CWM NEWSLETTER
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Editorial for the Fifteenth Issue

Dear Readers,

Welcome to the 15th edition of the CWM newsletter.

We are thrilled to report on the resounding success of the third edition of the World Meeting for Women in Mathematics—(WM)²—held on 22 July 2026, in Philadelphia, USA, the day before ICM 2026. The event brought together mathematicians from around the world in a vibrant celebration of community, connection, and mathematical excellence, and we are grateful to everyone who helped make it such a memorable occasion.

This issue also brings news from our May 12 celebration, marking another year of the initiative's continued growth and reach across the community, with recordings and event highlights now available for those who could not join in real time. We are pleased to share both recent and upcoming highlights from the AWM Lecture series, celebrating the accomplishments of the women recently honored as Kovalevsky and Falconer lecturers, and looking ahead to the announcement of the 2027 Noether Lecturer.

Finally, we are excited to feature a wonderful article, "Formalizing Mathematics and Making Its Women Visible," by Valeria de Paiva of the Topos Institute, Berkeley, which offers a thoughtful look at the intersection of formal mathematics and the visibility of women's contributions to the field.

We hope you enjoy reading, and as always, thank you for being part of this growing and vibrant community.

Ekin Özman

CWM at ICM 2026: World Meeting for Women in Mathematics and Panel Discussion

CWM is happy to report on the success of the two activities it organized around ICM 2026 in Philadelphia in partnership with the Association for Women in Mathematics (AWM): the third edition of the World Meeting for Women in Mathematics ((WM)²) and the panel discussion "Finding and Defining Success in Mathematics: Pathways and Measures."

Held on the day preceding the ICM, (WM)² aims to strengthen professional networks among women mathematicians while promoting their full participation in the Congress. It highlights the contributions of women mathematicians from the region in which the ICM is held and is open to the entire mathematical community.

Kirsten Eisenträger

Luz de Teresa

The third edition of (WM)² took place on 22 July 2026 in a hybrid format at the Pennsylvania Convention Center in Philadelphia and online via Zoom. The meeting had approximately 280 registered in-person participants, 150 of whom were recipients of ICM travel support from developing countries. In addition, nearly 120 people participated online. Altogether, (WM)² brought together participants from 78 countries.[1]

Melanie Weber

The scientific program reflected the breadth and vitality of contemporary mathematics. Participants enjoyed outstanding lectures by Kirsten Eisenträger, Luz de Teresa, Chelsea Walton, and Melanie Weber, covering topics ranging from cryptography and partial differential equations to

Chelsea Walton

[1]Unless otherwise stated, all photo credits: Dan Z. Johnson

algebra and deep learning. The program also included small-group discussions over lunch, a poster session featuring approximately 50 posters, and opportunities for networking throughout the day.

Group Discussion

The meeting opened with welcoming remarks by Ulrike Tillmann, incoming President of the IMU, Ravi Vakil, President of the American Mathematical Society, and Talitha Washington, Past President of the AWM, highlighting the importance of international collaboration in fostering an inclusive mathematical community.


Poster Session

The day concluded with the panel discussion "Imagining Mathematics in the Future: Hopes and Challenges," featuring Maria Klawe, Jaqueline Mesquita, Talitha Washington, and Lauren Williams. The panel explored how mathematics is being transformed by technological advances, evolving educational practices, and changing societal needs, while reflecting on the role mathematicians can play in shaping a more inclusive, creative, and impactful future for the discipline. The meeting closed with remarks by IMU President Hiraku Nakajima and Tiffany Vlaar, representing the organizing committee of ICM 2030, who invited participants to the fourth edition of $(WM)^2$, to be held in Glasgow in July 2030.


Ulrike Tillmann, incoming President of the IMU

The following day, the ICM officially began. CWM warmly congratulates all IMU Prize winners, especially Fields Medalist Hong Wang and Leelavati Prize recipient Hannah Fry, whose achievements are an inspiration to the mathematical community.

