place in Summer due to COVID); two-month trip through Russia (July-August) for meetings and pictures; communication around the project: creating and nourishing the [site](#) (including an along-the-trip blog) as well as the Instagram account; starting the design and content work on the book and the exhibition; administrative work; search for additional budget and partners.

**Places of activity.** 11 Russian cities (Khabarovsk, Novosibirsk, Irkutsk, Ekaterinburg, Kazan, Samara, Nizhny Novgorod, Moscow, Dubna, Fryasino and Saint Petersburg) for the trip (see map below) and Lyon, France.

**Dates of activity.** The exhibition will be presented from the 5<sup>th</sup> to 14<sup>th</sup> July 2022 in St-Petersburg, Russia. After the two-month trip in July-August 2021, we have started the work on the exhibition design and preparation of the book that we hope to finish on May 2022. The preparation of the exhibition and the companion book are two of our final goals for this project.

**Presentation of the activity and team.** The principal goal of МАТЕМАТИКА is to give more visibility for the actresses of mathematics throughout Russia. We want to tell stories of women who contribute in an important way, directly and indirectly, to the research in mathematics and to present the context in which their work is done.

We crossed Russia by train, from Khabarovsk to Saint-Petersburg, to meet, take portraits and conduct in-depth interviews with our heroines to understand the past, the present and the future of mathematics in their cities and in Russia.

This project is proposed by a team of two : Olga Paris-Romaskevich (mathematician at CNRS, University of Aix-Marseille, and science mediator), and Bertrand Paris-Romaskevich (photographer and designer, co-founder of Tadaa company).

**Activity in 2021.** In Spring 2021, Olga Paris-Romaskevich has conducted ten online in-depth preparatory interviews (in Russian) with the heroines of the project in order to get to know them better before meeting the heroines in person, as well as to prepare the plan of the trip (places we would like to visit with heroines) together with them. Then, the transcripts of all of the interviews were conducted to get the Russian texts with which one could then work.

A considerable amount of time has been spent in order to prepare the trip logistically and administratively, with the precious help and support of our partners Aix-Marseille University and CNRS.

Moreover, the necessary additional hardware for photography was bought and prepared.

The trip itself took place in July and August 2021, and we have taken extra in situ interviews with heroines (and several people working with them) by visiting their cities, as well as made several thousands of photographs and several dozens of ambiance videos. Olga Paris-Romaskevich has also

done three research talks during the trip and has participated in a research conference in Nizhny Novgorod.

In October-November 2021 we have continued research for additional financing as well as resumed the communication around the projet.

In December 2021, the design and writing part started back again. Olga Paris-Romaskevich started once again working on the blog of the exhibition (which is still to be finished by the end of this year), and preparing the interviews for the book, and the post-production of photographs is being finalized, while design of the exhibition and book is starting, to be finished in March 2022.

### **III. Indian Women in Mathematics activities in 2021-2022**

**1. Title. Indian Women and Mathematics (IWM) activities in 2021-2022, India.**

**2. Contact.** Prof. Riddhi Shah, [riddhi.kausti@gmail.com](mailto:riddhi.kausti@gmail.com)

**3. Activity report.** Due to the pandemic situation, the activities of Indian Women and Mathematics (IWM) continue to be in online mode. We have planned five events in the financial year 2021-2022. They are (a) virtual seminars (replacing the Visitor's programme) (b) a Mini-course (c) Regional workshop on research and opportunities (d) Young Women in Mathematics workshop and (e) Annual conference.

CWM funding is being used by Indian Women in Mathematics for their website, logo development and virtual conferences facilities.

A short description of the events are given below.

a) Virtual seminars

A virtual seminar by Prof. Ishii Shihoko, University of Tokyo & Tokyo Institute of Technology, Japan was organised on Friday, 27<sup>th</sup> August 2021.

The title of the seminar was Introduction to singularities on an algebraic variety. The talk was well-received and we plan more virtual seminars in 2022.

b) Mini-course

IWM organized a mini course titled "Approximate Solutions of Operator Equations and Eigenvalue Problems" on 20th and 21st November 2021 in online mode. The instructor was Prof. Balmohan V. Limaye, Professor Emeritus of IIT Bombay. The mini course consisted of four lectures.

