TECHNISCHE UNIVERSITÄT DRESDEN

Bereich Mathematik und Naturwissenschaften Fakultät Physik

PHYSIKALISCHES KOLLOQUIUM

Referent: **Dr. Alexander Haußmann**
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Thema: **Ferroelectric domain walls: Controlling conductivity through geometry** (Vorstellung für Habilitation)

Zeit und Ort: Dienstag, 10.10.2017, 16:40 Uhr
Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter: Prof. Dr. Lukas M. Eng

Kurzfassung: Ferroelectric materials are nowadays widely employed as optical frequency converters, piezoelectric filters and actors, as well as memory devices. These standard applications rely mainly on the bulk properties of ferroelectrics, i.e. the existence of a re-orientable remnant dielectric polarization and the formation of so-called domains, which are regions of constant polarization in the size range of several 100 nm up to cm. In contrast to this, current research has mainly focused on the domain walls (DWs), i.e. the narrow transition zones separating two neighboring domains. These DWs exhibit a minute thickness on the unit-cell level only, thus constituting embedded 2D nanosheets with very interesting electronic and chemical properties that differ drastically from the surrounding bulk. Moreover, they can be placed and reconfigured at will by the application of external electrostatic fields. In my talk, I will specifically address the pronounced electrical conductivity of DWs that penetrate across the perfectly insulating lithium niobate (LiNbO3) single crystal host, a phenomenon that has been extensively studied in our group. In fact, we were able to establish a clear connection between the DW conductivity and its geometry. Furthermore, we found easy-to-follow protocols in order to deliberately enhance the transport current flowing along such DWs by several orders of magnitude. Characterization techniques used in these experiments include conductive atomic force microscopy (cAFM), photoelectron emission microscopy (PEEM), as well as 3D DW imaging by Cherenkov Second Harmonic Microscopy (CSHGM) and optical coherence tomography (OCT), and the modeling of conductive paths along the DWs using resistor networks.

Biographie: Alexander Haußmann, born in 1980, studied physics at TU Dresden and received his diploma degree in 2006. From 2006-2009 he was a scholarship holder in the research training group "Nano- and Biotechniques for Electronic Device Packaging" (DFG 1401) and completed his doctoral thesis at the Chair of Experimental Physics / Photophysics (Prof. Lukas M. Eng) at the Institute of Applied Physics, TU Dresden, in 2011. Since then, he has worked there as a research associate and subgroup leader, investigating ferroelectric materials with optical and scanning force microscopy methods.