



The Abdus Salam
International Centre
for Theoretical Physics



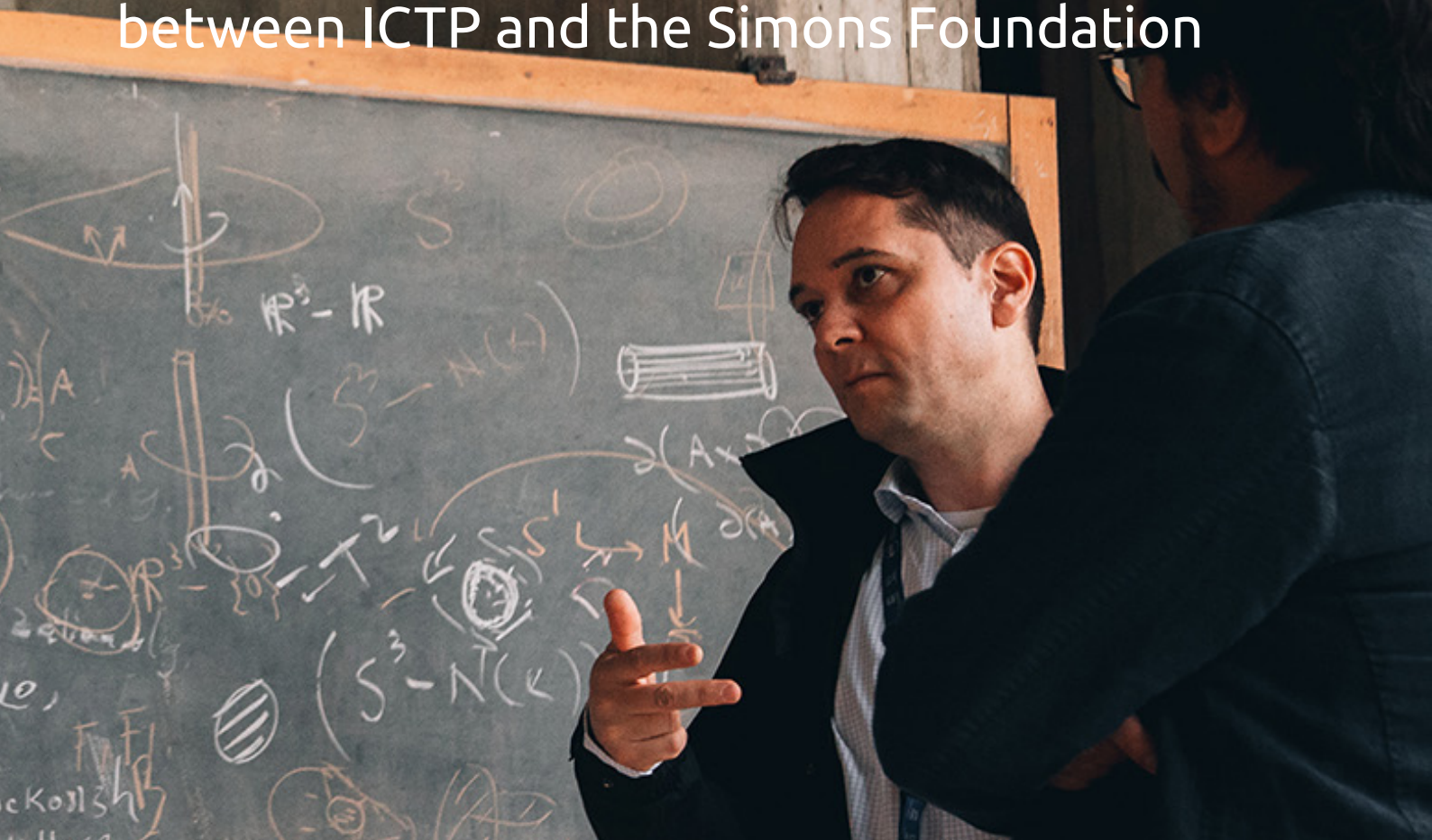
IAEA
International Atomic Energy Agency



unesco
United Nations
Educational, Scientific
and Cultural Organization

A Decade of Empowering Minds

Celebrating the 10-Year Partnership
between ICTP and the Simons Foundation



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**A Decade of Empowering Minds:
Celebrating the 10-Year Partnership between ICTP and the Simons Foundation**
The Abdus Salam International Centre for Theoretical Physics
by the *Institute for Advancement and Fundraising Unit* and the *Public Information Unit*