The first lecture was held on 20 November, 2021 from 10 a.m.-11 a.m. followed by the second one from 11:30 a.m. to 12:30 p.m. The same schedule was followed for lectures three and four on 21 November, 2021. Each lecture was followed immediately by a lively 15 minute discussion session where the participants interacted with Professor Limaye and asked several questions about the topics covered in the lecture.

It was held on the Zoom platform and also live-streamed on the IWM YouTube channel, where they are kept available for later viewing. There were approximately 120 participants in the mini course, out of which approximately 37% were female participants.

Motivated by the huge response for this programme, we plan to have more such mini-courses in the next financial year.

#### c) Regional Workshop on Research and Opportunities

This was conducted in a virtual mode in IIT Patna during 4<sup>th</sup> -5<sup>th</sup> December 2021. There were six lectures and approximately 75 persons participated in the workshop. The workshop had four women and two men speakers. The programme concluded with a session on “Opportunities in Mathematics”. The website is <https://sites.google.com/view/irwrw2021/schedule> and the detailed report is awaited.

#### d) IWM Young Women in Mathematics workshop

The IWM Young Women in Mathematics workshop for UG students will be organized by IIT Kanpur from 15<sup>th</sup>-24<sup>th</sup> December 2021 in an online mode. The participants in this programme will be second year undergraduate women students, who have mathematics as one of their major subjects. The main focus areas of this program will be Real Analysis, Linear Algebra, and Differential Equations. Besides two hours of lectures from 4 PM -5 PM, and 5:15 PM-6:15 PM every evening, there will be one hour of tutorial every day. The activity has been planned in such a way that students will not miss their regular college lectures.

The details of the program are available at <https://sites.google.com/view/iwm-winter-school-iitk2021>.

Out of the 380 applications received, 120 have been selected.

#### e) Annual Conference

The IWM Annual Conference will be conducted on 28<sup>th</sup> – 30<sup>th</sup> January 2022 and will be hosted by Department of Mathematics & Statistics, Banasthali Vidyapith, Rajasthan.

### IV. Thematic Mathematical activities in Latin America

**1. Title** Mujeres Dinámicas, Country of origin: Brazil, Chile, Costa Rica, Perú, Uruguay, Dates of activity: From 2021-03-01 to 2022-02-28

**2. Contact.** Nelda Jaque Tamblay, Address: Las Palmeras 3425, Ñuñoa, Chile, Email Address: [dinamicas.muieres@gmail.com](mailto:dinamicas.muieres@gmail.com)

**3. Details.** Number of attendees: 17, Number of women attendees: 17, List of Countries represented: Argentina, Brazil, Chile, Colombia, Costa Rica, Italia, Perú, Uruguay.

**4. Context.** Currently, Dynamical Systems is one of the leading areas in mathematical research in Latin America. Indeed, in 2020 year's edition of the UMALCA Prize two of the four laureates were researchers from the area: Luna Lomonaco (IMPA, Río de Janeiro, Brasil) and Rafael Potrie (UDELAR, Montevideo, Uruguay). Moreover, the only Field Medal ever won by a Latin American was awarded to Artur Avila, who also works in this area. Although in recent years have seen a growth in the participation of women in mathematical research, in the area of dynamical systems the number of women active in research is noticeably smaller than in many other fields of mathematics in Latin America. Junior female researchers form a particularly vulnerable group. Young researchers in general often struggle with lack of job opportunities and generating research independence from their advisors. For young women these problems intersect with others related to their gender such as: low self-esteem, impostor syndrome, maternity, diverse consequences after suffering from sexual or gender-based harassment or discrimination, etc. These problems generate extra difficulties in order to create a network of research collaboration in their early years, often leaving them isolated and consequently they may abandon research. Therefore, the purpose of Mujeres Dinámicas is to have a network from and for this group, where we aim to address and

ultimately overcome our own issues. This network is of female students, post-docs and junior (or in the transition) researchers based in Latin America. For more information, visit our web page/newsfeed/wp group <https://www.mujeresdinamicas.cl5>.

