TECHNISCHE UNIVERSITÄT DRESDEN

Bereich Mathematik und Naturwissenschaften Fakultät Physik

PHYSIKALISCHES KOLLOQUIUM

Referentin: **Jun.-Prof. Dr. Anna Isaeva**
AG Synthese und Kristallzüchtung von Quantenmaterialien
Institut für Festkörper- und Materialphysik, TU Dresden
und
Group 1204 Exploratory Synthesis of Quantum Materials
Institute for Solid State Research (Institut für Festkörperforschung IFF), Leibniz IFW Dresden

Thema: **New bismuth-based topological materials beyond Bi_2Te_3**
(Antrittsvorlesung)

Zeit und Ort: Dienstag, 21.01.2020, 16:40 Uhr
Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter: Prof. Dr. Bernd Büchner

Kurzfassung: The mathematical concept of topology was found indispensable to explain quantum effects holistically, including the quantized spin-polarized surface states in the first 3D topological insulators (TI): Bi_2Te_3, Sb_2Te_3 and Bi_2Se_3 bulk crystals, and $Bi_{1-x}Sb_x$ alloys in 2007–2009. About a decade after these first experimental discoveries, topological materials science is rich and diverse, and bismuth-based inorganic solids hold a strong position in the field as promising topological quantum materials of various types. The pursuit of new materials is fueled by the great conceptual variety of possible quantum effects, quasiparticles and resultant physical properties of topological solids. Using the principles of crystal chemistry and chemical bonding, we put forward a handful of new material candidates with layered crystal structures built by certain bismuth fragments. Topological properties originating from interactions of these fragments with their structural environment are studied theoretically and experimentally. We carefully optimize crystal growth techniques for all these bulk materials and investigate their structural, magnetic and surface properties by the efforts of a large interdisciplinary consortium of experimentalists and theoreticians. As a result, we considerably extend the rich palette of exotic bismuth-based quantum materials and add new strong (Bi_4I_4) and weak 3D topological insulators (Bi_2TeI, Bi_2TeBr, $Bi_4I_2Br_2$), crystalline topological insulators (Bi_2TeI, Bi_2TeBr), topological semimetals (Bi_3TeI, Bi_3TeBr, GdBiTe, PtBiTe) and, finally, the long-sought stoichiometric magnetic topological insulators ($MnBi_2Te_4$, $MnBi_4Te_7$, $MnBi_6Te_{10}$).

Biographie: 2005 – 2008: PhD in inorganic chemistry, Lomonosov Moscow State University / 2008 – 2009: Research assistant at Kurnakov Institute of General and Inorganic Chemistry, Moscow, Russia / 2009 – 2010: Postdoc at EMAT, University of Antwerp, Belgium / 2010 – 2013: Institute of Inorganic Chemistry II (IAC II), TU Dresden / 2013 – 2018: Principal investigator within the DFG SPP 1666 / 2019 – 2022: Junior professor, a joint appointment by IFMP TUD and Leibniz IFW Dresden.