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Filippo Blasetti for ICTP Photo Archives (cover, 4-5, 11 (2024), 16-17, 22)

Timeline photograph 2023 by Emily Tan/The Simons Foundation

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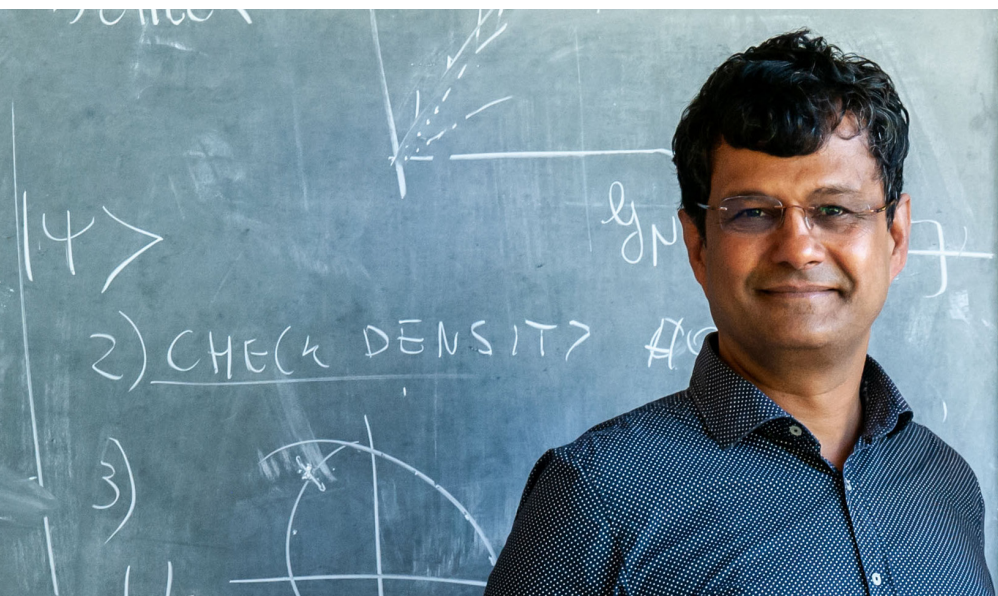
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A Shared Vision

Atish Dabholkar



ICTP turns 60 this year. For over half a century now, ICTP has delivered successfully on its ambitious mission to make advanced science globally accessible through specific programmes designed for scientists at different stages of their careers. One of our flagship programmes instituted by our founding Director Abdus Salam is the Associates Programme. It provides scientists from developing countries with opportunities to visit the Centre regularly, helping to foster a global science network that transcends geography, economics, ethnicity, or gender.

The Simons Foundation has been an invaluable partner in this unique mission for the past decade. The inspiration that led Jim and Marilyn Simons to create the Simons Foundation is akin to the one that guided Salam: to support fundamental science globally. ICTP is very proud

to be among the organizations that the Foundation has supported during its 30-year history to promote the basic sciences and mathematics at the highest level.

By supporting the Associates Programme, and by creating scholarships for PhD students, the Simons Foundation has impacted the lives and careers of many researchers worldwide and substantially magnified ICTP's impact across the world. By promptly responding to ICTP's request to support scientists at risk who sought shelter at ICTP, the Foundation has also helped ICTP continue its role as a safe haven for scientists at risk from regions at conflict.

This report aims to highlight some of the numerous ways in which the Foundation has been instrumental in advancing ICTP's unique mission. We extend our heartfelt gratitude to the Simons Foundation for its unwavering support, exemplified by the inspiring stories of the researchers it has empowered. ■

Atish Dabholkar
ICTP Director

Simons Foundation's Impact

Ralf Kaiser



While ICTP is celebrating its 60th anniversary, 2024 also marks 10 years of unwavering support from the Simons Foundation to two key programmes at ICTP: the Associates Programme and the PhD Programme.

ICTP founder Abdus Salam started the Associates Programme at the very inception of the Centre to offer a solution to the sense of isolation encountered by scientists working in developing countries. Over the past 60 years, the Programme has benefitted more than 3,000 scientists. Not only do these researchers contribute to creating local scientific communities in their home countries, they also become teachers and mentors for new generations of scientists. Starting in 2014, the Foundation has so far financed 71 associates. By funding their visits and giving Simons Associates the possibility to come with one of their students or

collaborators, the Simons Foundation has accelerated this impactful process.

