



hcm NEWS 2/2022



New Hausdorff Chair: Ana Caraiani

Ana Caraiani has accepted our call for a Hausdorff Chair and will take up her position in September. Since the Hausdorff Center was founded, these additional W3 professorships have been filled with outstanding international scientists on a candidate-driven basis. The 37-year-old Romanian is the first woman in this position and complements the circle of excellent mathematicians around Massimiliano Gubinelli, Stefan Müller, Sven Rady, Peter Scholze, and Christoph Thiele.

new colleague in Bonn: "With Ana Caraiani, a world-leading scientist in arithmetic geometry comes to Bonn. We have already worked together a lot in the past, on questions in the Langlands program and especially on the cohomology of Shimura varieties. I'm very much looking forward to continuing this work, and especially to organizing seminars and other events together," says Peter Scholze.

Langlands program – Close Cooperation with Peter Scholze

Ana Caraiani has already got close ties to Bonn: In 2016 she became a Bonn Junior Fellow. In 2017, she moved to Imperial College London as a Royal Society Research Fellow and Lecturer and has been associated with us as a Bonn Research Fellow ever since. Since 2021, Ana Caraiani has been a full professor at Imperial College London. Ana Caraiani works at the interface between the Langlands program and arithmetic geometry. In recent years, she has co-authored many of her papers with Peter Scholze who is very happy about his

Enthusiastic About Fostering the Next Generation

In 2018, Ana Caraiani was one of the winners of the Whitehead Prize of the London Mathematical Society. In 2020, she was elected a Fellow of the American Mathematical Society and was awarded the 2020 EMS Prize. Ana Caraiani is one of the organizers of the trimester program "The Arithmetic of the Langlands Program" to be held at the Hausdorff Research Institute for Mathematics (HIM) in the summer of 2023. She is enthusiastic about fostering the next generation and organizes, together with Jessica Fintzen, a conference Community-building in the Langlands Program (CLAP) prior to this trimester program. In this CLAP conference, early career

researchers, in particular those from groups that are under-represented in mathematics, and those who have been particularly affected by the pandemic, are encouraged to apply.

Exceptional Environment at Bonn

Speaking of Jessica Fintzen: The fact that her colleague has also accepted a call to Bonn was one of the reasons for Ana Caraiani to come to Bonn. “I was really excited that Jessica Fintzen was recruited to come to Bonn around the same time as me, this played an important part in my decision.” But of course, the excellent reputation of Bonn mathematics and its students attracted her as well, as Ana Caraiani emphasizes: “Bonn is one of the best places in the world to do arithmetic geometry and I am particularly excited by the chance to be colleagues with Peter Scholze, who has already had such a great impact on pure mathematics. In addition, I think the students in Bonn (from Bachelor’s all the way to PhD) are extremely strong and I look forward to interacting with them. My three current PhD students have all been Master’s

students in Bonn and I think they all look forward to coming back to this exceptional environment.”

The fact that she is the first female Hausdorff Chair does not impress her too much: “To some extent, I feel that it doesn’t matter so much who is the first, but rather what matters is to create the right environment and opportunities so that there can be many more to come.”

Please find [here](#) a detailed interview with Ana Caraiani about her life and work, which was published in the Quanta magazine.



HAUSDORFF PEOPLE



Martin Nägele joined the Hausdorff Center for Mathematics as a Postdoc in the group of Jens Vygen. During his PhD at ETH Zurich under the supervision of Rico Zenklus, his research focus was the development of efficient algorithms for combinatorial optimization problems. During his time as a Postdoc, he would like to continue working in that direction. Besides the interest in new and better theoretical results, he is also driven by developing and implementing strong algorithms for practical problems such as planning routes for delivery services.

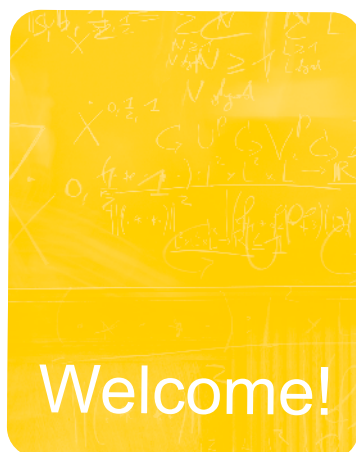


Kelin Luo joined the HCM as a postdoc in January 2022 and she is now working in the group of Heiko Röglin. She obtained her PhD at XJTU China, under the supervision of Yinfeng Xu and Thomas Erlebach in June 2019, and received a EuroTechPostdoc scholarship to join the department of mathematics and computer science at the Eindhoven University of Technology as a postdoc until December 2021. Her research focuses on combinatorial optimization, especially online algorithms and approximation algorithms with particular applications for shared mobility problems. She is also interested in clustering problems and general network design problems.

