THE HANNA NEUMANN FELLOWS 2025

Interview with Monika and Alice Marveggio

[THE INTERVIEW WAS CONDUCTED IN MAY 2025 BY BEATE ROGLER, PUBLIC RELATIONS MANAGER AT MATH+]

Monika is a Research Associate at the Statistics and Mathematics Unit, Indian Statistical Institute Kolkata, India. She obtained her PhD in 2024 from the Indian Institute of Science Education and Research, Bhopal, India. After that, she held a postdoctoral position at the Indian Institute of Technology, Gandhinagar, India. Monika's research interests lie in low-dimensional topology, knot theory, and contact and symplectic geometry. She is currently working on several projects related to the classification problem for Legendrian knots and 3-dimensional contact manifolds. As part of the MATH+ Hanna Neumann Fellowship, Monika is collaborating with Marc Kegel and his research group at Humboldt-Universität zu Berlin.

Personal homepage

Alice Marveggio is a Postdoctoral Researcher at the Hausdorff Center for Mathematics (HCM) in Bonn. She received her PhD in 2023 from the Institute of Science and Technology Austria (ISTA). Prior to that, she completed her bachelor's and master's degrees in physics at the University of Pavia, Italy. Alice's research interests lie at the intersection of partial differential equations and the calculus of variations, with a particular focus on interface evolution problems arising in continuum mechanics. From October 2025, her research in Bonn will be funded by the Alexander von Humboldt foundation (AvH). In Berlin, she will collaborate with Barbara Zwicknagl at Humboldt-Universität zu Berlin as part of the MATH+ Hanna Neumann Fellowship.

Personal homepage

Interview:

I. MATHEMATICAL JOURNEY

What first sparked your interest in mathematics?

Alice: Mathematics was my favorite subject when I was a child, and I always wanted to become a mathematician. Later, I also got interested in physics, and eventually I chose to study physics at university. However, I was able to personalize my curriculum to follow my passion for mathematics.

Monika: I've liked mathematics since I was a child. My grandfather used to teach me and my brothers simple arithmetic—addition and subtraction. What fascinated me most about mathematics was that I didn't need to memorize anything: everything followed logically, and there was no room for error. That made it feel easy to me, so I ended up spending more time on math than on other subjects. During my master's studies, I decided to pursue a PhD

in mathematics. I took a course on knot theory, which I really enjoyed, and that's when I knew I wanted to specialize in knot theory.

Were there any role models or people who inspired you to pursue mathematics?

Monika: Not really. Things just happened one step at a time. I was good at math, and mostly I just wanted to leave my village and become independent. So I decided to pursue a bachelor's degree. At that time, I had no idea what research even was. Just like in many families in India, the plan for me was to complete a bachelor's degree and then get married. But I managed to pass an entrance exam and got into IIT Kanpur, which is a prestigious institute in India. After that, my family thought, "Let her do this one more degree." And from there, thinks kept moving forward. Doing a PhD was never really part of the plan. So no, there wasn't a specific role model at that time.

Alice: In terms of role models, there have been many people in my life that inspired me. I had supportive teachers and later professors at university who encouraged me to follow this path. But the mindset—to challenge myself, to pursue my dreams and goals—that definitely comes from my dad.

How would you describe your journey in mathematics so far?

Alice: It started with a bachelor in physics, so I didn't go straight into mathematics. But while studying physics, I realized that my favorite university courses were Analysis I, II, and III. That made me think I should move closer to applied analysis and mathematics. It also made me realize that my high school teacher was probably right when he told me: "I think it would be best for you to study mathematics. Of course, there have been ups and downs—periods of low motivation moments of imposter syndrome, asking myself: "Am I good enough to do this?" But in the end, I reminded myself that we're all doing this job because we're driven by curiosity, and we enjoy problem-solving. Right now, and looking ahead, I just want to focus on that good feeling I get when I follow my curiosity and try to answer interesting questions.