The collaboration between the CWM and the AWM continued during the ICM itself with the jointly organized panel "Finding and Defining Success in Mathematics: Pathways and Measures," held on 24 July 2026. Featuring Annalisa Crannell, Fern Hunt, Emily Riehl, and Shelby Wilson, the discussion challenged traditional notions of success in mathematics by highlighting diverse professional trajectories spanning research, leadership, industry, and public engagement. Through personal experiences and thoughtful reflections, the panel encouraged participants to embrace broad and inclusive perspectives on achievement and impact within the mathematical community.

AWM-CWM Panel at ICM. Photo Credit: Birgit Seeliger

CWM thanks everyone who contributed to the success of these activities and looks forward to continuing this work with the international mathematical community at ICM 2030 in Glasgow.

Part of the (WM)^2 organizing team

News and Announcements

May 12 – Celebrating Women in Mathematics in 2026

In 2026, "May 12 – Celebrating Women in Mathematics" was once again a lively worldwide celebration, inspiring women, honouring their achievements in mathematics, and encouraging an open, welcoming, and inclusive working environment for everyone.

May 12 was among the first initiatives registered in the Directory of Initiatives of the Standing Committee for Gender Equality in Science, which was launched on 20 August 2026.

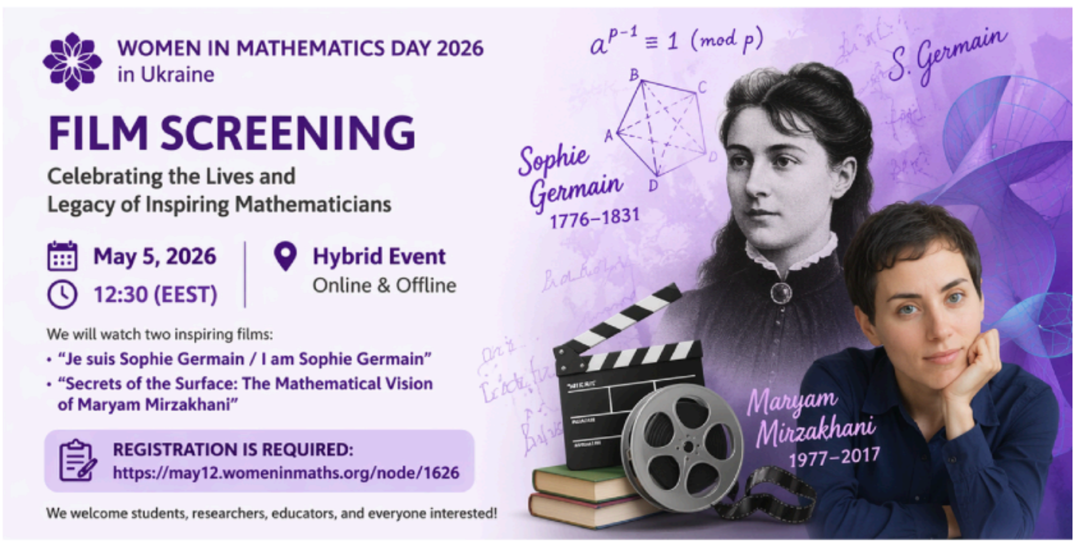
A total of 192 events from 61 countries were registered on the interactive May 12 website: seven countries in Africa (Algeria, Burkina Faso, Egypt, Madagascar, Senegal, South Africa, and Tunisia); 11 in the Americas (Argentina, Brazil, Canada, Chile, Colombia, Cuba, Ecuador, Mexico, Panama, Peru, and the United States); 14 in Asia and Oceania (Australia, China, India, Indonesia, Iran, Japan, Nepal, Oman, the Philippines, Taiwan, Thailand, Turkey, the United Arab Emirates, and Uzbekistan); and 29 in Europe (Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, and the United Kingdom).

For this eighth edition of the May 12 initiative, arrangements were made to produce subtitles for the Institut Fourier and femmes & mathématiques short film *Je suis Sophie Germain/I Am Sophie Germain*, marking the 250th anniversary of Sophie Germain's birth on 1 April 1776. May 12 volunteers produced subtitles in Arabic, Chinese, English, French, Greek, Hausa, Italian, Japanese, Korean, Nepali, Persian, Portuguese, Sinhala, Spanish, Taiwanese, Thai, Turkish, and Wolof.