The PhD is a defining experience in every researcher's career and by funding scholarships of 7 PhD students from developing countries at ICTP, the Simons Foundation has given young scientists the opportunity to gain the skills and knowledge they need to contribute to the future of science at the highest level.

In 2022, the Simons Foundation has also promptly acted to enable Ukrainian and Russian scientists at risk to find shelter at ICTP. Two Ukrainian, two Russians and a Turkish researcher have been supported by the Foundation so far and they have become important members of the ICTP community.

Through the stories of current and past associates, PhD students, and scientists at risk, this report illustrates how the Foundation's generosity has created life-changing opportunities for the numerous researchers who have benefitted from it.

We are profoundly grateful to the Simons Foundation for their unfaltering support and we look forward to continuing our collaboration. Together, we will provide scientists worldwide with the resources and opportunities they need to participate in the global pursuit of scientific knowledge. ■

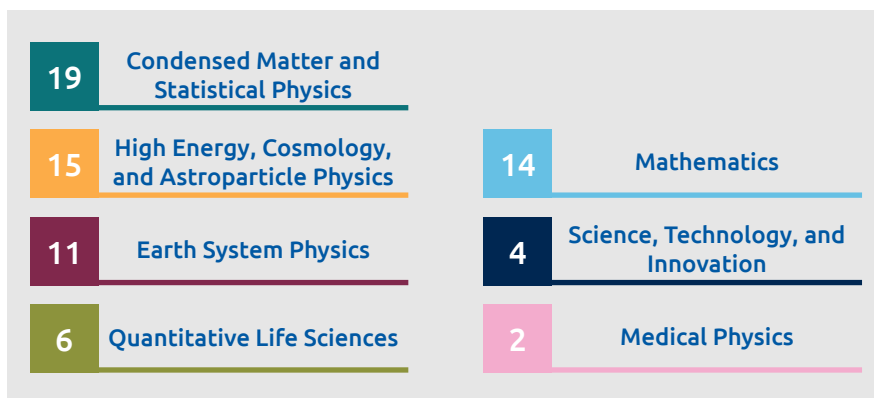
Ralf Kaiser
*Senior Coordinator
Programmes and Advancement*

Key Figures

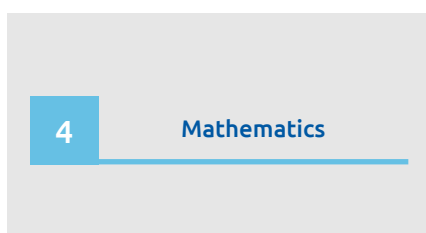


71 Associates **7** PhD Students **28%** Female **23** Countries

Associates Fellowships



PhD Fellowships



Programmes supported by the Simons Foundation

Associates Programme

Since its creation in 1964, the ICTP Associates Programme has granted more than 3000 Associateships to scientists coming from all over the world and working on a broad spectrum of topics in mathematics and theoretical physics, ranging from high-energy astrophysics to medical physics. The Programme supports regular visits to ICTP from individual scientists at different stages of their careers after their PhD who are also given the opportunity to bring their younger collaborators with them – master's and PhD students or postdoctoral researchers.

The Simons Foundation has been supporting the ICTP Associates Programme since 2014. Until 2024, the Foundation will have funded more than 200 visits from 71 associates and about 60 of their young collaborators. They have come to Trieste from 20 different countries to benefit from ICTP's international, top-notch scientific environment.

As a result of the interactions and collaborations they have built at ICTP, or simply because of the tranquillity they could rely on while at the Centre, ICTP Associates have published almost 800 publications. The ripple effects of the Associates Programme, however, go much farther: ICTP Associates, all active scientists in their countries, play a major role in building local scientific communities, enhancing physics and mathematics education at all levels, and planning research projects related

to the specific needs of their region.

PhD Programme

ICTP joins forces with the International School for Advanced Studies (SISSA), a post-graduate education and research institution in Trieste, to provide students from developing countries with the opportunity to obtain a doctoral degree from a high-level institution, recognised worldwide.

Students who are accepted in the ICTP-SISSA programme are supported over four years and get the opportunity to work under the supervision of one of ICTP's or of SISSA's researchers to carry out original work in their field of interest.