Monika: I originally wanted to enroll in physics at Delhi University, but on the first day, the cutoff score was very high. I was eligible for mathematics instead, which I also felt good about. Eventually, I accepted the offer for the math, and that's how it all started. However, at the university, I felt that the teaching was heavily focused on solving problems for exam preparation, with little emphasis on research. That didn't interest me much. Things changed when I went to the Indian Institute of Technology (IIT) Kanpur for my master's. That's where I had amazing teachers—experts working in their fields—because the IITs are among the top institutes in India, with around 10 or 12 institutes across the country. I still remember one professor who taught Analysis I. The way he explained things was incredible. That's when I thought, "Okay, this is really something," so I decided to pursue a PhD. During my PhD, I also had a great mentor. But at some points, there were times when I thought maybe I didn't belong here.
You often meet people who say they've loved mathematics since childhood, and I started much later. Plus, there aren't many women in this field, which can be discouraging. But I learned to find joy in small things—like solving a problem. Not necessarily a big research

problem, just something you've been working on. And when you solve it, you feel happy, and you should take credit for that. Those small wins are where I found motivation and joy.

Have there been any major challenges along the way? How did you overcome them?

Monika: There have been challenges at every step for me as a woman. I think this happens everywhere, but it's particularly common in India. There's constant pressure to leave research, get married, and "settle down." Academia is a long journey filled with uncertainties. By the time you finish your PhD, you are often around 30, and there's always pressure to start a family. When you refuse to get married, your family still pushes. At the end of the master's, my family insisted that it was time to get married. But I said then: "Let me just enroll in a PhD program." The problem is, mathematics is something that requires peace of mind—it's a creative process. You can't do it well when you're under constant emotional pressure. This kind of pressure often affects women, especially in Asia.
I'm not sure how it is in other countries. But as a woman, you constantly have to take care of so many things. For example, sometimes you're judged just for wearing makeup—you're not taken seriously. People assume you are not focused or committed, simply because of how you present yourself. You constantly have to prove that you're serious about your work. Whenever you're giving a talk, or having meetings with senior faculty, you have to be extra careful—just to be taken seriously.

Alice: The situation is somewhat different in Europe, but some issues are very similar. What Monika said about women not being taken seriously—that's quite common. It's not just about where you're from, it's about the fact that women are still underrepresented in this field. Some male colleagues still struggle to see women as equal professionals, not just as "women," but as colleagues. That's frustrating. When a woman gives a seminar or presents a poster, there's often this lingering doubt: *"Are they engaging with me because they're genuinely interested in my research, or just because I'm a woman?"* There are still daily comments we hear and try to ignore. Take the fellowship Monika and I received—it's a great opportunity. But I fully expect some male colleagues to say, *"They only got it because they're women."*
When we try to open doors for women who face underrepresentation, imposter syndrome, and a lack of visibility, that support is often questioned. It's perceived as women being "given" things they don't deserve. So it ends up feeling like women have to constantly prove they're good enough to be here.
Yes, things are improving. There have been efforts and concrete steps taken, but there's still a lot to be done. In the end, I think the root of the problem lies more in society than in mathematics itself.
When those strange or discouraging comments come, I try not to question my own value—I just keep going. It really helps to have structures and networks that support women in this field. Sometimes, when young women or girls face early challenges, they give up because no one is there to say, *"You can do it."* You have to be lucky to be surrounded by supportive colleagues who recognize what's happening and are willing to help.
Also, women should support each other rather than compete—which, unfortunately, does sometimes happen. But there's no space for that kind of division. Up until a few years ago, I didn't have many women collaborators. One of my recent goals was to change that. Now I'm connecting with more women in my field, and it's been a wonderful experience. There's

a strong network, and it feels great to have friends and colleagues in the same area who support one another. Women bring unique perspectives, and they deserve to be heard and to contribute fully.

II. HANNA-NEUMANN-FELLOWSHIP & BERLIN COLLABORATION

Congratulations on receiving the MATH+ Hanna Neumann Fellowship! What does this recognition mean to you?

