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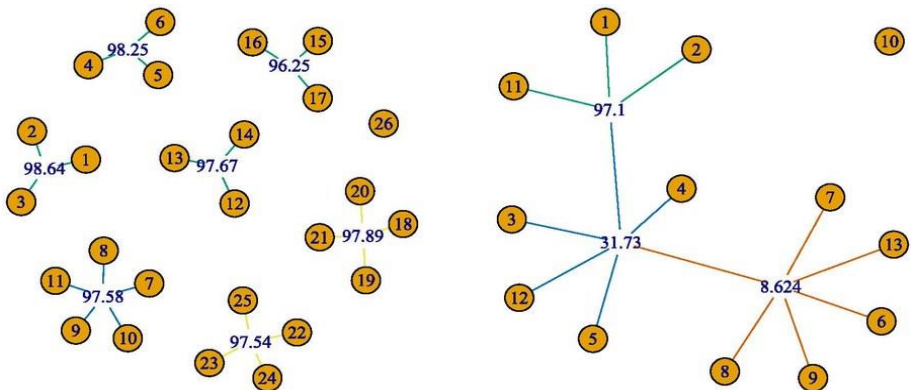
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**RESEARCH**

**Mathematicians at TUD develop new statistical indicator →**



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**Dr. Björn Böttcher, Prof. Martin Keller-Ressel and Prof. René Schilling** from the Institute of Mathematical Stochastics have developed a new statistical indicator for complex, nonlinear dependencies. "Up to now, it has taken a great deal of computational effort to detect dependencies between more than two high-dimensional variables, in particular when complicated non-linear relationships are involved. We have now found an efficient and practical solution to this problem", emphasizes René Schilling, Professor of Probability at TU Dresden. Dr. Böttcher, Prof. Keller-Ressel and Prof. Schilling have now developed a dependence measure called "distance multivariate" for this purpose. Martin Keller-Ressel explains: "To calculate the dependence measure, not only the values of the observed variables themselves, but also their mutual distances are recorded and from these distance matrices, the distance multivariate is calculated. This intermediate step allows for the detection of complex dependencies, which the usual correlation coefficient would simply ignore. Our method can be applied to questions in bioinformatics, where big data sets need to be analysed." The researchers provide all necessary functions in the package 'multivariate' for the free statistics software 'R', so that all interested parties can test the application of the new dependence measure.

**Internet-based self-help program for expectant mothers "PandaMom"**

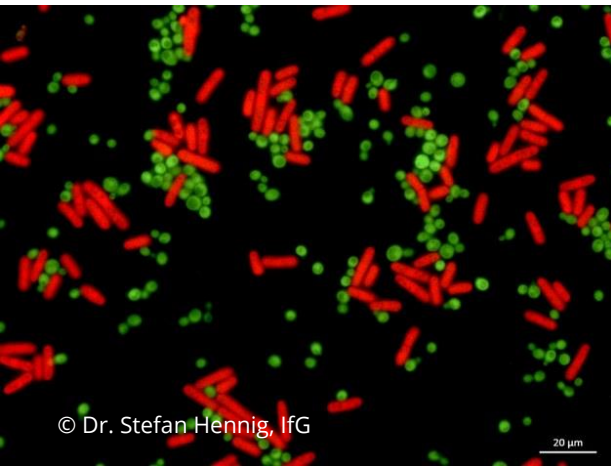


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The anonymous and free online self-help program PandaMom was developed at the Chair of Clinical Psychology and E-Mental Health at the TU Dresden under the direction of the psychologists **Franziska Hagner** and **Juliane Schmidt-Hantke**: It is intended to promote the well-being of expectant mothers in the period around the birth and in the first year thereafter. Especially mothers suffer from doubts, dissatisfaction, anxiety and worries up to depression shortly after, but also before birth. Very few of them seek professional advice. In addition, counselling centres are rare, especially in rural areas. PandaMom was developed in cooperation with gynaecologists, midwives, pregnant women and mothers. It supports pregnant women in their emotional and physical well-being by means of information texts, audio, exercises and case studies. "The aim of PandaMom is to allay women's fears and worries in the last trimester of

pregnancy," explains Franziska Hagner. "It is perfectly normal for expectant mothers to be worried and insecure. We would like to show how to deal with the challenges". Users receive individual feedback from a psychologist from the study team and can also anonymously exchange thoughts in the PandaMom forum. Participation is open to adult, pregnant women in their 3rd trimester, provided there is no psychotic disease (schizophrenia) or addiction. Registration and information can be found [here](#) (German).