The Simons Foundation has funded 7 doctoral fellowships so far. All of them were former ICTP Diploma students who went on to start a PhD. The first students to be supported were Alaa Elshorbagy, a mathematician from Egypt, and Deepak Karki, a condensed matter physicist from Nepal. Both successfully defended their theses in 2019. Elshorbagy continued her path in research, first in Czechia, then in Germany and in Egypt, before deciding to embark on a career in data science in Germany; Karki became a postdoctoral fellow at BAQIS Institute in China and then a postdoctoral researcher at Argonne National Laboratory in the US.

Five more PhD students have been funded by the Simons Foundation and are still completing their PhDs. Asem

Abdelraouf of Egypt, and Hamza Ounesli of Algeria are both specialising in mathematics, while Poetri Tarabunga of Indonesia and Mikheil Tsitsishvili of Georgia are specialising in condensed matter physics. All of them will defend their theses in 2024 and some of them already have postdoctoral positions awaiting them: Ounesli will do his postdoc at ICTP, Tarabunga at the Technical University of Munich, in Germany, and Tsitsishvili at Heinrich Heine University in Düsseldorf, Germany.

Ajay Gautam of Nepal started his PhD in 2021 and is expected to finish in 2025. He specialises in mathematics.

Scientists at risk

ICTP is committed to science as a global endeavour and in carrying out its mission, over the years it has built a strong network of scientific relationships that cross economic, political and national boundaries. The support of the Simons Foundation has been key to strengthen ICTP's efforts to support mathematicians and theoretical physicists who find themselves under political or physical threat. Since 2022, the Foundation has supported five researchers at risk: a PhD student, a postdoctoral researcher and three scientists, who could carry out their collaborative research in the peaceful and stimulating environment of ICTP, producing papers, building external collaborations and participating in scientific events both at ICTP and elsewhere in Europe. ■

Milestones



1964

Founding of ICTP

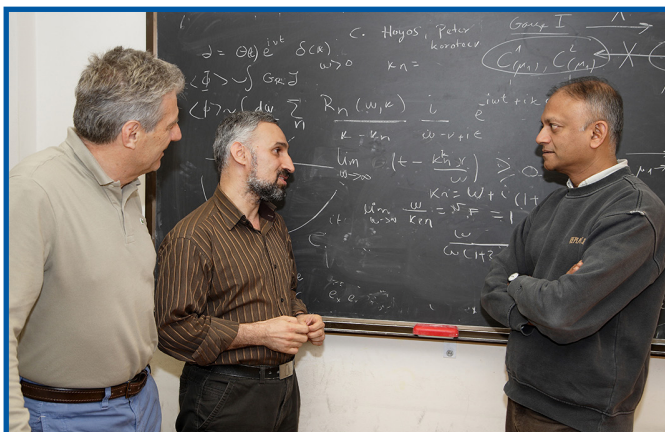
Nobel Prize laureate Abdus Salam founds ICTP and launches the Associates Programme.



2015

James and Marilyn Simons visit ICTP

On this occasion they meet then ICTP Director Fernando Quevedo and several Simons Associates.



2014

Start of Partnership

The Simons Foundation starts supporting the ICTP Associates Programme and PhD Programme.



2020

Renewal of Partnership

The Simons Foundation extends its support of the ICTP Associates Programme and PhD Programme.

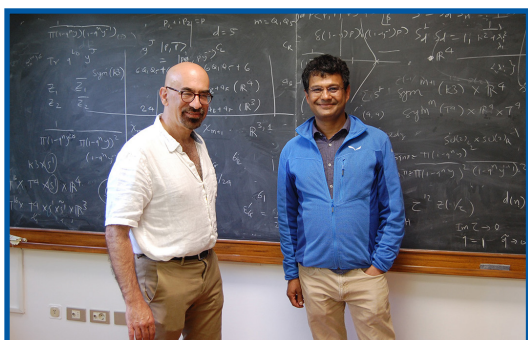
(Yasaman Farzan, Simons Associate)



2023

ICTP event hosted by the Simons Foundation

Atish Dabholkar in conversation with theoretical physicist Edward Witten at the Flatiron Institute.



2021

David Spergel visits ICTP

The President of the Simons Foundation meets ICTP Director Atish Dabholkar and the ICTP community.

2024

Celebrating Milestones

This year marks the Associates Programme's 60th anniversary and 10 years of partnership with the Simons Foundation.