Jessica Fintzen joined the Institute for Mathematics as a W3-Professor. She obtained her PhD from Harvard University and has spent time as a postdoc at the University of Michigan, the Institute for Advanced Study and at Trinity College, University of Cambridge. Since 2020 she has been an Assistant Professor at Duke University and a Royal Society University Research Fellow and Lecturer at the University of Cambridge.

Jessica Fintzen’s research concerns the representation theory of p -adic groups and related topics including various incarnations of the Langlands program. Her research in Bonn will be supported by an ERC grant. Jessica Fintzen will be teaching an Advanced Topics course in algebra on Bruhat–Tits theory this semester and together with Ana Caraiani she will organize the conference “Community-building in the Langlands Program (CLAP)” in Bonn in August. Jessica Fintzen is excited to join the vibrant math community

in Bonn. Outside of math she enjoys doing gymnastics and hopes to find a place in or near Bonn to restart this hobby after a break imposed by the pandemic. If you know about nice gymnastics opportunities, please reach out to her.



HAUSDORFF PEOPLE

ERC Starting Grant for Tobias Barthel

Tobias Barthel, an advanced researcher at the Max Planck Institute for Mathematics (MPIM) at Bonn, has received a prestigious ERC Starting Grant for his project on the “spectral geometry of higher categories”. The total budget of the grant is 1.5 million euros for the project duration of 5 years.

The European Research Council (ERC) is the premier European funding organization for excellent frontier research. It funds creative researchers of any nationality and age, to run projects based across Europe. The ERC offers four core grant schemes: Starting Grants, Consolidator Grants, Advanced Grants and Synergy Grants. The ERC is led by an independent governing body, the Scientific Council. Its prestigious grants are awarded annually. ERC Starting Grants are for researchers with 2-7 years of experience since the completion of their PhD, a scientific track record showing great promise and an excellent research proposal.

Tobias Barthel is a W2 Research Group Leader at the Max Planck Institute of Mathematics in Bonn, one of



the six institutes that form our Hausdorff Center for Mathematics. He is interested in homotopy theory, tensor-triangular geometry, and their various interactions with other areas of mathematics (see here for a list of his publications). He finished his PhD thesis under the supervision of Mike Hopkins in 2014, then spent the following years as a postdoc in Bonn as well as at the University of Copenhagen, partly supported by an EU Marie Curie Individual Fellowship. Tobias Barthel is one of the organizers of the Trimester Program “Spectral Methods in Algebra, Geometry, and Topology”, which will take place in our Hausdorff Research Institute for Mathematics (HIM) starting in September.

[Here](#) you can find the official announcement of the ERC starting grants results.



Wolfgang Lück holds the Euler Lecture 2022

The HCM spokesperson Wolfgang Lück will hold the Euler Lecture in Berlin on May 20, 2022. The prestigious event will take place for the 29th time. The title of his lecture is “A panorama of L2-invariants”. The Euler Lecture in Sanssouci is a Mathematics lecture and a festive occasion. It is organized jointly by the Math Institutes of Berlin and Potsdam, as well as local mathematical associations and organizations, and takes place once a year. The event is named after Leonhard Euler (1707-1783). The speakers are chosen by a distinguished and independent jury. Previous lecturers include the Fields Medalists Michael Atiyah, Martin Hairer, David Mumford, Cédric Villani, and Wendelin Werner.

HAUSDORFF PEOPLE

Florian Schweiger Receives the Hausdorff Memorial Prize

The Mathematics Department awards Florian Schweiger the Hausdorff Memorial Prize for the best PhD thesis in mathematics in the academic year 2020/2021. The honor celebration – which again could only take place virtually this year due to the Corona pandemic – was held on January 19 by the chair of the Department, Anton Bovier, subsequent to the Hausdorff Colloquium.

