



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

**Fachbereich Physik**

Institut für Physik  
Kondensierter Materie  
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# Physikalisches Kolloquium & Verleihung des Harald-Rose-Preises 2023 der TU Darmstadt

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<b>Title:</b>	<b>Exploring and Exploiting 3D Magnetic Textures with Electron Optics</b>
<b>Speaker:</b>	<b>Prof. Dr. Axel Lubk, IFMP TU Dresden, IFW Dresden</b>
<b>Date &amp; time:</b>	<b>Friday 24.11.2023, 2 pm</b>
<b>Location:</b>	<b>ZKS-Uhrturmhörssaal, S2 08, R. 171, Hochschulstraße 4</b>
<b>Host:</b>	<b>Dekanat FB Physik</b>

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**Der Harald-Rose-Preis 2023 der TU Darmstadt wird verliehen an Herrn Dr. Alexander Zintler.**

**Abstract:**

Non-homogeneous three-dimensional (3D) magnetic textures, such as spin spirals, magnetic vortices, skyrmions or magnetic domain walls, determine the properties of magnetic materials at the micro- and nanoscale. They form due to competing interactions such as symmetric and antisymmetric exchange, crystalline anisotropies as well as dipolar interactions, and are central to applications such as magnetic memories.

Probing the 3D structure of the texture including their energetics and dynamics is crucial for gaining insight into their interactions, formation processes, stability, etc. The talk provides an overview on modern electron optical methods using transmission electron microscopy, which allow to reconstruct magnetic textures down to the nanoscale. That will particularly include electron holography and electron tomography. Amongst others, we will demonstrate the 3D reconstruction of magnetic skyrmion tubes in a helimagnet. In a second part magnetic vortex states and their high susceptibility to magnetic fields are exploited in micron sized magnetic multipole devices fabricated with by lithography methods. We discuss their static and dynamic electron optical properties as well as possible applications for imaging the dynamic properties of domain walls or skyrmions.

