O 84: Overview Talk Claus M. Schneider (joint session O/CPP)

Time: Friday 13:15–14:00 Location: S054

Invited Talk O 84.1 Fri 13:15 S054

Exploring the Mysteries of Topology in Quantum Materials — •Claus M. Schneider — Peter Grünberg Institut PGI-6, Forschungszentrum Jülich, 52425 Jülich

A characteristic feature of emergent or quantum materials is the competition of various spin-dependent interactions, such as spin-orbit coupling and exchange interaction. In addition, depending on the material system, there may be a breaking of time-reversal and/or inversion symmetries at play. As a consequence, topological materials may range from metals to insulators. In the vicinity of the Fermi level, this situation leads to peculiar electronic dispersions associated with Dirac and Weyl points, eventually also resulting in complex spin textures in momen- tum space. The interplay of competing mechanisms often results in unusual charge and spin transport phenomena in such materials. In order to understand the physical properties of quantum materials on a fundamental level, we need to explore these electronic states in detail and disentangle the role of the various interactions. For this purpose, we employ electron spectroscopic approaches, which explicitly take the electron spin as an experimental quantity into account. In this contribution we discuss an avenue starting from simple single-crystalline systems (e.g, W(011), Fe(100) and Co(100)) to more complex 2D and 3D quantum materials and detail the role of the individual interactions and symmetry-breaking mechanisms by experimental examples.