## **5. Activities about women in mathematics.**

In the course of 2021, the group has worked in several fronts. We organize activities that include research projects, public discussions of gender related issues, academic and administration activities. The main objective for this year was to give more visibility to our group and activities.

### **Gender related issues Dissemination Activities.**

*Round Tables/Discussion of Problems.* We organize discussion sessions for specific gender related situations, in which we invite some researcher that has experience with said situations to give their point of view, and start a conversation based on that. In the period indicated in item 1., we will have an activity on January 26, 2022. We invite a senior researcher in dynamical systems to give a talk about gender dissemination. This is María Isabel Cortez who will talk about "gender-based harassment: the subtleties of the hidden part of the iceberg."

*Interviews.* The members of the group who are interviewed make the gender gaps in science visible. During the time indicated in item 1, we have an interview report. On this opportunity, member Nelda Jaque Tamblay was interviewed by a student from Departamento de Matemáticas at Universidad de Chile. The interview was conducted on May 12, 2021 on the occasion of the International Day of Women in Mathematics. You can find the interview in Spanish in <https://matematicas.ciencias.uchile.cl/2021/05/11/12-de-mayo-dia-internacional-de-las-mujeres-en-matematicas/>.

### **Administration Activities.**

*Technical Staff.* Some of us, we take care of dealing with emails, subscriptions and requests for information on the website. Moreover, of organizing the activities related to Mujeres Dinámicas and of administration of the web page, up to loading and editing the new content. During the period indicated in item 1 we were able to hire personnel to help with part of this work allowing us to concentrate in the other areas.

*Social Media and Marketing Digital.* Create visibility for the group in social media in order to attract new participants and to give visibility our events. Creating content for popularization in the form of videos, cartoons, interactive content, texts etc. During the period indicated in item 1, we were able to hire an external company for this work (see our Instagram <https://www.instagram.com/sistemasdinamicas/?hl=es>) allowing us to concentrate in the other areas.

## **6. Academic Activities.**

### **Research.**

*Seminar.* During the period indicated in item 1., we have carried out 3 seminars. On May 10, 2021, we invited Jana Rodriguez Hertz, senior teacher, who trained several members of our group. On May 31, 2021, Gabriela Estévez, a member of our group, gave a talk. And on September 3, 2021, Natalia McAlister, a new member of our group, gave the last talk of this activity.

*Research Subgroup.* We have 4 subgroups working on research projects led by group members. The singular flows project carried out two face-to-face activities during the time indicated in point 1. From October 4 to 15, 2021, Jennyffer Bohorquez and Adriana da Luz met in Rio de Janeiro, Brasil. From January 18 to February 16, 2022, Nelda Jaque Tamblay, Jennyffer Bohorquez and Adriana da Luz meet in Rio de Janeiro, Brasil.

*Cultural coffee.* We have subgroups formed around studying classical results in the fields of research of some of our participants. The idea of these groups is for the participants to be able to get an overview of the research fields of the others.

### **Teaching.**

*Classes at the Universidad de Chile.* We make use of the context of the global pandemic so that our members teach dynamic systems electives at Facultad de Ciencias of Universidad de Chile, every second semester of 2020 and 2021. During the period indicated in item 1, Nelda Jaque Tamblay, Jennyffer Bohorquez and Adriana da Luz gave classes about Lorenz Attractor to undergraduate students in mathematics and a master's degree in mathematics from the University of Chile and the Pontifical Catholic University of Chile. Moreover, we are writing some notes in Spanish about the elective (still under construction).

*Course Scientific Events.* We encourage participants to take introductory courses based on their projects. Jennyffer Bohorquez Barrera, Adriana da Luz Angeloni and Nelda Jaque Tamblay, offered a course for the Capricorn Mathematical Congress 2021, which is organized by the state universities of northern Chile. The course dealt with "An introduction to the Lorenz attractor". You can find the three days of talk in <https://www.youtube.com/watch?v=vWuNPYbFYFE&t=2895s>,

<https://www.youtube.com/watch?v=JSQD6W44kWk&t=3028s>

and

<https://www.youtube.com/watch?v=AqEH-JIhwTk&t=2971s>.

