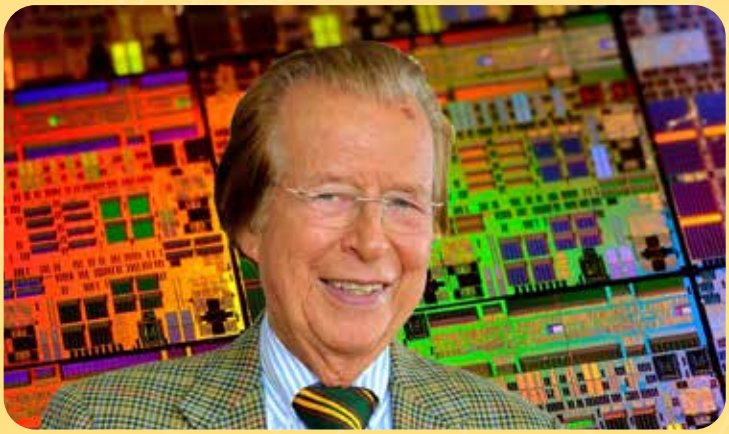
hausdorff center for mathematics

UNIVERSITÄT BONN

hcm NEWS 3/2021

Bernhard Korte receives Honorary Award "Ehrenpreis des Innovationspreises NRW"

Bernhard Korte wins the Innovation Prize of the state of North Rhine-Westphalia in the category "Honorary Award". Andreas Pinkwart, Minister of Economics and Innovation, presented the honorary award to the director of the Research Institute for Discrete Mathematics in recognition of his life's work. The award ceremony took place as part of a hybrid celebration in Düsseldorf and online.



The Innovation Prize of the State of North Rhine-Westphalia is the most important award for innovations in Germany, alongside the German Future Prize conferred by the Federal President. It is awarded annually for outstanding achievements and excellent research in three categories: "Young Talent", "Innovation", and "Honorary Award". The non-monetary honorary award is given to outstanding personalities for their life's work.

Bernhard Korte (born 1938) grew up in the Ruhr area. He studied mathematics, physics and chemistry in Bonn, where he also received his doctorate. After professorships in Regensburg and Bielefeld, he was called back to take a professorship at the University of Bonn in 1972. Since then he has received numerous appointments at excellent universities in Germany and abroad. However, he has remained loyal to the University of Bonn and has been a full professor here for 50 years. Since 1988 he has been director of the Research Institute for Discrete Mathematics. He is also the founder of the Arithmeum.

The focus of his scientific work is the usage of combinatorial optimization to solve highly complex problems. Especially in chip design, Bernhard Korte has set standards worldwide. The "BonnTools" developed under his leadership are programs with which the manufacturers of computer chips can optimize the layout of their products and thus make them energy-saving and as small and fast as possible. More than 3,000 highly complex microprocessors have already been developed with it, including the chip that won a chess game against Kasparov, and the processor from SUMMIT from Oak Ridge National Laboratory, USA; which was the fastest computer in the world for several years. The "BonnTools" have made a major contribution to technological progress in this are. There is hardy any microcomputer in today's electronic devices that does not contain know-how from the Bonn research institute. Just recently, the Hausdorf Center and the Deutsche Post DHL agreed to extend their collaboration in the field of route planning for an unlimited period.

Bernhard Korte is a member of the National Academy of Sciences Leopoldina in Halle (Saale), the North Rhine-Westphalian Academy of Sciences and Arts in Düsseldorf and the German Academy of Engineering Sciences (acatech). He has already received numerous prizes and awards for his scientific work, including the Prix Gay-Lussac/Alexandre de Humboldt of the French Republic in 1980, the North Rhine-Westphalia Order of Merit in 1993, the State Prize of North Rhine-Westphalia in 1997, and the Great Federal Cross of Merit in 2002. He has a honorary doctorate from La Sapieza, Rome, and an honorary professorship at the Academia Sinica, Beijing, and the Pontificia Universidade Católica, Rio de Janeiro.

HAUSDORFF PEOPLE

Catharina Stroppel is Plenary Speaker at ICM 2022

Catharina Stroppel will be one of the Plenary Speakers at the next International Congress of Mathematics (ICM), which will take place in St. Petersburg, Russia, from 6 to 14 July, 2022. The ICM is the most influential conference in pure and applied mathematics. Many prestigious awards as the Fields Medals are awarded during the congress‘s opening ceremony. An invitation to give a plenary lecture to the thousands of ICM participants is considered a special distinction in the mathematical community.

Catharina Stroppel is a Professor in Pure Mathematics at the Mathematical Institute and a member of the Hausdorff Center for Mathematics. Her interests include different aspects of Lie theory and representation theory, often combining geometric, algebraic and combinatorial aspects. She was a pioneer of the concept of categorification and is in particular known for the development of a Lie theoretic version of Khovanov homology. She is a member of the German National Academy Leopoldina and was an invited ICM speaker in 2010 and winner of the Whitehead Prize.

