

Theoriekolloquium

Am **12. Dezember 2019** um **14.15 Uhr** in **W2 1-143** hält

Herr Prof. Dr. Ronny Thomale (Würzburg)

einen Vortrag mit dem Titel

Room temperature quantum spin Hall effect

Since its discovery in HgTe/CdTe quantum wells in 2007, the quantum spin Hall effect (QSHE) has been the central catalysis of the search for topological quantum matter. Featuring spin-selective dissipationless edge channels, the QSHE promises applications in spintronics as well as logic electronic processing with low power consumption. While HgTe/CdTe and related semiconductor compounds seem to constrain the QSHE to low temperatures, i.e., small insulating bulk gaps, the challenge is to find realizations at higher operational temperatures in order to facilitate technological applicability. We develop a theoretical paradigm for room temperature QSHE materials by design, involving a tailored arrangement of spin-orbit coupling, lattice symmetry, and multi-orbital hybridization profile. Our theoretical predictions apply to the heterostructure Bi/SiC as a candidate for room temperature QSHE, featuring an observed bulk gap of 670 meV. We further revisit the QSHE found in WTe₂ monolayers, where we identify a custodial glide symmetry as the source for high temperature QSHE. In the QSHE mineral jacutingaite, we reveal the possibility of reaching unconventional triplet f-wave superconductivity already at moderate doping.

Interessierte sind herzlich eingeladen.

gez. Prof. Dr. Martin Holthaus