### **7. Conclusions and recommendations.**

In March 2022, we will celebrate 2 years of life as Mujeres Dinámicas. This beginning has helped us to get to know each other in research and identify ourselves with the different gender discrimination that each member of the group has experienced. To continue socializing, we have planned the talk by Maria Isabel Cortez on January 26, 2022. Currently, the "singular flows" subgroup is meeting in Brazil to work on research. In addition, a visit by Adriana da Luz to Nelda Jaque Tamblay in Chile is pending. On the other hand, we have thought of inviting a psychologist to our Round Table activity so that she can help us build a safe place for ourselves. We are also discussing to open up our space to include other non-hegemonic genders

## **V. WOMEN IN MATHEMATICS in IMM**

**1. Title.** Women In Mathematics, from 2021-09-06 to 2021-09-10. The event was held online but it was part of the orientation week for the International Mathematics Master (IMM) program in Lahore, Pakistan and thus virtually hosted by COMSATS University Islamabad. Lahore Campus.

**2. Contact.**

Dr. Aisha Mahmood (University of Education, Lahore, Pakistan) [aisha.mahmood@ue.edu.pk](mailto:aisha.mahmood@ue.edu.pk) coordinated an international steering team for the entire event.

Dr. Angela Tabiri (AIMS, Ghana) was responsible for the WIM activities within the event.

Dr Stefano Luzzatto (ICTP, Trieste) was part of the organizing team.

**3. Details.** Between 30 and 40 women participated in all the dedicated WIM sessions, mostly from Pakistan and Malaysia. Attached is the participation log form one of the sessions.

**4. Context of the Activity** The International Mathematics Master (IMM) is a capacity building project coordinated by Stefano Luzzatto of the Abdus Salam International Centre for Theoretical Physics. Since its launch in 2019 it has admitted three batches of students for a total of 25 students, of which 9 women. 9 out of 12 students of the first batch, including 2 women, who graduated in 2021, were admitted to funded postgraduate programs in Europe (Italy, France, UK, Ireland). The event was planned within this context, initially as an event for the women students of IMM, but also for women interested in IMM and in studying mathematics in general. Due to professional connections with women mathematicians in Malaysia, it eventually grew to into a truly international event with a significant participation of women mathematicians and students from both Pakistan and Malaysia.

#### **5. Activities about women in mathematics.**

The activities included a number of special talks and discussions.

**WOMEN IN MATHEMATICS** Junior and Senior Women researchers from many different countries shared stories about how they became professional mathematicians, the challenges they faced, and the satisfaction they have achieved. Female participants were given opportunities to interact and ask questions. Most of these sessions were reserved for women participants only.

**WIM INSPIRATION TALKS** Through these sessions, the invited speakers highlighted their journeys as successful female mathematicians to encourage and inspire female students of the IMM program. They shared their personal and professional experiences with students and engaged them in interactive question and answer sessions.

**WIM SPECIAL SESSIONS** These sessions focus on themes of interests such as Enhancing visibility for WIM, Work life balance for WIM, Career paths for WIM and Future for WIM – the way forward. At the end of the event, students got inspired and encouraged by the professional trajectories of these WIM.

Event photo gallery <https://www.internationalmathematicsmaster.org/2021-thinkingmathematically-gallery>

More information, full timetable, and other details are available on the website <https://www.internationalmathematicsmaster.org/2021-thinkingmathematically>

**6. Academic activities.** The speakers mentioned some of their academic interests as part of their talks and within the roundtable discussions, but the focus was mainly on how to combine their personal and professional lives and the challenges they have faced as women.

**7. Conclusions and recommendations.** The feedback from the student participants as well as from the speakers and organizers was overwhelmingly positive. Everyone expressed a strong desire to have other activities of this kind.