An agreement was again reached with Zala Films and director George Csicsery to offer free screenings of the documentary *Secrets of the Surface: The Mathematical Vision of Maryam Mirzakhani*. Arabic and Chinese subtitles were produced by May 12 volunteers. The free screening period ran from 1 to 20 May, and more than 420 requests for group or individual screenings of the two films were received. These screenings added 12 countries to the places celebrating May 12: Afghanistan, Brunei, Burundi, Costa Rica, the Dominican Republic, Hungary, Jamaica, Malta, Moldova, Morocco, Nigeria, and South Korea.

Je suis Sophie Germain/I Am Sophie Germain, with all available subtitles, can be viewed here.

The May 12 initiative is sponsored by CWM and is led by a coordination group that includes representatives of several continental and international organizations supporting women in mathematics.



An event organized by the Council of Young Scientists of the Institute of Mathematics of the National Academy of Sciences of Ukraine

Towards Gender Equality in Scientific Organizations: Report by ISC, IAP, and SCGES

The report *Towards Gender Equality in Scientific Organizations: Assessment and Recommendations*, published by the International Science Council (ISC), the InterAcademy Partnership (IAP), and the Standing Committee for Gender Equality in Science (SCGES), presents the most comprehensive global assessment of gender equality in scientific organizations to date.

The analysis draws on institutional data from 136 organizations, survey responses from nearly 600 scientists, and 12 interviews with representatives of scientific organizations. Together, these sources provide a multilevel assessment of women's representation, participation, leadership, and recognition, combining structural analysis with lived experiences. The report can be found here.

Launch of the SCGES Directory

Women make up half of the world's population, yet they account for only about one-third of scientists and less than 15% of the leaders of the scientific community. A growing number of initiatives seek to address this disparity, which is detrimental both to women and to science. These initiatives operate at the local, national, regional, and international levels, within individual disciplines and across disciplinary boundaries.

On 20 August 2026, the SCGES launched a worldwide online directory to increase the visibility of these initiatives. As the directory is new, it currently contains only a small number of entries. Please help us expand it by submitting more initiatives.

AWM Lecture Series: Recent and Upcoming Speakers

The Association for Women in Mathematics has announced three distinguished lecturers for its named lecture series:

2026 Sonia Kovalevsky Lecture delivered by Professor Fioralba Cakoni

The Association for Women in Mathematics and the Society for Industrial and Applied Mathematics announced that Professor Fioralba Cakoni was the 2026 Sonia Kovalevsky Lecturer. The Kovalevsky Lecture was delivered at the 2026 SIAM Annual Meeting in Cleveland, Ohio, July 6–10, 2026. The Kovalevsky Lecture honors Sonia Kovalevsky (1850–1891), the most widely known Russian mathematician of the late-nineteenth century. More information can be found here.

2026 Etta Zuber Falconer Lecture delivered by Christina Edholm

The Association for Women in Mathematics and the Mathematical Association of America announced that the 2026 Etta Zuber Falconer Lecturer was Christina Edholm, associate professor at Scripps College. The Falconer Lecture was delivered at the MAA MathFest in Boston, MA, from August 5–8, 2026. The Falconer lectures were established in memory of Etta Zuber Falconer (1933–2002). Her many years of service in promoting mathematics at Spelman College and the efforts to increase the participation of minorities and women in scientific careers through many forums in the mathematics and science communities, were extraordinary. Falconer lecturers are women who have made distinguished contributions to the mathematical sciences or mathematics education. More information can be found here.

2027 AWM-AMS Noether Lecturer will be Gigliola Staffilani

The Association for Women in Mathematics and the American Mathematical Society are pleased to announce that Gigliola Staffilani, Abby Rockefeller Mauzé Professor of Mathematics at the Massachusetts Institute of Technology (MIT), will be the 2027 AWM-AMS Emmy Noether Lecturer. The Noether Lecture will be delivered at the Joint Mathematics Meetings, to be held in Chicago, IL, January 12–15, 2027. AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences. In April 2013 the lecture was renamed "AWM-AMS Noether Lecture" and in 2015 was jointly sponsored by AWM and AMS. More information can be found here.