In his PhD thesis, Florian Schweiger has dealt with a number of difficult problems in the borders between analysis, probability theory, and statistical mechanics. In statistical mechanics, the measured quantities in a system of finite volume are subject to random fluctuations. If the system is enlarged and the number of particles and the volume go to infinity so that the density remains constant, this is known as the thermodynamic limit. In this way, the statistical fluctuations disappear and thermodynamic state variables are obtained in the limiting case. A central question in the PhD thesis of Florian Schweiger is to understand the behavior of discrete elastic membranes in this thermodynamic limit. The deformation of such a membrane is described by a function defined on a discrete, d -dimensional hypercube. Each such function is associated with an energy that depends on the squares of the second derivatives of this function. This is associated with a probability distribution on the space of these functions, called the Gibbs measure. The central question is how large are the fluctuations of typical functions under this measure when the side length of the hypercube tends to infinity. While many results were already known for dimension 1 and dimensions larger than 4, Florian Schweiger has obtained significant breakthroughs in his work for the dimensions 2,3 and 4. Particularly noteworthy is his extremely precise result for the behavior of the maximum in the critical dimension 4, showing that the model falls into the currently much-noticed class of so-called log-correlated fields. Remarkable is the broad methodological spectrum, which Florian Schweiger handles with great elegance and technical skills. Florian Schweiger was supervised by Stefan Müller at the Institute of Applied Mathematics.

Every year the Hausdorff Memorial Prize is presented in honor of Felix Hausdorff around his death day, the 26th January, during the Hausdorff Colloquium. Every professor and private lecturer may make a nomination. The final decision is made by a jury appointed by the Mathematics Department. The award consists of a 500 euro prize money and a book prize.



Honoring Bachelor Graduates by the Bonn Mathematical Society

After the award of the Hausdorff Memorial Prize, the “Bonner Mathematische Gesellschaft” honored the best bachelor theses in mathematics with 200 euros, as every year. In the academic year 2020/2021, the following Bachelor graduates were honored:

Lars Becker, “*The Falconer Problem*”,
supervisor: Pavel Zorin-Kranich

Moritz Hartlieb, “*A reconstruction theorem for varieties*”, supervisor: Daniel Huybrechts

Jan Holstermann, “*Brunn-Minkowski Inequality with Gaussian Measure*”, supervisor: Pavel Zorin-Kranich

Daniel Perniok, “*Unzerlegbare Darstellungen der Lorentz-Gruppe und Köcherdarstellungen*”, supervisor: Igor Burban

Vanessa Ryborz, “*Properties of Solutions of a System of Partial Differential Equations with Singular Data*”, supervisor: Sergio Conti

Pascal Steinke, “*Sobolev inequalities: Trace style*”, supervisor: Franz Gmeiner

HAUSDORFF EVENTS



Grow@Bonn 2022

The Graduate Research Opportunities for Women at Bonn Conference (GROW@Bonn 2022) was excellently organized by our young junior scientists*. GROW@Bonn was aimed at female, non-binary, and diverse students who wanted to learn about opportunities for mathematics PhD studies and other career paths. The conference was open to students from universities in Germany and neighboring EU countries, including

international students. Lectures, panel discussions on mathematical research, networking opportunities, and advice on preparing applications for graduate schools (master's and doctoral) were offered. The plenary speaker was Ulrike Tillmann, the new director of the Isaac Newton Institute and long-time chair of the HCM SAB Board.

Walk in Honor of Felix Hausdorff

Three days after the 80th anniversary of Felix Hausdorff's death, we held a three-hour walk in his honor. Walter Purkert as a Hausdorff expert and Stefan Hartmann as the organizer participated this walk together with 15 visitors. We started at the former home of Felix Hausdorff, at Hausdorffstraße 61. Walter Purkert delighted us with exciting and entertaining anecdotes from Felix's life as a mathematician, philosopher, and essayist. Afterwards we took a walk to the grave of the Hausdorff family at the Poppelsdorf cemetery. During a stopover at the HIM, visitors were able to take a look at the guest offices, the garden, and the historic bathtub. Finally, we visited our Math Center. There we told the guests not only about the architecture but also about our research. A great event that was a lot of inspiration for us, as it certainly would have been in the spirit of Felix Hausdorff.



HAUSDORFF EVENTS



Science Rally and “Schülerinnen-SchnupperUni”

Do circles always have to be round? And how do you encrypt and decrypt a message with the Enigma? Together with many curious high-school students, the HCM school team got to the bottom of such questions during the (virtual) science rally around Poppelsdorf. The young explorers found a “square” circle in the Manhattan metric and deciphered the word “math”, for example. As always, we had a lot of fun – and so did the more than 100 students who participated that day! This was also true for the many participants of the “Schülerinnen-SchnupperUni”, an offer exclusively for girls. After a short virtual excursion into mathematics in Bonn, the

schoolgirls were given an insight into the way mathematicians think and work at the university, using mathematical logic as an example. Information about studying mathematics and an outlook after graduation were also provided. We are very pleased that we were able to win mathematicians from Bonn for all three workshops: Meike Neuwohner, Franca Hoffmann, and Clelia Albrecht, who gave the students an insight into their work and were available to answer questions about their studies and the time afterwards. Many thanks to all involved!

