



# hcm NEWS 1/2017



## HAUSDORFF SPECIALS



## Ada-Lovelace-Prize for Nora Lüthen and Sara Hahner

December 2, 2016

Since 2010, the Institute for Numerical Simulation at the University of Bonn has annual awarded the Ada Lovelace-Prize.

The award promotes young female researchers in the area of Numerical Mathematics. The prize is named after the British female mathematician Ada Lovelace (1815 – 1852) and it honors the best bachelor’s, master’s, or doctoral theses. The endowment for the prize ranges from € 500 for the best bachelor’s degree to € 1,000 for the best master’s degree to € 2,000 for the best dissertation.

For the academic year 2015/2016, the prize was awarded to **Nora Lüthen** for her outstanding Master’s thesis “Numerical Shape Optimization of Branching-Periodic Elastic Structures” and to **Sara Hahner** for her excellent Bachelor’s thesis “Untersuchung einer inversen Abbildung zu nichtlinearen Dimensionsreduktionen mit Anwendung auf Simulations-

daten” (German). (“Investigation of an inverse mapping of nonlinear dimensionality reductions with application to simulation data”).

In her Master’s thesis, Nora Lüthen investigates complicated branching patterns which characterize optimal microstructures in elastic structures. Such geometric patterns can be observed in nature, e.g. in the fine-branched structures of bones, the so-called spongiosa. With a newly developed, efficient, and robust numerical method Nora Lüthen managed to clarify the exact shape of such structures and here, her work complements theoretical predictions.

The Bachelor’s thesis of Sara Hahner was written in cooperation with the Fraunhofer SCAI and deals with methods from machine learning to analyze numerical car crash simulation data.

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## New Horizons in Mathematics Prize awarded to Geordie Williamson

*Press release of the Max Planck Institute from December 6, 2016*

Geordie Williamson has received a New Horizons in Mathematics Prize jointly with Benjamin Elias for pioneering work in geometric representation theory, including the development of Hodge theory for Soergel bimodules and the proof of the Kazhdan-Lusztig conjectures for general Coxeter groups. Geordie Williamson had been advanced researcher at the Max Planck Institute for Mathematics from 2011 until August 2016, when he moved to a position at the University of Sydney in his native Australia.

The New Horizons in Mathematics Prize is an annual prize for junior researchers who have already produced important work. It consists of a monetary award of \$100,000. The prize was established in 2016 and is funded by Mark Zuckerberg and Yuri Milner. The prize was awarded together with the Breakthrough Prizes 2017 on December 4, 2016 at a red carpet gala ceremony in Silicon Valley hosted by Morgan Freeman.

## Millions in funding for economist from the University of Bonn

*December 16, 2016*

### Prof. Christian Bayer has received a coveted ERC Consolidator Grant

The European Research Council (ERC) awarded the economist Prof. Dr. Christian Bayer from the Institute for Macroeconomics and Econometrics and the Cluster of Excellence Hausdorff Center for Mathematics at the University of Bonn with a coveted ERC Consolidator Grant. With the grant comes 1.3 million euro in funding over the next five years. For Prof. Bayer this is already the second funding by the ERC: In 2011, he received a high-profile ERC Starting Grant.

In the project “A Unified Framework of Business Cycles and Household Portfolios: Income Risks, Asset Liquidity, and Inequality” (LiquidHouseCycle) the economist wants to investigate how portfolio decisions of individual households interact with the national economy. An example for a portfolio decision is the question, if one prefers to buy a house, to take out pension insurance, or to choose a more solvent type of investment, e.g. a savings account.

“The starting point of my project is that such investment decisions, if made by many households in the same direction, have an impact on height and composition of the total national demand”, says Prof. Bayer. In the ERC project, theoretical as well as empirical investigations will be carried out. It is central to the theoretical work to develop models that connect the interaction of business cycles, income risks of individual households, portfolio decisions, and the liquidity of asset markets, especially of the real estate market. The empirical work is about the description of an overall picture as complete as possible of the development of the household portfolios on the basis of the combination of many data sources on the distribution of income and the division of assets.

### Who benefits from the low interest rates of the European Central Bank?

“In the end, this work will enable us to understand the reaction of these portfolios to economic shocks and hence ground the theoretical work empirically”, says



## HAUSDORFF SPECIALS

the economist from the University of Bonn. The aim of the project is i.e. to better understand who benefits from measures for stabilizing the economy and who does not and if the allocation of profit and loss depends on a certain instrument of stabilization. Bayer: "My work will also help to clarify the question of who benefits from the currently low interest rates of the European Central Bank, who loses, who would be better off with an alternative politico-economic stabilization, for example low taxes or higher public expenditure, and who maybe even profit from the crisis.

Moreover, the project helps to understand how some measures suggested by a fiscal perspective can also cause considerable unintended economic side effects, because they intervene in the portfolio decisions of the households. An example would be a pension cut, which enforces higher provisions for one's retirement and with that may have a weakening effect on demand.

### Two ERC awards for the scientist

The economist from the University of Bonn already received a Starting Grant of the European Research Council in 2011. This grant supports excellent young researchers. The ERC Consolidator Grant addresses outstanding scientists who already successfully established their own research group. "The funding is central to my research activities", says Bayer. "It enables me to concentrate on the project, to engage experienced scientists and to finance young researchers, who can prove themselves."

Prof. Bayer did his diploma in economics at the University of Bonn. He received his PhD in Dortmund and did research in Milan, Florence, and at Yale. Since 2008, the 38-year-old has been a Professor for Economics at the University of Bonn and, since 2013, director of the Institute for Macroeconomics and Econometrics.