## VI. CGD-Umalca on line workshop

**1. Title.** Online Workshop for CWM Ambassadors from Latin America and members of other women associations from Latin America. Dates: 2021-10-28 and 2021-10-29.

**2. Contact.** Gender and Diversity Committee of the Latin America and Caribbean Mathematical Union. Carolina Araujo, Gabriela Araujo, Eugenia Ellis, Gabriela Ovando, Eddy Pariguan, Andrea Vera-Gajardo. Email: [cgd.umalca@gmail.com](mailto:cgd.umalca@gmail.com)

**3. Details.** The workshop consisted of two sessions of approximately two hours. The topics covered were theoretical framework of gender-based violence, sexism, sexual harassment and other violences in the Math Community.

This virtual Workshop was delivered by Andrea Pequeño Bueno, who holds a degree in Humanities and Social Communication, both from the University of Chile; a Master's degree in Social Sciences, mention in Gender and Development, from FLACSO-Ecuador; and a PhD in Social and Cultural Anthropology, from the Autonomous University of Barcelona.

Nineteen women mathematicians from the following countries participated in the workshop: Argentina, Brasil, Chile, Colombia, Costa Rica, México, Perú, Uruguay.

**4. Context.** The workshop included a discussion about situations of different sexual violence in the academy as well as possible answers and strategies to resist them.

The activity was thought as part of the activities proposed by the Committee for the 2021 year. The Committee organized several activities during Latin America Meetings, such as Mathematical Congress of America, Congress of Latin America and Caribbean Mathematics. In this last Congress, CGD-Umalca organized a meeting of different groups and associations of women in Math.

**5. Conclusions and recommendations.** This activity is part of a continuum of activities carried out by the CGD-Umalca, in order to train and sensitize the mathematical community on gender issues. This will continue to be the work of the CGD during this and the coming years.

## VII. Words of women in mathematics in the time of Corona

**1. Title.** Production and dissemination of the film “Words of women in mathematics in the time of Corona”

**2. Contact.** Prof. Sylvie Paycha, Potsdam University [paycha@math.uni-potsdam.de](mailto:paycha@math.uni-potsdam.de)

**3. Details.** 2 000+ spectators

- Online Launching of the Movie WWMTC team, May 12th 2021  
The filmmaker Irina Linke, and various women who contributed, will tell us about their experience around the project in a Zoom Meeting.

- Online Launching of the Movie, ICMS, Edinburgh, Scotland, May 12th, 2021  
Launch & International Panel

[discussionhttps://www.eventbrite.co.uk/e/words-of-women-in-mathematics-in-the-time-of-corona-tickets-153855675467](https://www.eventbrite.co.uk/e/words-of-women-in-mathematics-in-the-time-of-corona-tickets-153855675467)

- Presentation Sapienza University Roma, May 12th, 2021
- UNESCO exhibition “Creative Resilience” in the framework of the 41<sup>st</sup> Session of UNESCO’s General Conference, October 27<sup>th</sup>, 2021 (ongoing)
- Pop-Up Exhibition "She Is Science", November 11th, 2021 <https://udays.org/sheisscience>

Upcoming Events:

- Faces of Science Park, Amsterdam, February 7-11, 2022
- University of Potsdam, February 11th, 2022
- <https://www.un.org/en/observances/women-and-girls-in-science-day>
- UNESCO Exhibition 2022, Dubai

**4. Context of the Activity.** Follow-up to the Faces of Women in Mathematics film to capture the experiences of women mathematicians during the pandemic.

#### **5. Activities about women in mathematics.**

87 women from 36 countries speaking 25 languages contributed to the film. Some of the main themes were: learning new technologies (positive and negative aspects); balancing family and professional responsibilities, especially during the time when schools were closed; the benefit of shift to online events which permitted women to participate who would otherwise not have been able to participate due to travel costs and visa restrictions.

#### **6. Conclusions and recommendations.**

A book is being put up for online distribution and for print (small number). A website is being constructed that features the film and lists all the events related to the Words of Women in Mathematics project.