Alice: For me it's a great opportunity to come to Berlin. It means a lot to be connected with the Berlin Mathematics Research Center MATH+ and to collaborate with the people working here. I'm especially excited to work with a female professor like Barbara Zwicknagl at Humboldt-Universität. She's an outstanding researcher and a real source of inspiration

Monika: I also think it's a fantastic opportunity. I'll be here for three months, working with Dr. Marc Kegel on new projects. We're already collaborating, but we'll be starting even more projects together, also involving BMS students at Humboldt-Universität. Thanks to this fellowship, I can attend conferences that would have been difficult or impossible to access from India. That's really great. I'm also looking forward to meeting new people and attending the weekly seminars at Humboldt-Universität. It's going to be amazing, and I'm very excited about it.

What are you most excited about in your collaboration with your host researchers and their research group at MATH+ in Berlin?

Monika: I'm most excited about this opportunity, because in India, there aren't many researchers working in my area, and those who do are spread across the country. Being here for three months and having regular in-person discussions with Dr. Marc Kegel and his research group is going to be incredibly helpful.

Could you share a bit about your research and how it connects to your work in Berlin?

Monika: My research interests are in low-dimensional topology—specifically knot theory, Legendrian knot theory, 3-manifolds, and contact geometry. You can think of a knot like tying a knot using a piece of thread and closing it into a loop. The classification problem in knot theory asks: *without cutting the knot, can you transform or deform it into another?* That's the main problem I work on. Marc also works in several areas, but this is one of them—so we share this common ground. In short, I focus on the classification problem for knots and three-dimensional contact manifolds.

How will your stay in Berlin support your future career?

Monika: I'll definitely learn a lot and start new projects, which is great for my future. The fellowship also adds value to my academic profile. In two years, I plan to apply for permanent positions in India, and this experience will strengthen my applications. Collaborating with different researchers is so important—not just for learning, but also because, realistically, mathematics today requires both good research and strong collaborations. This experience supports both.

And you, Alice? Can you tell us about your research and what excites you most about your collaboration here in Berlin? Do you see long-term benefit for your career?

Alice: Absolutely. Over the past years, my research has focused on interface evolution problems—basically, the study of how interfaces or boundaries between different phases or different physical states evolve over time. Currently, I'm shifting my focus towards a more static approach, looking at the properties of the energy functionals associated to these models. This collaboration in Berlin is a great fit for that shift. It allows me to approach problems coming from physics using tools from the calculus of variations, which is a major area in analysis. It's a great opportunity to start a new project in this direction.

III. CELEBRATING INTERNATIONAL WOMEN IN MATHEMATICS DAY

What does "International Women in Mathematics Day" mean to you on a personal level?

Alice: For me, it's a day to remember outstanding women mathematicians—those who achieved great things in the past and those making amazing contributions today. There are many excellent women in mathematics doing impactful work and solving problems people have been trying to tackle for years. But it's also a reminder that we still have a long way to go to achieve gender balance. Women are still underrepresented in this field. You can see that just by attending a master's course—often there's only one or even no female students in the class. That shows we still face stereotypes. This day is important to support women and encourage them to pursue their passion for mathematics and not give up.

Monika: I think it's important to celebrate the work and achievements of women in mathematics. It's a reminder of both the progress we've made and the work that still lies ahead. This special day is needed because of the underrepresentation of women in the field. Sometimes, you feel demotivated simply because there are so few people like you who truly understand your struggles. For me, it's a source of motivation and a moment to connect with a wider community that shares similar goals and challenges.

What can we do to encourage more women to enter and thrive in the field?

Monika: We should start at the school level—organizing workshops and mentorship programs for young girls to spark their interest in mathematics. Then, at higher academic levels, we need support especially during the crucial transition after the PhD, which is often when career-building starts. Unfortunately, that's also when pressure to start a family becomes intense. Society tells women that after 35, it's too late. So we need fellowships for women who have taken a career break due to maternity reasons. These women deserve structured programs to support their return, because otherwise, that break often becomes the end of their careers. It's hard to come back and catch up with the research world if you're left without support.