Moustapha Mouhamed Fall

Simons Associate 2014-2019
Senegal



Moustapha Mouhamed Fall arrived at ICTP as a young diploma student. After acquiring research experience across Europe, he set out to build the research community he had always dreamt of in Senegal, his home country. He is now the President of the Senegalese section of the African Institute of Mathematical Sciences (AIMS), a pan-African network of mathematics research centres aiming to provide Africa's most talented students with the skills they need to become innovators and drive the future of the continent.

Fall was still a young student in mathematics when he was admitted to the ICTP Diploma Programme in 2004. "It was a life-changing experience for me. At ICTP I found colleagues from Iran, Cameroon, Indonesia, Sudan, Vietnam, and the Philippines. We all had very different backgrounds and soon found out that to succeed in what revealed to be a very challenging training programme we needed not only to work hard, but also to help each other and work as a group. These skills turned out to be incredibly useful in my career".

The programme led Fall to being admitted to SISSA International School for Advanced Studies in Trieste for his PhD. "I was only the second person from Africa to succeed the entrance exam to SISSA. That wouldn't have been possible without all that I had learnt during the diploma programme".

After his PhD Fall held postdoctoral positions in Belgium, Germany and Italy, before returning to Senegal, at AIMS. "Deciding to go back to Senegal was not easy.

After spending so many years in Europe, I worried about the lack of infrastructures and of an environment conducive to research, but I decided to take on the challenge to create the right conditions for scientists to thrive in Senegal".

In 2014, only one year after having gone back to Senegal, Fall obtained a Simons Associateship. "Thanks to the programme, I could bring two of my students to ICTP. They had never been abroad and this opportunity helped them experience the international environment of ICTP, build collaborations and present their work to the community".

Being able to visit other research institutes, where to set his many administrative duties aside, remains very important for Fall, and something the ICTP Associateship made possible. "Even when you can count on a good scientific environment at home, having the possibility to go abroad, focus on research and build international collaborations is essential, and the Simons Associateship allows for this".

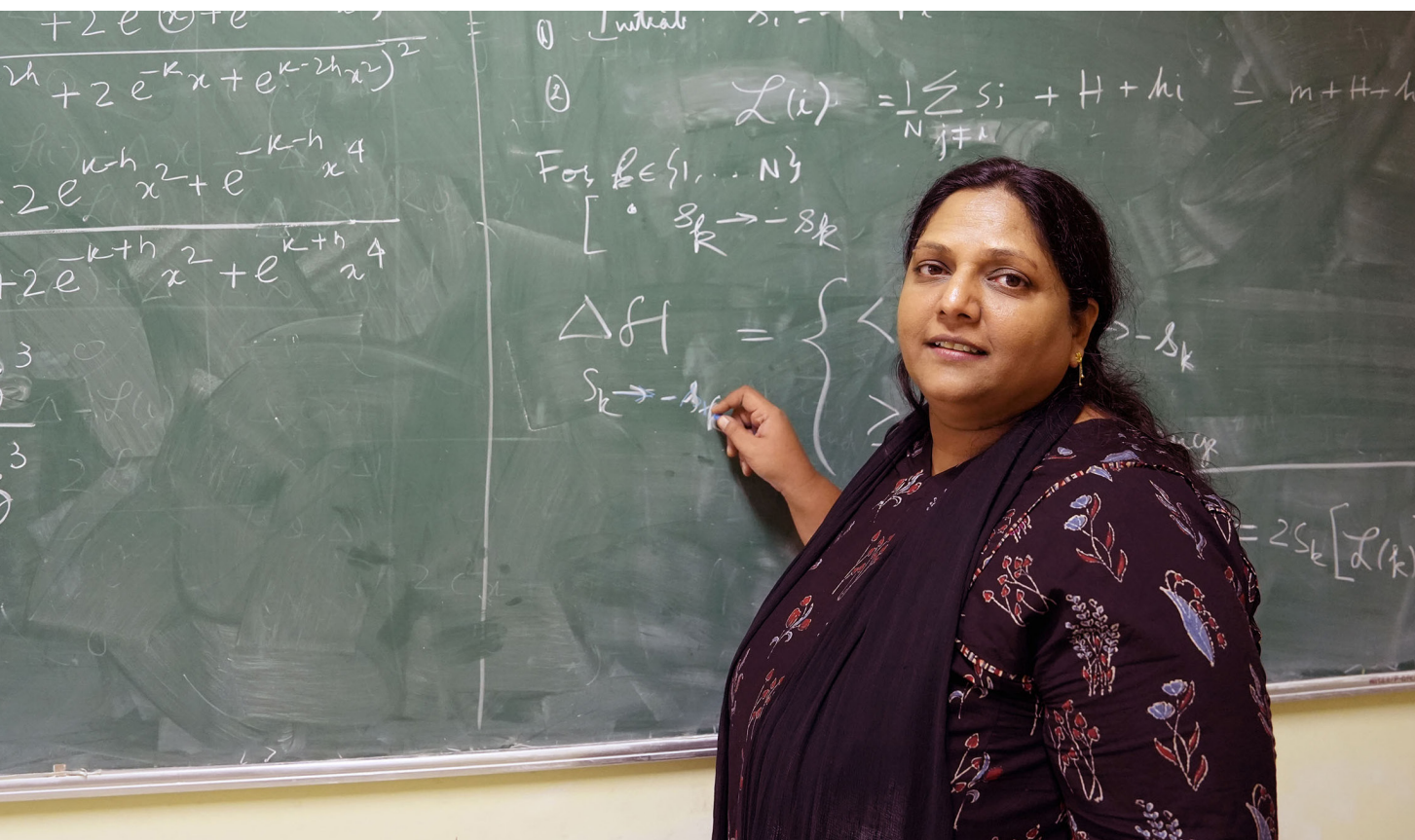
"We all had very different backgrounds and soon found out that to succeed we needed not only to work hard, but also to help each other, work as a group. These skills turned out to be incredibly useful in my career."

