TECHNISCHE UNIVERSITÄT DRESDEN

**Bereich Mathematik und Naturwissenschaften** Fakultät Physik

# DRESDNER PROMOTIONSPREIS PHYSIK 2019

*Program:*

- Opening: Dean of the Faculty of Physics, Prof. Dr. Michael Kobel
- Welcoming Address: Vice-Rector for Research, Prof. Dr. Gerhard Rödel
- Laudation: Chair of the Prize Committee, Prof. Dr. Jan Budich
- Laureate Lecture: Dr. Kai Wagner
- Reception

*Time and Place:* Tuesday, 10.12.2019, 16:40 (tea and coffee in foyer from 16:20)
Recknagel-Bau, Lecture Hall REC/C213, Haeckelstr. 3

*Lecture:*

## Spin-textures as a complement to magnonic circuitry

Increasing the energy efficiency and functionality of logic circuitry is one of the current grand challenges for information technology. The field of magnonics, explores a magnetic concept, complementary to charge-based electronic devices, with the aim of using magnons, the quanta of magnetically ordered spin systems, as information carriers. Both energy and angular momentum are transported as waves of the electrons' spin without Ohmic losses. Besides that, information may also be stored, manipulated and moved via nano-sized spin textures, e.g. as skyrmions or magnetic domain walls. These robust, yet controllable, textures and magnons share the same fundamental origin, allowing for their mutual interaction. Their combination with each other promises additional reprogrammable functionalities with high integration density. In this talk the extension of magnonic circuitry by nano-sized spin-textures and electric currents is introduced. In particular, the manipulation and propagation of magnons is discussed for confined magnonic transport along nano channels realized by magnetic domain walls. Interfacing charge currents with these magnonic concepts will be discussed. The methodology allows one to probe spin texture information via magnons and to design magnonic devices via spin textures on nano-scale dimensions, while at the same time being both non-volatile and reconfigurable.

*Biography:* Kai Wagner is a postdoctoral researcher at the University of Basel since 2019, working on Quantum Sensing of solid state systems via spin-qubit magnetometry. In 2018, he received his PhD with *summa cum laude* from the TU Dresden conducting his work at the Helmholtz-Zentrum Dresden-Rossendorf, focusing on the field of magnonics in the presence of electric currents and magnetic textures. Together with his colleagues he was awarded the HZDR research award in 2015 and elected as a runner-up for the Ken Hass Outstanding Student Paper Award in 2016. He received his M.Sc and B.Sc. from the University of Duisburg-Essen, under the guidance of Prof. Farle and was awarded as first student of his class (2014) and the Sparkassenpreis for academic excellence for his thesis in 2011.

*Gefördert von:*
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DRESDEN concept
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