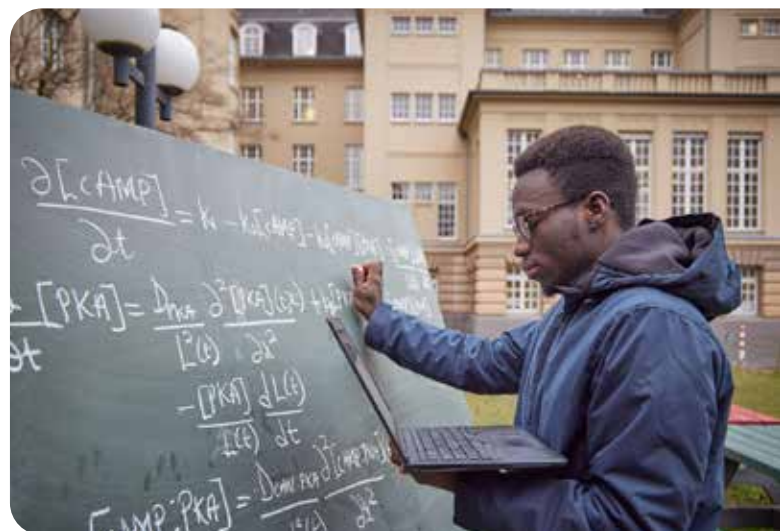
Start of the YAM program

Sefah Frimpong, the first person to receive a scholarship under the YAM program, spent October to December 2022 studying and researching at the Hausdorff Center for Mathematics (HCM). His conclusion:

“Above all, it is fascinating to have so many experts from different areas of mathematics in one place. There is always someone you can turn to with any problem.”

You can find the entire [interview](#) on the pages of the University of Bonn. The Bonner General-Anzeiger also reported in a large article.

YAM enables young, talented and highly motivated African graduates of the African Institute for Mathematical Sciences (AIMS) to get to know the HCM in Bonn and immerse themselves in a field of academic and research excellence. This insight into a highly skilled international research environment is intended to have a lasting influence on their continuing personal and professional development. The young mathematicians go through a competitive selection process in which each AIMS center nominates two graduates and presents them to the selection committee. The motivation and commitment of the nominees are also particularly important selection criteria alongside their academic track record. Ultimately, three



candidates are chosen to receive the scholarship and invited to Bonn for one to six months within the space of a year. As well as offering close academic and personal supervision, the scholarship also covers travel expenses.

For the initiator of the YAM program, Franca Hoffmann, Bonn Junior Fellow at HCM, the unifying element of mathematics between different disciplines and cultures is of extraordinary importance. She reported on it in detail in the Newton Institute podcast. You can listen to the interview [here](#).

HAUSDORFF MIXED

European Girls' Math Olympiad (EGMO): Four medals for Germany

At the European Girls' Mathematical Olympiad 2022 (EGMO) in the Hungarian city Eger, the German team won a gold medal as well as one silver and two bronze medals. A total of 222 young people from 57 countries took part in the top international tournament for mathematically gifted female students. As every year, the Hausdorff Center supported the selection and preparation of the German team.

Réka Amélie Wagener (11th grade) from Siegen achieved the best result of the four German starters and won a gold medal – the first-ever for the German team in the history of the tournament. A silver medal was awarded to Olesia Gaiduk (12th grade) from Berlin. Anna Leeb (10th grade, Munich) and Ruth Plümer (11th grade, Siegen) won a bronze medal.

The four members of the German team qualified for the EGMO as the best participants in the pre-selection exams for the International Mathematical Olympiad (IMO) 2022. In two four-and-a-half-hour exams, the students tackled a total of six complex mathematical problems.

The European Girls' Mathematical Olympiad (EGMO) is an international mathematics competition for mathematically



gifted schoolgirls, which is based on the International Mathematical Olympiad (IMO) in terms of form and procedure. Since 2012, more than 50 countries from around the world participate annually in the junior tournament. Each country can send a maximum of four female students to the competition. In Germany, the association "Bildung & Begabung" and the Hausdorff Center for Mathematics organize the selection and preparation of the German team.