## When yeasts are talking to each other →

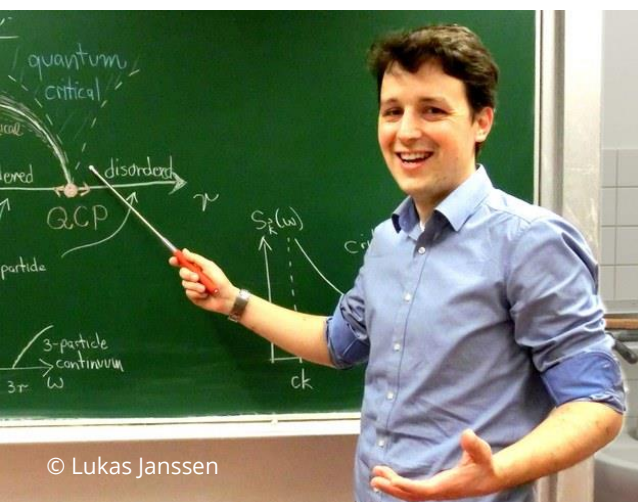


A team of researchers at TU Dresden led by **Dr. Kai Ostermann**, Institute of Genetics, as well as **Prof. Thomas Walther** and **Prof. Thomas Bley** from the Chair of Bioprocess Engineering has modified the communication of yeasts for biotechnological processes. Yeast cells use pheromones to communicate their mating types to each other. In yeasts of opposite mating types, the pheromones kick off a chain reaction that leads to the activation of promoters that regulate certain genes. Dr. Ostermann's team has already produced sensor cells from the yeasts that react to an environmental stimulus, for example by producing a fluorescent protein. For more complex applications, the project group now wants to combine several yeast populations in a controlled communication: "If we were to bring different yeast strains with different metabolic performances into controlled compounds, it would also be possible to bring about complex substance transformations in biotechnological processes," said Dr. Ostermann.

The team has recently succeeded in allowing yeasts of different species to communicate in a controlled way, influencing the growth of yeast cells. In order to transfer the successful experiments from laboratory scale to biotechnological processes, the Bioprocess Engineering group developed a mathematical framework model that is able to describe the growth dynamics of the yeast consortia in detail and allows to control cells and subpopulations in the reactor.

## EXCELLENT

## Where quantum events make the change: New Emmy Noether junior research group „Quantum Critical Matter“

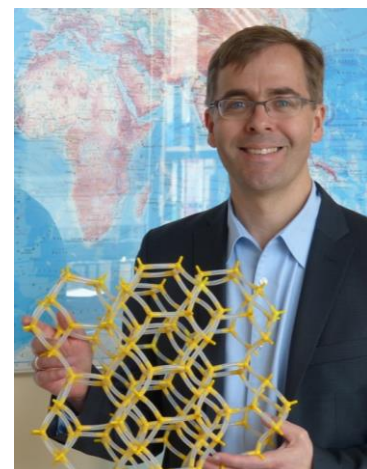


The German Research Foundation (DFG) has granted **Dr. Lukas Janssen** from the Chair of Theoretical Solid State Physics an Emmy Noether junior research group entitled "Quantum Critical Matter". The physicist is investigating at which critical points quantum materials change fundamental properties, why and how they do so – and how these processes can be controlled. On 1<sup>st</sup> September 2019, the group will begin its work; Lukas Janssen, a PhD in Physics since 2012, will thus continue his teaching and research activities on phase transitions and magnetic frustration in a prestigious programme with which the DFG promotes young researchers as the head of a research group in order to qualify them for university teaching. Dr. Janssen's quantum material research focuses on the emergence and disappearance of quasi-particles: Microparticle associations that behave like individual particles in their interactions. Janssen wants to investigate their behaviour at critical points that cause state changes in a material – and thus find out

which quantum mechanical interactions determine the physics of strongly correlated materials such as superconductors or magnetic isolators. It is still basic research. However, the results could be used in new applications: "It is conceivable, for example, to generate impulses for the synthesis of new materials that would enable a mass-produced quantum computer," explains Janssen.

## Prof. Stefan Kaskel appointed member of the European Academy of Science

**Prof. Dr. Stefan Kaskel**, Chair of Inorganic Chemistry I, was appointed a member of the European Academy of Science on 24<sup>th</sup> July. Before his appointment to TU Dresden in 2004, he conducted his research at the Max Planck Institute for Coal Research in Mülheim an der Ruhr, where he also obtained his habilitation. Prof. Kaskel has repeatedly been listed among the "Highly Cited Researchers" (Clarivate Analytics/Thomson Reuters); in 2003 he was honored by the German Federal Ministry of Education and Research with the Young Scientist Nanotechnology Award and in 2016 with the Research Award of the Japan Society for the Promotion of Science. In addition to the European Academy of Science, the chemist is a member of the German Chemical Society (GDCh), DECHEMA and the American Chemical Society.



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## EVENTS

### **Short symposium on teaching**

How to promote the conceptual understanding of students, how promote research and creative work? How can one create a stimulating discussion culture? And how can e-learning help with these challenges? On 12<sup>th</sup> September, the Centre for Continuing Education invites teachers, students and staff to exchange experiences in the short symposium "University Teaching".