You can read previous issues and subscribe to the CWM newsletter here.

https://www.mathunion.org/cwm/about/cwm-newsletter

FORMALIZING MATHEMATICS AND MAKING ITS WOMEN VISIBLE

By Valeria de Paiva, Topos Institute, Berkeley

For most of the twentieth century, formalized mathematics was easy to admire and easy to ignore. It belonged, many mathematicians felt, to a neighbouring world: logic, computer science, foundations. Proof assistants could certainly do impressive things, but they did not seem likely to alter everyday mathematical practice. Writing a paper, proving a theorem, checking a colleague's argument, teaching a graduate course---those were still human activities, carried out in ordinary mathematical language, with all the shortcuts and tacit understanding that such language permits.

That perception has begun to change. Formal mathematics---the representation of definitions, statements, and proofs in a language precise enough for a computer to verify every step---is no longer a curiosity at the edge of the discipline. It is becoming part of a broader conversation about mathematical reliability, digital infrastructure, and the role of artificial intelligence in research. If the past decade made proof assistants more usable, the current wave of AI has made them harder to dismiss. Machines can now generate mathematical prose, suggest proof strategies, search libraries, and in some settings produce formal solutions to Olympiad-style problems. The question is no longer simply whether formalization is possible. It is what formalization is for, how it changes mathematical practice, and why it may matter more in the age of AI than it ever did before.

What formalization is, and why it matters now

To formalize a theorem is to express it in a system such as HOL, Mizar, Rocq (formerly Coq), Agda, Isabelle, or Lean, together with enough definitions and proof steps for the system's kernel to check that the argument is correct. This notion of correctness is stronger, and narrower, than ordinary mathematical acceptance. It does not depend on whether a referee is convinced, whether a seminar audience nods along, or whether a gap seems “routine.” A formal proof is one the machine can verify down to the axioms and inference rules. Of course, one still has to trust the software, but the point of proof assistants is that the trusted core can be made very small.

Formalization has a long prehistory. Whitehead and Russell's *Principia Mathematica* aimed at a hand-built version of the same dream: to reduce mathematics to explicit symbolic reasoning. Automated theorem proving and mechanized proof checking have been active research areas since the mid-twentieth century. Research-level mathematics has been formalized for decades, from the four-colour theorem to the Feit--Thompson theorem and, more recently, major projects in analysis, algebra, topology, and number theory. What is new is not the existence of proof assistants, but the sense that they may be moving from heroic demonstrations to practical infrastructure.

> "If AI is generation, formalization is adjudication."

One reason is simply accumulation. Formal libraries are now large enough that formalization can become cumulative. Lean's Mathlib, developed by a worldwide community, contains an enormous body of undergraduate and research-level mathematics; Isabelle, Rocq, and other systems have built their own substantial ecosystems. Once definitions, standard lemmas, and common proof patterns are in place, the next theorem is cheaper to formalize than the last one. Another reason is improved tooling: better automation, better editors, more sophisticated tactics, better engineering, and more experienced communities. The "de Bruijn constant"---the ratio between the size of a formal proof and the size of its informal counterpart---remains substantial, but it is less crushing than it once was. Some users report that proof-writing now feels like a well-designed game, with immediate feedback and a satisfying sense of progress.

The paradox: why AI makes formalization more important

The third reason for progress is AI, and here the story is both exciting and genuinely paradoxical. There is now real progress in machine-assisted theorem proving and mathematical language generation. Large language models and related systems can propose tactics, guess intermediate lemmas, search formal libraries, help translate ordinary mathematical text into proof-assistant syntax, and even engage in real-time dialogue about mathematical problems. In professional mathematics, many researchers now find that conversational AI feels like working with a junior colleague---an extremely well-read one, available instantly, who can suggest approaches, clarify definitions, and help think through problems. For both theoretical and computational mathematicians, this kind of interaction is already changing how work gets done.

