



Einladung zum
Physikalischen Kolloquium
Wintersemester 2022/2023

Physikzentrum der Technischen Universität Braunschweig

Dr. Manuel Brando

(MPI Dresden)

will give a talk on

December 13th, 16:45, MS 3.1

**The multi-phase heavy-fermion
superconductor CeRh_2As_2**

We discovered superconductivity in CeRh_2As_2 ($T_c = 0.26$ K) in 2017. It is a rare case of a system with multiple superconducting (SC) phases in which the even-parity SC order parameter can be changed into an odd-parity one by a magnetic field [1]. Meanwhile, a large number of experiments have been performed to understand its SC state and other peculiar properties, namely: i) the presence of a non-magnetic ordered phase believed to be a unique example of quadrupole-density-wave (QDW) order [2], ii) the suspected presence of antiferromagnetic (AFM) order as odd-parity multipoles inside the SC phase [3], and finally the nature of the quantum critical fluctuations observed right above all these ordered phases. I will present a comprehensive overview of recent experiments and provide new insights into the understanding of this material. In particular, I will focus on the interplay between superconductivity and the QDW and AFM phases with the aim of explaining why CeRh_2As_2 has still no equals.

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[1] S. Khim, J. F. Landaeta et al., Science 373, 1012 (2021)

[2] D. Hafner et al., Phys. Rev. X 12, 011023 (2022)

[3] M. Kibune et al., Phys. Rev. Lett. 128, 057002 (2022)