Fall's work has been recognised internationally. He was an invited speaker at the 2018 International Congress of Mathematicians in Rio de Janeiro, he is a member of the International Mathematical Union's Executive Committee, and of the European Mathematical Society's Committee for Developing Countries. In 2022 he received the Ramanujan Prize, which is awarded every year by ICTP and the International Mathematical Union to a young mathematician from a developing country, who has conducted outstanding research.

"The prize has been very important for my career, and also for Senegal and for science in Africa. That the prize was awarded to an African mathematician, as it had not been the case for a very long time, showed that Africa can contribute to research in mathematics at a very high level".

Sumedha Sumedha

Simons Associate 2020-2025
India



Sumedha Sumedha defied the sense of isolation she experienced when she moved back to India after many years abroad by embracing new research topics and strengthening her relationship with the ICTP community. She has been a reader at the National Institute of Science Education and Research (NISER) in Bhubaneswar, India since 2010. She has also been a Simons Associate in the ICTP's Quantitative Life Sciences section since 2020.

With a passion for interdisciplinarity, Sumedha immediately felt at home when she first visited ICTP, at the end of her PhD, which she attended at the Tata Institute for Fundamental Research in Mumbai. “When I arrived at ICTP, I was impressed by the number of physicists working on a large variety of topics and gathered in the same place,” she explains.

After her PhD, Sumedha developed important experience as a postdoctoral researcher both in Europe and in the United States. “By the time I finished one year of postdoc at Brandeis University in 2010, both my husband and I had received a job offer from the same institute in India. We always knew that we wanted to go back and moved to India very quickly once we were offered the job. I have been at NISER since,” she recounts.

Moving with her partner to a new place in India and starting a family came with challenges and for some time it was difficult for Sumedha to be fully immersed in her research. She did not give up and was soon able to find new lines of research: “What I like the most about statistical mechanics is that it allows one to contribute to remarkably diverse fields. I decided to embark on new research challenges, first by looking into disordered systems and then even by collaborating with colleagues in high energy physics,” she says.

It is at that point in her life that she decided to visit ICTP again. “A background in statistical physics provides me with a variety of techniques that I can apply to different topics, but that is not enough. To make meaningful contributions it is also essential to understand what the relevant problems are and that becomes

easier when you can attend conferences and interact directly with researchers who have been in the field for longer,” Sumedha explains. “During a short visit to ICTP in 2019 I could distinctly perceive what an impact ICTP could have on my work and I realized how much I was missing”.

“Being surrounded by so many people enthusiastic about science and willing to share their knowledge has been a boost for my confidence and it has encouraged me to continue my work.”

This experience motivated Sumedha to apply for Simons Associateship, but because of the pandemic, she had to wait until 2023 to be able to visit ICTP again. “I was there for a month, and during that time two very high-profile conferences took place. One was in biophysics and the other was in data science, two very promising research areas in which statistical mechanics can make important contributions,” she says.