Alice: I completely agree. Initiatives should start as early as elementary school. But more importantly, we need strong support systems for women at all levels, because the challenges can vary greatly. Like Monica said, there needs to be support for women who choose to have a family while pursuing an academic career. Too often, it feels like if you have a family, you're left behind by the system. That's a real problem. And it's not just in mathematics—

it's a broader societal issue. We need to rethink how careers and caregiving are balanced, not just in academia, but across all fields.

If you could share one message with girls interested in mathematics, what would it be?

Alice: If you like math, it's for you—just follow your curiosity.

Monika: Don't let anyone tell you that you can't do it. If you're curious, explore it. I say this from experience—my journey started quite late. I wasn't always sure about mathematics. In fact, I'd say that my mathematical age is not that much. It's only been about seven years since I've fully committed myself to this field. So it doesn't matter when you start. If something inside you tells you to explore mathematics, go for it.

IV. FUTURE PLANS

What are your professional goals for the next few years?

Monika: The next two years, my plan is to do a lot of research, but I will also be focusing on teaching because I do want to become a good teacher. Good teachers are very much needed. Not all good researchers are good teachers, and good teachers play an important role in motivating students to do more mathematics. That's one of my goal to gain more teaching experience along with my research. After two years, I plan to start applying for permanent positions. I also want to attend many conferences, summer schools, give lectures and attend lectures, because I have seen that at some point, when researchers reach their 40s or so, they stop doing this and focus only on their daily job, like teaching. But I want to present my work, talk to many people, keep interacting with new students and keep learning new subjects.

Alice: Of course, I have many small goals I'd like to achieve to improve my professional profile in both teaching and research. There's always work to do to strengthen your CV. But right now, my focus isn't so much on making my CV the most competitive—it's more about following my curiosity and passion for mathematics. I want to spend this time solving problems that fascinate me and that I love. Sometimes we forget what originally brought us to this career. I want to remind myself why I chose mathematics in the first place—simply because I enjoy solving problems. So for me, it's about staying happy and motivated. Becoming a professor is a dream many of us had as children, when we were bold enough to say it out loud. Now, I prefer to think of it as taking one step at a time, driven by curiosity and love for math. Eventually, I'll get somewhere—let's see where.

Monika: When I say I'll be applying for a permanent position, I mean a professorship. In India, permanent positions begin at the assistant professor level, and with experience, you advance to professor. That's the ultimate goal. But I think there's also an age restriction in India—if you don't secure an assistant professorship by the age of 35, you can't apply anymore. I'm not sure how it works in other countries, but institutions like the IITs (Indian Institutes of Technology), ISI (Indian Statistical Institute), and IISERs (Indian Institutes of Science Education and Research) all have this limitation. So you have to move quickly.

Do you have any advice for young women considering a career in mathematics?

Alice: When I decided to pursue this path, I was honestly unaware of many things I probably should have known—and that might have helped me. But maybe that's what allowed me to take the leap without being afraid. So I always tell girls: if you want to pursue a career in mathematics, you absolutely can. Don't let anyone undervalue you. Keep going, do your best, and know that any contribution to the field you make is a valuable one.

Monika: If you have a passion for math, go for it. But take it slow—there's no need to rush. You don't have to learn a hundred topics in one month or even in one semester. Take your time with whatever you're studying. Read carefully, understand it deeply. I used to try learning too many things at once, and ended up just skimming the surface of each. Explore different areas, find out what you enjoy, and seek out mentorship. Don't hesitate to reach out to senior people or professors. Tell them what you're interested in—they can often guide you to the right materials or suggest what to read and where to start.

Thank you very much for taking the time to speak with us following your arrival in Berlin as the Hanna Neumann Fellows 2025. This was a wonderful insight into the experiences of women mathematicians—your challenges, goals, and the research opportunities offered by your stay in Berlin. Welcome again to Berlin and the MATH+ community!