Herzlich Willkommen!

Leon Bungert is a new postdoc at HCM, working in the group of Franca Hoffmann. In 2020 he earned his PhD at the University of Erlangen under supervision of Martin Burger. His thesis ”Nonlinear Spectral Analysis with Variational Methods” was awarded the Biennial French-German Mathematics in Imaging PhD Prize. Leon’s research focusses on variational methods with applications in data science, machine learning, and imaging. This includes PDEs on graphs, regularized training methods for neural networks, and nonlinear eigenvalue problems.

Alena Weissgerber will replace Volkmar Jahn at HIM and, among other things, will take care of hotel bookings in the future. Volkmar, unfortunately, had to leave us because his wife will be working in a consulate in Romania from July. Alena Weissgerber previously worked as a travel agent and clerk in event management and can therefore bring a wealth of experience to us.

HAUSDORFF PEOPLE

Alexey Bufetov Appointed to Leipzig

The position of Bonn Junior Fellow remains a stepping stone for a career in mathematics: Alexey Bufetov recently accepted a position at the University of Leipzig. His research is devoted to the analysis of probabilistic models derived from representation theory, statistical mechanics, the field of random matrices and combinatorics. In 2018 he came to us from MIT as a BJF.

Portrait of Franca Hoffmann in the "forsch"

Together with the University communications department, we have set ourselves the goal of portraying our Bonn Junior Fellows, provided that those involved agree. We started with Franca Hoffmann. A portrait of her was published in "forsch". The article is worth reading **here**. We will publish this as well as all future portraits of the BJFs on our website.

HAUSDORFF EVENTS

"Picture a Scientist" – Stimulating Discussions

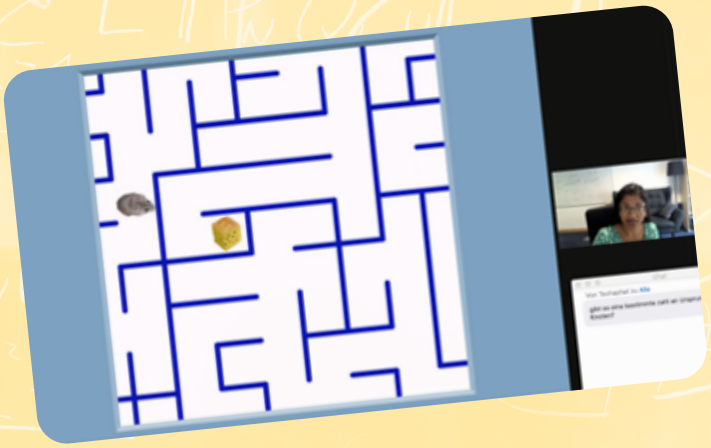
We offered all members of Bonn mathematics, including students, the opportunity to watch the film "Picture a scientist" for free. This possibility was created within the event "Celebrating Women in Mathematics", which takes place annually on May 12th. Using individual examples and cases, the film describes discrimination and harassment of women in science, but also (partly unconscious) prejudices against women scientists compared to their male colleagues. A few days later we discussed topics related to it with some interested parties via Zoom in breakout rooms: How is the situation in Bonn and how can we improve it? Which steps are necessary for more gender equality? How do you become an ally? And much more. The discussion was actually only scheduled for an hour, but when no end was in sight after two hours at the latest, it was clear to everyone: We have to repeat this – and there is still a lot to be done!

HAUSDORFF EVENTS

Girls' Day

One of our goals is to get more girls into math. That is why we take part in Girls' Day every year. This year Girls' Day took place virtually for known reasons and we had put it under the motto cryptography. The HCM school team presented, among other things, the Diffie-Hellman key exchange in workshops. Ina Prinz, the head of the Arithmeum, and our PhD student Clelia Albrecht gave exciting lectures and answered questions from the 38 participating girls about mathematics and their careers.

Bonn Math Circle – Knots, Cylinders and Tori



We regularly invite female role models to the Bonn math circle. In June, Arunima Ray from the Max Planck Institute for Mathematics was a guest. First we talked to her about her career and how she got into mathematics and to Bonn. Exciting, not just for the many girls listening today: How is a woman with a migration background doing in the mathematical research landscape that is dominated by white men?

She introduced the students to the world of knots from a mathematical point of view – a mathematical world (almost) without formulas, equations and polynomials. Aru introduced the three-color method, but also pointed out other knot invariants. In her research, Aru is interested in low-dimensional topology, and so three- and four-dimensional spaces and essential fundamental topological ideas could not be missing in her lecture.