During that visit, Sumedha also had the opportunity to present her work to the ICTP community, receiving positive feedback and expressions of interest. “Being surrounded by so many people enthusiastic about science and willing to share their knowledge has been a boost for my confidence and it has encouraged me to continue my work. I am looking forward to my next two visits and to the progress I will make in my research thanks to them.” she concludes. ■

Working in a small university in Chile means that our research group is very small and that the nearest geometer lives a two-hour flight away. Spending some time at ICTP has been a great opportunity for me and especially for my PhD students, whom I saw mature as mathematicians already in the space of only one month.

“ ”

Elizabeth Gasparim, Brazil
Simons Associate 2014-2019



Thanks to my Simons Associateship I was able to set up a collaboration with two ICTP associates, one from Morocco and the other from Iran. This helped us to establish a multidisciplinary bilateral project between Tunisia and Morocco, which involves physics, chemistry and biology.

“ ”

Sonia Haddad, Tunisia
Simons Associate 2014-2019

The Simons Associateship has been an incredible booster for the young scientist from developing country that I am. It showed me that it is possible for children who grow up in low-income countries to succeed if they work hard. I am very grateful for all the opportunities that have come my way thanks to the Simons Associateship, including the chance to discuss with Jim and Marilyn Simons in Trieste.

“ ”

Etienne Wamba, Cameroon
Simons Associate 2014-2019

ICTP serves as an invaluable meeting place for researchers from the developing world. Gaining insights into the experiences of other colleagues who face similar challenges can be enlightening. ICTP takes the responsibility of building and keeping these bridges that are connecting science worldwide; a common bridge connecting minds without frontiers.

“ ”

Luis E. F. Foà Torres, Chile
Simons Associate 2020-2025

Poetri Sonya Tarabunga

Simons PhD Student 2020-2024
Indonesia



Poetri Sonya Tarabunga, a young researcher from Indonesia, is deeply passionate about quantum many-body systems. Despite the challenges of being a diploma student at ICTP during the COVID-19 pandemic in 2020, she emerged as the top student of her year and gained acceptance into the joint PhD program run by ICTP and SISSA, supported by the Simons Foundation. Now in the final year of her PhD, she has an impressive track record of publications and has already secured a postdoctoral position at the Technical University of Munich, one of the leading institutions in her field.

Tarabunga started the ICTP Postgraduate Diploma Programme in 2019 and for her final project, she concentrated on a problem about quantum entanglement. That first project inspired her to embark on a PhD under the supervision of Marcello Dalmonte, a research scientist in the ICTP's Condensed Matter and Statistical Physics section, and to continue studying quantum many-body systems, which are her main topic of interest. "In my research, I look at how quantum properties lead to novel collective behaviours, developing state of the art computational techniques. This has got many interesting applications, for example in quantum computing," she says.

A few months into her PhD she already had enough results for her first research article. During her four years as a PhD student at ICTP, she worked on 9 different publications, 7 of which have already been accepted in peer-reviewed journals, while the others are in review.

"Poetri has been the leading author of most of her papers, including three published in top-notch peer-reviewed journals, such as Physical Review Letters and Physical Review X Quantum," Dalmonte explains. "She has developed knowledge in a broad range of topics in theoretical physics, with her works spanning several aspects of quantum many-body physics: from providing theoretical explanations of ground-breaking experiments, to developing advanced computational algorithms, and discovering how quantum resources typically associated to quantum computing can be directly linked to collective phenomena such as

phase transitions," he continues.

"The highlight of Poetri's PhD has been the development of computational methods to evaluate "quantum magic" - a fundamental property of quantum computers, that until last year had eluded most computational approaches. These achievements speak loud about the uncanny combination of creative thinking and strong computational background acquired during her PhD," Dalmonte adds.

"ICTP has seen Poetri grow from a promising student to an independent and strong young researcher with a broad background and an impressive track record."

In addition to the ones she forged at ICTP, Tarabunga also established collaborations with researchers in other research institutes, for example while visiting the University of Cambridge, as part of her PhD. In addition to collaborative work, she published a single-author paper, which is incredibly rare for researchers at the early steps of their careers.