**9 to 12.45 p.m.**

**Rooms 61 and 161 in the Potthoff Building, Hettnerstraße 1, 3**

In two parallel sessions, actors from the TU Dresden, the HTW Dresden and the FH Dresden will present their teaching and learning concepts in short, practical lectures and encourage discussion. You can register [here](#).

### **Writing Marathon**

Lacking of motivation for writing your paper? Do it with others – at the Writing Marathon. Waste no more time, but write more concentrated, with set timeframes and work tables. You can work on daily goals between 9am and 5pm each day, from 3<sup>rd</sup> to 6<sup>th</sup> and 9<sup>th</sup> to 13<sup>th</sup> September at the Schreibzentrum, Strehlener Straße 22, in the conference room on the 7<sup>th</sup> floor. Further information and registration can be found [here](#).

and Venezuela. High Energy Physics (HEP) will be the model area of the project that is supported by TUD in the framework of a co-operation led by **Dr. Joany Manjarres** from the Institute of Nuclear and Particle Physics. In addition to networking the project universities, the development of an e-learning platform based on cost-effective open access tools within the framework of modern virtual research and learning communities (VRLC) is part of the project objectives, as is a modular, flexible and problem-oriented curriculum. The vision: a unique VRLC network of universities, renowned HEP research centres and IT companies.

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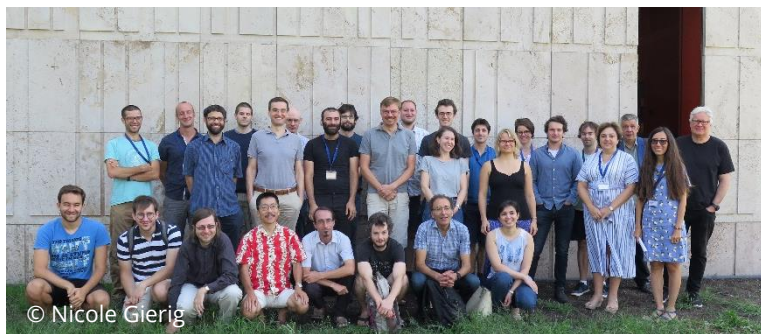
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## NETWORKED

### **International conference "Geometry and Approximation" - with sustainable food for thought**

From 5<sup>th</sup> to 9<sup>th</sup> August, about 50 experts from 13 countries met at the TU Dresden for the "Geometry and Approximation" conference within the framework of the ERC Consolidator Grant "Groups, Dynamics, and Approximation" of **Prof. Dr. Andreas Thom**, Chair of Geometry. Some highlights of the conference were the lectures by Narutaka Ozawa (Kyoto) and Jesse Peterson (Vanderbilt), who presented the latest findings from the theory of von Neumann algebras. Participants from Prague and Wrocław had the opportunity to plan further research projects. The conference ended with a walk over the Schrammsteine rocks, which became a memorable excursion despite the rainy weather. "The personal contact with scientists from all over the world is a central element of my scientific work," says Professor Thom. But he also stresses: "In times of the climate change we must examine now, however seriously, whether there are alternatives, e.g. by video conferences or online work surfaces. I myself will drastically reduce the number of business trips by air until a more sustainable approach has been adopted."



**RISE Worldwide 2020 promotes research internships in Canada →** Within the framework of RISE Worldwide (Research Internships in Science and Engineering), it is still possible to apply for a research internship in Canada until 18<sup>th</sup> September 2019. The duration is 10 to 12 weeks. The offer is aimed at Bachelor's, Diploma and state examination students from universities and universities of applied sciences in the fields of natural sciences and engineering, medicine, psychology and computer science and includes a monthly DAAD full scholarship rate, a travel allowance, health, accident and liability insurance as well as supervision by a local mentor. The earliest start date for internships is 1<sup>st</sup> May 2020, the latest start date is 31<sup>st</sup> July 2020 (by arrangement). Applications go through the Canadian DAAD partner [Mitacs](#).

### **Bridges to Latin America: Grant for Latin American Alliance for Capacity building in Advanced Physics**

The goal of the Latin American Alliance for Capacity building in Advanced Physics (LA-CONGA), which was granted funding under the Erasmus+ programme, is to modernise the education platforms at eight universities in Colombia, Ecuador, Peru and Venezuela. High Energy Physics (HEP) will be the model area of the project that is supported by TUD in the framework of a co-operation led by **Dr. Joany Manjarres** from the Institute of Nuclear and Particle Physics. In addition to networking the project universities, the development of an e-learning platform based on cost-effective open access tools within the framework of modern virtual research and learning communities (VRLC) is part of the project objectives, as is a modular, flexible and problem-oriented curriculum. The vision: a unique VRLC network of universities, renowned HEP research centres and IT companies.



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