In 2024, DeepMind's AlphaProof achieved results on International Mathematical Olympiad problems that brought automated proving into the public eye, and the pace of development since then has been rapid. It would be a mistake to dismiss these advances as mere publicity. It would be an equal mistake to over- interpret them. Solving Olympiad-style benchmark problems is not the same thing as understanding a research area, choosing the right definitions, organizing a long proof, or deciding which theorem is worth proving in the first place. Assessing the relevance of a mathematical contribution---deciding whether a result matters to a field, whether it opens new directions, whether it solves a problem people actually care about---has always been the hardest part of mathematical refereeing. No machine has shown the slightest competence at this.

More importantly, the systems now grouped under the label “AI” are not reliable mathematicians. They are often brilliant assistants and terrible witnesses. They produce fluent explanations, plausible citations, and proof sketches that look persuasive even when they are wrong. They hallucinate. They conflate definitions. They silently smuggle in false steps. In ordinary mathematical life, human readers can sometimes patch these failures by intuition and background knowledge. But if machines begin generating mathematics at scale, that strategy will not be enough.

This is the paradox at the centre of the present moment. The better AI becomes at generating mathematical language, the more important formal verification becomes. Formalization is not made obsolete by machine-generated proofs; it becomes one of the only robust ways to tell whether a proof is genuine. If AI is generation, formalization is adjudication. If AI is a prolific source of conjectures, proof attempts, and formal snippets, proof assistants are what keep the resulting mathematical ecosystem from collapsing into a fog of persuasive but unverified claims.

Bridging formal and informal mathematics

There is a deeper question beneath all of this, one that has occupied my thinking for the past six years. Formal languages are powerful precisely because they are rigid: every symbol means exactly one thing, every rule applies in exactly one way. But this rigidity creates a profound cost. The flexibility of ordinary mathematical language---what we might call mathematical English, the lingua franca of the discipline---is not incidental to how we think. It is essential. We work with examples, intuition, partial sketches, and conversations in which meaning is negotiated rather than fixed. We rely on analogies and shift perspective when stuck. Mathematical English permits all of this.

> “If women are underrepresented in the rooms where those decisions are made, the field will inherit the same narrowness that many parts of mathematics and computing already suffer from.”

Formal systems permit none of it. This gap is why formalization has remained laborious and why interoperability between proof assistants, libraries, and formal systems is so difficult. Human mathematicians solve analogous communication problems by debating with one another, trying different framings, and building intuition together. Now, for the first time, machines are becoming quite good at this kind of seeming-to-reason-like-a-human: they can rephrase, offer multiple perspectives, and spot when a term might mean different things to different communities.

My vision, which I still believe in, is to use the new tools that AI provides for language understanding to help bridge this gap. Not to replace formal systems---their precision is essential---but to help mathematicians and machines negotiate the passage between the rigidity of formal mathematics and the flexibility that mathematical communication requires. This is not about making formal mathematics less formal. It is about making the bridge between the two worlds less painful, less error-prone, and more natural. If AI can help with translation, rephrasing, and making explicit the tacit steps that humans skip, then we may finally have the means to make formal mathematics a genuine part of ordinary mathematical practice rather than a specialized side-activity.

Surveying the landscape: the Hausdorff trimester

One of the clearest places where I saw this shift taking shape was the Hausdorff trimester Prospects of Formal Mathematics, held at the Hausdorff Research Institute for Mathematics in Bonn in the summer of 2024. I co-organized the program with Kevin Buzzard, Jacques Carette, Michael Kohlhase, and Josef Urban. For three months, Bonn became a meeting point for several communities that do not always occupy the same rooms: proof-assistant developers, category theorists, number

theorists, homotopy type theorists, computer scientists, and researchers interested in machine learning for mathematics. Participants came from the worlds of Lean, Rocq, Isabelle, Agda, and beyond. Some were formalizing particular results; some were building libraries; some were trying to understand how large language models might help bridge the gap between informal and formal mathematics.

What made the trimester so striking was that it brought into focus the full ecology of formal mathematics. Formalization is not only about proving theorems in a proof assistant. It is also about designing and maintaining digital libraries of mathematics; making formal proofs readable enough that mathematicians can learn from them; finding ways to translate papers, lecture notes, and blackboard arguments into a form that machines can check; and asking what counts as a mathematical contribution when part of the labour has moved into code, library design, and verification. Those are questions about culture and institutions as much as about logic and software.