"ICTP has seen Poetri grow from a promising student to an independent and strong young researcher with a broad background and an impressive track record – as testified not only by her publication list, but also by the very strong attention her work is attracting within the physics community," Dalmonte concludes. ■

Nataliia Manko

ICTP Postdoctoral Researcher 2022-2024
Ukraine



Nataliia Manko arrived at ICTP from Ukraine in June 2022. Upon joining the ICTP community, she contributed her programming skills to a research project that has resulted in a paper currently under review by one of the most important international science journals. With a newly-found enthusiasm in research, and despite the challenges her family has been going through, she has recently joined the University of Trieste as a postdoctoral researcher.

Manko arrived at ICTP from Ukraine just a few months after the start of the full Russian invasion of Ukraine, thanks to the intermediation of Ali Hassanali, Senior Researcher at ICTP. In her home country, she was a senior lecturer at Sumy State University, located in a small city in the north-eastern part of Ukraine, which was surrounded by the Russian army at the beginning of the war. "Those first months were really hard and as soon as the territory was liberated in April 2022, I started looking for ways to leave the country with my two children," she explains.

Manko then contacted Ali Hassanali, a research scientist at ICTP, whom she had met and collaborated with about eight years before, while she was a PhD student in Ukraine. Acting in concert with the ICTP Programmes and Advancement unit, Hassanali operated quickly to have Manko come to ICTP, first as a TRIL fellow and then, once the Centre was able to secure specific funding from the Simons Foundation, as a postdoctoral researcher.

"I arrived in Trieste with my two kids, who at the time were six and two years old, and with my mother. None of us spoke Italian, but with the help of many people at ICTP I was soon able to find an accommodation and a school for my children who had to adapt to a country that was completely new to them," Manko explains.

After her PhD, Manko had found a permanent position as a lecturer at her home university but during the past few years, while on maternity leave, she had also trained as a programmer. At ICTP, she took up a collaborative project drawing on her skills in software development. "We set out to investigate one of water's most peculiar properties: the presence of a second critical point in supercooled water involving a transition between a high-density and low-density phase," Hassanali, who led the collaboration, recounts.

"Nataliia refined our collection of numerical tools into a very efficient and modular Python script that automatically identified changes

in long-range orientational order and hence polarization within the low-density phase. If these features end up being true, it could open up new experimental and theoretical directions to search for the second critical point in water using dielectric probes," Hassanali continues.

These findings are so striking that they resulted in a publication currently under review at the prestigious journal Proceedings of the National Academy of Sciences (PNAS). "Nataliia is an extraordinary example of a researcher who, despite coming from a distressed region, in a very short time was able to work hard and put her skills to service to a collaboration that also resulted in an important research output," Hassanali concludes.

"Being fully immersed in the international community of ICTP and feeling that I could contribute in many ways helped me go through the difficulties of being away from my husband and with my country at war"

With still much uncertainty in the future of Ukraine, Manko does not know when and if her family will be able to re-settle in Ukraine, but her experience at ICTP has made her confident that she can find her own way in science and that more opportunities will come her way. "Being fully immersed in the international community of ICTP and feeling that I could contribute in many ways helped me go through the difficulties of being away from my husband and with my country at war," Manko says, adding "Now I know that there are many possibilities out there, especially for physicists like me. Trieste is a really good place to do science, and my children like it here, we will see what the future brings."



Acknowledgments

ICTP expresses its deep gratitude to the Simons Foundation for its support over the past ten years.

The Simons Foundation's generous funding has been instrumental in the success of the ICTP Associates Programme and the PhD programme that ICTP runs jointly with SISSA. Both these programmes have provided important opportunities for scholars from around the world to advance their education and research, and this report provides only a quick glimpse of the far-reaching impact that they have had on the lives of many scientists.

The 71 associates, the 7 PhD students and the 5 scientists at risk who have visited ICTP thanks to the Simons Foundation will impact as many research communities spread across the developing world, inspire more students and give rise to yet new collaborations that will push the boundaries of knowledge.

By supporting the Associates Programme, by funding scholarships for PhD students and by supporting scientists at risk, the Simons Foundation has provided accomplished scientists and early career researchers with opportunities to participate in the high-level scientific environment of ICTP, thus helping the Centre achieve its mission.

Together, ICTP and the Simons Foundation have impacted science at a truly global scale and ICTP is immensely grateful to the Simons Foundation for having been such an invaluable partner in overcoming the barriers of gender, ethnicity, geography, economics in science, thus making fundamental research a truly inclusive endeavour. We look forward to more common projects and more years of fruitful collaborations. ■



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