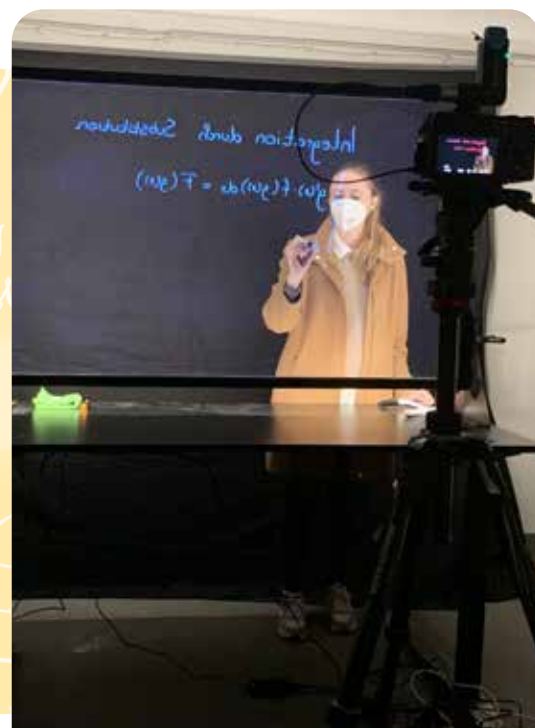
Susanne Armbruster, the head of the delegation of the German team, and her deputy Luise Puhmann are both PhD students at the Research Institute for Discrete Mathematics in Bonn. Their conclusion is extremely positive: "We are proud of the great result and the best placement of a German team in the history of the EGMO."

Two of the students, Réka Amélie Wagener and Ruth Plümer from Siegen, participate in the Bonn Math Club and in its math competition training.

More information about the tournament can be found on the [EGMO website](#)

Inauguration of the Lightboard

We purchased a lightboard for the production of learning videos for our "Fit4Math" program and our public relations work. A lightboard is a glass panel that is illuminated. You can lecture on the board while facing the audience. We activated the lightboard at the beginning of the year. Our math student Lara Sauvillie – along with other students – used the Lightboard to produce and edit videos for "Fit4Math" for the first time. You can find an example [here](#). The [online course](#) "Fit4Math" includes two basic building blocks: learning modules and tests. In the learning modules, important mathematical topics (basics in term transformation and fractions, knowledge of functions, differential and integral calculus up to linear algebra and stochastics) are presented and calculation techniques are explained using examples.



HAUSDORFF MIXED

Otto Toeplitz Memorial Endowment Fund Established

The Otto Toeplitz Memorial Endowment Fund was established on December 17, 2021, and supports research in the field of the history of mathematics. After the war, there were always professors at the Mathematical Institute who had an interest in the history of mathematics and promoted work on it. For about 30 years, the Mathematical Institute has again been one of the important sites of research in the history of mathematics, with the preparation of the internationally renowned Hausdorff Edition (10 volumes including an extensive Hausdorff biography); of the Bonn professors, Egbert Brieskorn (1936-2013), Friedrich Hirzebruch (1927-2012), and Walter Purkert deserve special mention. The Otto Toeplitz Memorial Endowment Fund has the goal of ensuring high-quality research in the history of mathematics at the Institute over the next 10 years and of familiarizing future teachers of mathematics with the history of their subject. The founder is the Munich entrepreneur Gert Purkert. The foundation was established as a so-called consumption endowment fund, i.e. the endowment capital is consumed from year to year.



News From the Bonn Math Club

News From the Bonn Math Club Outstanding talents are trained at the Bonn Math Club. Alexander Koblbauer from Bavaria has been taking part in the virtual workshops there for two years and has also received individual and intensive support through personal training. A first success: Being only 13 years old, Alexander was one of the youngest winners ever in the national mathematics competition. A few months younger is Oliver Mettin from Berlin, who became the youngest ever national winner. We can't take credit for his success, however, because he only discovered the Bonn Math Club after the colloquium. But it is not only in the promotion of excellence that the Bonner Math Club continues to develop, but also in its efforts to promote inclusion and equality. Once a month, the course for the lower grades (grades 5-8) is supported by German sign language interpreters, on a great initiative by Swetlana Nordheimer. In addition, the Bonn Math Club has again been offering regular math competition training via Zoom since March. The high proportion of girls is the flagship of the math club: for the math trip in June, almost 50% of the female participants; a quota of female participants is no longer required.

IMPRINT

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