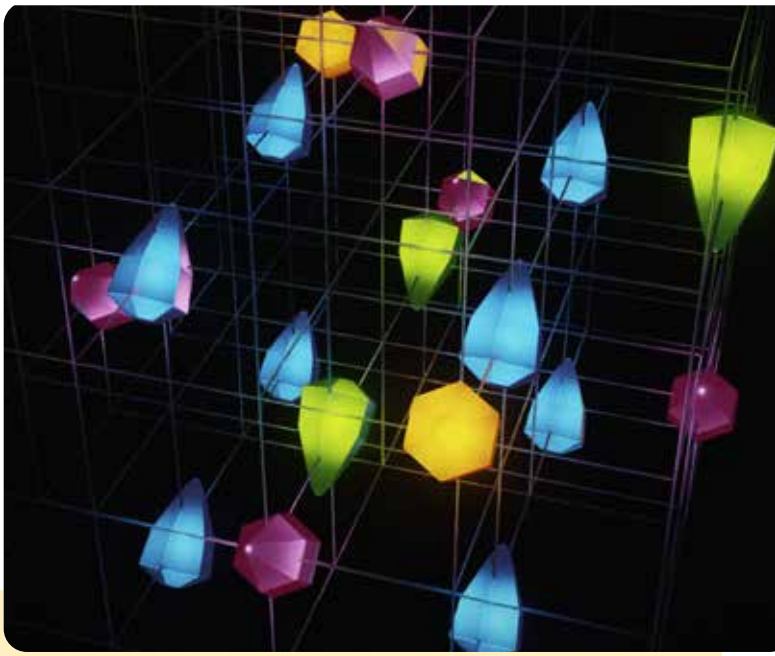
In what world does good old Pacman "live", who can go out on one side of the screen and come back in on the other? On a cylinder! And what about the mouse in the computer game in the picture? On a torus! The mouse can also go out below and come back in above. And at the end of the lecture it got physical. Which three-dimensional structures are imaginable and how can they be created? What does this have to do with knots and loops? And which three-dimensional structures are conceivable for our universe, if one takes the curvature into account? In the end, everyone was exhausted, but overjoyed to have attended this special event.

Speaking of the Bonn math club: Annette Breitbach (15) and the two 12-year-old students, Katarina Kraus and Alexander Koblbauer, who have been taking part in the virtual Bonn math circle since the beginning of the pandemic, both grade 7, achieved 1st prize in the first round of the national mathematics competition and were among the youngest prize winners at all. Congratulations!

HAUSDORFF MIXED

Shanghai-Ranking

We can easily get over the “drop” by one rank to 14th compared to the previous year: Mathematics in Bonn remains by a large margin at the top in Germany and at the top worldwide, surrounded by US elite universities.



About the Unit- and the Farrell-Jones Conjecture

In the “Quanta Magazine”, Erica Klarreich and other mathematically educated science journalists introduce from time to time research results of pure mathematics, which are usually hard accessible for non-experts. Recently, there was a very interesting **article** about the disproof of the 80 years old Kaplansky‘s unit conjecture through a computerized counterexample found by the postdoctoral researcher Giles Gardam from Münster.

The conjecture states that a group ring of a torsion-free group has no units except the trivial ones (the multiple of the group elements with the units of the rings). As the Farrell-Jones conjecture is closely related to the unit conjecture, Wolfgang Lück who has been researching this for years, was interviewed for this article and even quoted. The Farrell-Jones conjecture is sadly not as easily stated as the unit conjecture. It claims that the algebraic K- and L-theory of groups are isomorphic to certain calculable homology groups, leading to many applications to algebraic and topological problems. The Farrell-Jones conjecture also implies the famous Borel conjecture about aspherical manifolds. This is enough reason for us to investigate the concrete connection between the unit conjecture and the Farrell-Jones conjecture and how surprised Wolfgang Lück was about the counterexample to the former. Please click **here** for the interview.

Outdoor Blackboards at the Math Center

In order to promote exchange even during pandemic times, we have installed numerous outdoor boards behind the math center – based on the model at HIM. These are very popular and should continue to be used diligently after Corona. When we posted photos of it on our social media, mathematicians from all over the world replied and want to propose this idea to their home institutes as well.

HAUSDORFF MIXED

HCM Contribution for “Jugend präsentiert”

For ten years now, the “Jugend präsentiert” (“Youth presents”) student competition has been held with the aim of promoting the presentation skills of students and getting them excited about the natural sciences. The aim of the competition is to bring young people closer to scientific research. In 2021, the student competition will take place purely digitally. Unfortunately, visits to research institutions will have to be canceled. In order not to lose touch with research, the organizers have come up with a little game. At the competition final in September, the participants will give a scientific presentation on an annual changing main topic. Have the students guess the topic. For this purpose, we (like other research institutions) were asked to answer a question in a short **video** that can be assigned to the main topic of the competition in the broadest sense without revealing the topic. Thoralf Räsch explains how to count mathematically and compares – quite deliberately (!) – apples with pears. And: do you guess the topic?

Young Talented Moderators from Bonn

The 60th Mathematics Olympiad came to an end with the federal round. At the virtual ceremony, two mathematics students from Bonn conducted the live stream and turned out to be real presenter talents: Many thanks and congratulations to Vanessa Ryborz and Laurits Blank for the great show – and of course to all winners for the great successes!

IMPRINT

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