The trimester included a school for newcomers and workshops on formalization, on libraries of digital mathematics, and on the difficult relation between informal and formal proof. A recurring theme was that the real bottleneck may not be the logical core of proof assistants, but the interface between formal systems and ordinary mathematical life. If formal methods are to become mainstream, they must either become more hospitable to this way of working or be paired with tools that help translate between the two worlds. That is precisely where AI may be useful---not as a substitute for proof, but as a bridge.

Women in Formal Mathematics

Within that setting, together with Sandra Alves and EuroProofNet-Women, I organized a two-day workshop on Women in Formal Mathematics. This part of the story is as important as the technical one---and for deeper reasons than mere lack of representation. Formal mathematics sits at the intersection of mathematics and computer science, two disciplines that each already struggle with gender imbalance. The result is a field in which women can easily become invisible even while doing central work. And because formal mathematics is still young enough that its norms, prestige structures, and habits of collaboration are not yet fixed, visibility and intentional community-building matter enormously now.

The workshop was designed to make women's work in formal mathematics visible to the broader trimester community and to one another. The aim was not simply to showcase a few successful careers, but to make visible a network of women participating in the construction of a field that is becoming increasingly important.

We wanted younger researchers to see that there is a place for them in this area, and senior researchers to meet one another across the many small and scattered communities that formal mathematics still consists of.

That visibility matters for intellectual reasons as well as social ones. Formal mathematics is not just a set of tools. It is a developing research culture with its own standards of elegance, its own forms of labour, and its own decisions about what counts as valuable work. Libraries do not build themselves. Interfaces do not design themselves. The translation between informal mathematical writing and formal verification does not happen automatically. If women are underrepresented in the rooms where those decisions are made, the field will inherit the same narrowness that many parts of mathematics and computing already suffer from. Conversely, if formal mathematics is being built now, this is exactly the moment when interventions in culture, mentorship, and visibility can have lasting effects.

What should mathematicians believe?

So what should mathematicians believe amid the current excitement? **First**, that something real is happening. Formalized mathematics is no longer confined to toy examples. There are now large libraries, serious theorem-proving environments, and major collaborations between proof-assistant communities and mainstream mathematicians. The experience of working with AI as a junior colleague in real time is changing mathematical practice, for better and worse, whether or not every theorem ends up fully formalized.

Second, that the loudest public claims should be treated with caution. We do not know what fraction of mathematics is formalized. We do not know how quickly research mathematics will move into proof assistants. We do know that formalization remains expensive, that interoperability is poor, and that benchmark success does not amount to autonomous mathematical understanding.

Third, and most importantly, we should recognize that AI makes the central question of formal mathematics sharper rather than fuzzier. Once machines can generate mathematical text at scale, mathematics needs reliable mechanisms for checking what those machines produce. And once mathematicians begin using AI as a thinking partner---as many already are---we need ways to distinguish genuine reasoning from plausible-sounding hallucination.

That is why I think formalization matters now in a way it did not even ten years ago. It is not merely a foundational exercise, or a hobby for logicians, or a badge of rigour attached to a few celebrated theorems. It is becoming part of the infrastructure by which mathematics may preserve trust in an era of machine generation. Proof assistants, formal libraries, and machine-checked verification will not replace mathematical creativity, taste, or explanation. But they may become essential supports for a discipline that increasingly has to distinguish insight from imitation, proof from persuasion, and genuine knowledge from very convincing statistical guesswork.

And if that is the future of formal mathematics, then the question of who gets to build it is not peripheral. Making women visible in formal mathematics is not only about fairness, though fairness would be reason enough. It is also about ensuring that one of the most consequential new interfaces between mathematics, computing, and AI is shaped by a community broad enough to deserve the name mathematical community at all.

Valeria de Paiva is a principal researcher at the Topos Institute in Berkeley, working in categorical logic, semantics, and type theory. She created the Dialectica categories framework in her 1990 Cambridge PhD thesis, co-organized the Hausdorff trimester "Prospects of Formal Mathematics" and the Women in Formal Mathematics 2024 workshop, and is a founder and longtime organizer of the Women in Logic workshop series.