

## PHYSIKALISCHES KOLLOQUIUM

### Sommersemester 2023

Das Kolloquium findet (soweit nicht anders angegeben) **jeweils montags um 17:15 Uhr in Präsenz im Röntgen-Hörsaal des Physikalischen Instituts, Hubland Campus Süd, Universität Würzburg und online via Zoom statt.**

Link zum Zoom-Raum:

<https://go.uniwue.de/physkolloqzoom>



**08.05.2023**

Prof. Dr. Achim Rosch  
Universität zu Köln, Institut für Theoretische Physik

#### **Emergent gauge fields in solids: from skyrmions to visons**

##### **Abstract**

The principle of gauge invariance is one of the most powerful concepts in physics. It is, for example, the basis of the standard model of particle physics. A fascinating question is where gauge theories may come from. Can they naturally "emerge" in the description of materials? We discuss how emergent electromagnetic fields [1] are measured and how they are used to describe the coupling of electrons to magnetic whirls, so-called magnetic skyrmion. Furthermore, we search for manifestations of emergent gauge excitations in liquid crystals and frustrated magnets approximately described by Kitaev models. We explore the quantum mechanical properties of visons [2], which are the flux excitations of the gauge theory.

[1] T. Schulz, R. Ritz, A. Bauer, M. Halder, M. Wagner, C. Franz, C. Pfleiderer, K. Everschor, M. Garst, A. Rosch,  
Nature Physics 8, 301 (2012).

[2] Aprem P. Joy and Achim Rosch, Phys. Rev. X 12, 041004 (2022).

Für die Dozentinnen bzw. Dozenten der Fakultät

PD. Dr. Meyer, Prof. Dr. Klemmt, Dr. Fromm, Dr. Feichtner und Hr. Kögel