Newsletter Physics 07/21

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News from the Department

Marina Gerhard appointed as a professor

Marina Gerhard has accepted the offer for a professor position at the Department of Physics. We interviewed her about her future plans, highlights in her career, work-life balance and much more. "I am very happy that it worked out with the professor position". "It is great when an experiment works after many days of trying". "The best decision of my career was to go to Sweden". Read the full interview below (in German).

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Funding for the interdisciplinary project "The Adaptive Mind"

The Hessian Ministry of Higher Education, Research, Science and the Arts has granted a new cluster project "The Adaptive Mind – TAM" with 7.4 Million Euro for four years. The highly interdisciplinary TAM cluster-project brings together 24 PIs from four Hessian universities (Marburg, Giessen, Darmstadt, and Frankfurt) and the Frankfurt Institute of Advanced Studies (FIAS) from the fields of Physics, Psychology, Medicine, Neuroscience and Computer Science. Frank Bremmer is the speaker of the Marburg site.

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New grants for the Semiconductor Photonics Group

Three research proposals of the semiconductor photonics group have been granted. Two projects are funded by the German Federal Ministry for Economic Affairs and Energy and one by the Federal Ministry of Education and Research. In these projects the group will develop systems to detect and identify microplastics, plastic waste and dissolved organic carbon compounds, respectively. In total, the group obtains 540.000 €.

Arne Sjögrens PhD Award for Samuel Brem

Samuel Brem, postdoc in the Ultrafast Quantum Dynamics group, has obtained the prestigious Arne Sjögrens Award from the Excellence Initiative Nano as well as the Best Thesis Awards from the Vinnova Competence Center 2D-TECH and from the Department of Physics at the Chalmers University of Technology. The three awards recognize his excellent PhD work on "Microscopic theory of exciton dynamics in two-dimensional materials" with over 30 publications in peer-reviewed journals.

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Teaching Award "Lehre@Philipp" for Ada Bäumner

Ada Bäumner has obtained the teaching award "Lehre@Philipp" recognizing her project on integrating virtual experiments in the undergraduate studies at the Department of Physics. Her goal is to create an awareness among students about various advantages and challenges of numerical modeling. She wants to achieve this by setting up a digital lab, where students should learn to use computer-assisted experiments as a useful extension to hands-on experiments.

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David Geisel (AG Complex Systems) defended his PhD

David Geisel from the Complex Systems group has finished his PhD on "Modeling the Spatio-Temporal Organization and Segregation of Bacterial Chromosomes". He studied the spatial organization of multiple chromosomes in bacterialcells, which can be understood as the result of mechanical, topological and thermodynamic properties of DNA. Furthermore, he modeled the dynamics of simultaneous replication and segregation of bacterial DNA and classified different separation mechanisms of bacterial chromosomes using machine learning models.

Örs Legeza obtains the Hans Fischer Senior Fellowship

Our guest professor, Örs Legeza, has been awarded the Hans Fischer Senior Fellowship by the Institute for Advanced Study of Technische Universität München. The program is dedicated to international scientists who intend to explore innovative, high-risk topics in their scientific research areas together with a TUM research group. The fellowship will allow him to conduct research in Munich for a total of at least nine months over the next three years.

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Stargazing at Frauenberg and in Botanical Garden

You are fascinated by the beauty of a night's sky? There are so many stars, planets, meteor showers visible for your naked eye. In smaller telescopes you can experience star clusters, the colors of stars as well as the luminescent gas clouds of dying stars. The Astronomy Group offers tours through the starry night sky several times throughout the year.

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PhD Representatives

Since this year, there is a general doctoral candidate representation at the University of Marburg. We want to be a fair and competent representation of all doctoral candidates and a contact for all kinds of questions. We will support the interests of doctoral candidates in committees of the university. In addition, we will improve networking among doctoral candidates through social activities (monthly get-togethers etc.) and by compiling information and events that can help during the doctoral phase.

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Research Highlights

Nano Letters publication on formation dynamics of dark excitons (AG Höfer / AG Malic)

Excitons, which form out of electrons and holes at different locations of the Brillouin zone, so-called dark excitons, have been predicted and mainly investigated by theory, since they are not accessible by most experimental techniques. In a collaboration between the groups of Ulrich Höfer and Ermin Malic together with the group of Rupert Huber in Regensburg, the formation dynamics of dark excitons have been directly observed for the first time in an WS_2 monolayer and modelled by a fully microscopic theory. The experiment made use of the time-resolved momentum microscopy setup with a high-harmonic light source to image the exciton population in momentum-space. The excellent agreement between experiment and theory in this work holds great promise to investigate charge transfer processes on a microscopic level.

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Natural Sciences publication on excitons in atomically thin materials (AG Malic)

Excitons govern optoelectronic properties of atomically thin semiconductors. Although their optical signatures have been extensively studied, experimental access to the excitonic wave function has remained elusive. The Ultrafast Quantum Dynamics Group (AG Malic) was part of a joint experiment-theory collaboration with Ralph Ernstorfer, Angel Rubio, and Andreas Knorr studying the characteristics of the excitonic wave function in WSe_2. We demonstrated that all fundamental exciton properties are encoded in the time-resolved ARPES signal including the exciton binding energy, its self-energy as measure of the exciton–lattice coupling as well as the real-space distribution of the excitonic wave function.

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npj Quantum Information publication on Qbits from magnesium color centers (AG Legeza)

In their recent publication "Highly tunable magneto-optical response from magnesium-vacancy color centers in diamond" Örs Legeza and his colleagues analyzed how Qbits can be realized from magnesium ions in diamond crystals. Qbits are the basic units for the storage and manipulation of quantum information. In their numerical investigation using density functional theory in combination with quantum-chemical density-matrix renormalization group and complete active space self-consistent field calculations, they identified the electronic structure of the defect state and explained the corresponding experimental observations.

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New Colleagues

Sarah Bindbeutel

I am happy to be the new secretary of Prof. Dr. Bremmer at the Neuro-Physics Group. Furthermore, I am responsible for the economical and administrative coordination of the Integrated Research Training Group "The Brain in Action". In my free time, I love to spend time with my family, horses and friends.

Goretti G. Hernandez-Cardoso

I am a postdoc in the Semiconductor Photonics group. I have been working on the application of terahertz radiation and now I am focusing my research on strong THz-emitters within the SFB 1083. I am from Mexico and love spending time with my friends, listening to music and walking around the city.

Sadra Fathkhani

I am a new doctoral candidate in the fantastic Neurophysics working group led by Prof. Dr. Frank Bremmer. I finished my Master's degree at Iran University of Science and Technology (IUST), primarily worked on non-human primate brain signal decoding. I moved here with my wife, we are happy to be in this lovely and historic city.

Baptiste Cazoit

I joined Frank Bremmer's lab as a postdoc to work on developing neural recording techniques for freely-moving non-human primates. Though I am originally from France I did my PhD and mostly worked in the US. My background is in Electrical Engineering and Psychophysics.

In our last newsletter, we had unfortunately typos in the names of **Samuel Brem** and **Giuseppe Meneghini** (Ultrafast Quantum Dynamics Group).

- Summer break -

We are back in autumn and wish everybody a nice and relaxing summer.

Share your good news.

Your newsletter team: Maya Strobel, Carina Hlawaty, and Ermin Malic

Send us an e-mail with a short text and a nice foto to newsfb13@physik.uni-marburg.de

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