## HAUSDORFF PEOPLE



**Kohei Suzuki** is a new postdoc at the Hausdorff Center in the group of Karl-Theodor Sturm. His research field is related to stochastic analysis on metric measure spaces and Ricci curvature bounds. Until September, he worked at Kyoto University.



**Bo Wu** joined the Hausdorff Center as a new postdoc in October. He is working with Karl-Theodor Sturm. His main research interest is stochastic analysis, especially functional inequality on Riemannian path and loop space. He received his PhD from Beijing Normal University.



Since October, **Elena Pulvirenti** has been a new HCM postdoc in the group of Anton Bovier. Her research interests lie in probability theory and statistical mechanics with a focus on phase transitions, metastability and potential theory, cluster and Mayer expansion. Before coming to Bonn, she worked as a postdoc at Leiden University and the University of Crete. She received her PhD from Roma Tre University.



As of October, **Immanuel Zachhuber** is a new PhD student in the research group of Massimiliano Gubinelli. His research interests are mainly in stochastic PDEs and nonlinear dispersive equations. He completed his Bachelor as well as his Master studies in Bonn.



Since November, **Marco Fraccaroli** is supporting Christoph Thiele as a new graduate assistant. His main research interests are in Harmonic Analysis.



## HAUSDORFF EVENTS

## Hausdorff School: Job Application Training

On November 2, our PhD students and postdocs were able to participate in a job application training. The workshop is part of the soft skills program of the Hausdorff School and was offered in cooperation with the Zurich Gruppe Deutschland. All day long, the participants gained valuable insights into the recruiting processes of private companies and learned a lot about possible career steps as mathematicians working for an insurance company.

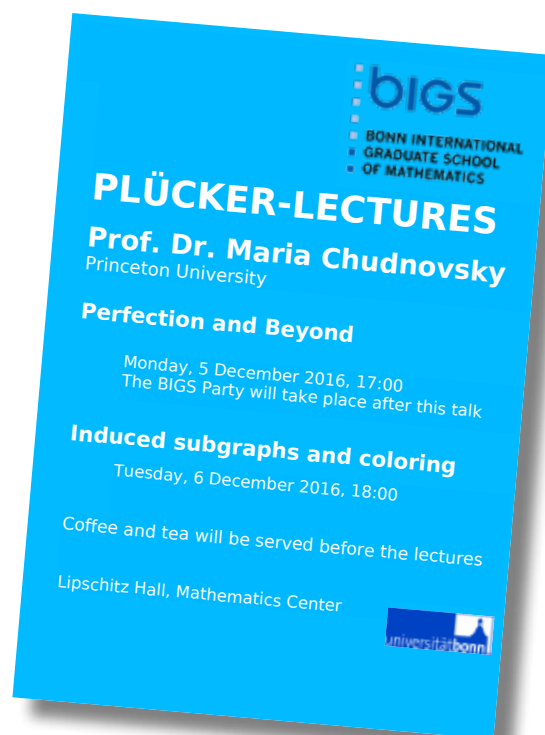


## Dies Academicus 2016

This year's dies academicus of the University of Bonn took place on December 7. At this open house, the Hausdorff Center shared a stand in cafe unique with Immuno-Sensation. Visitors were informed about the HCM and could experience mathematics at our various hands-on exhibits.

## Maths Club – Platonic solids in 3D

The Bonn Math Club, aimed at pupils from class 7 to 13, invited all interested pupils to get to know the club. On this occasion, Prof Karcher gave a lecture on platonic solids which he presented in 3D with the aid of red-green glasses. The lecture was topped off with some hands-on experiments about red-green 3D visualization.



## Plücker Lecture and Welcome Party

This year's two-day Plücker lecture on December 5 and 6 was given by Maria Chudnovsky (Princeton University). After the talk on Monday all BIGS PhD students were invited to the big Welcome Party for the new PhD students.

## HAUSDORFF CALENDER

### Multiscale Problems: Algorithms, Numerical Analysis and Computation

(Hausdorff Trimester Program)

**January 3 to April 21**

### Winter School on Numerical Analysis of Multiscale Problems

(Hausdorff Trimester Program Activity)

**January 9 to January 13**

### Colloquium for Prof. Dr. Werner Ballmann

**January 13, 4:00 p.m.**

### Toeplitz Kolloquium 2016/17

*Christoph Kirfel (Bergen, Norway)*

**January 23, 4:00 p.m.**

### Colloquium in honour of Felix Hausdorff

**January 27, 2:45 p.m.**

### Hausdorff Kolloquium 2016/17

*Serge Cantat (Université Rennes),*

*Isabelle Gallagher (Université Paris - Diderot)*

**February 1, 3:15 p.m.**

### Toeplitz Kolloquium 2016/17

*Klaus Volkert (Wuppertal)*

**February 6, 4:00 p.m.**

### Workshop on Numerical Inverse and Stochastic Homogenization

(Hausdorff Trimester Program Activity)

**February 13 to 17**

### Hausdorff School:

#### Recent development in singular stochastic PDE

**February 20 to 24**



## HAUSDORFF MIXED

### Felix Hausdorff

Hausdorff ranks among the preeminent German mathematicians of the early 20th century. He was born on 8 November 1868 in Breslau as the son of a Jewish merchant. He was appointed associate professor in Bonn in 1910 and assumed a full professorship in 1913 in Greifswald. He returned to Bonn in 1921 to continue his work until 1935. With his masterpiece “Grundzüge der Mengenlehre” (“Basic Principles of Set Theory”), Hausdorff established topology as an independent discipline in mathematics.

During the national socialist regime, he suffered increasing harassment and humiliation until January 26, 1942, when he, his wife, and his sister-in-law chose suicide over imminent deportation to a concentration camp.

In honour of the 75th anniversary of his death, the Hausdorff Center will hold a colloquium on January 27 (see Calender for details).

## IMPRESSUM

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