

O 125: Overview Talk: Roland Wiesendanger (joint session O/CPP/DS)

Time: Friday 14:00–14:45

Location: HSZ 02

Topical Talk

O 125.1 Fri 14:00 HSZ 02

Surface Science Aspects of Topological States of Matter —

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Topological states of matter have raised great excitement in solid state physics in the past years, e.g. in the fields of topological insulators, topological spin textures (magnetic skyrmions), and topological superconductors hosting Majorana states. Surface and interface science plays a crucial role for all these fields, as has been demonstrated, e.g., by the discovery of ultimately small-scale skyrmions stabilized by interfacial Dzyaloshinskii-Moriya interactions [1,2] or the direct real-space observation of the emergence of Majorana states in atomic-scale magnet-superconductor hybrid systems [3,4]. In particular, the prepara-

tion of extremely clean surfaces of elemental s-wave superconductors, such as Re, Ta, La, and Nb has boosted recent studies of topological superconductivity in bottom-up constructed 1D and 2D hybrid systems, allowing for the atomic-scale design of Majorana states and a one-to-one comparison between results of theoretical toy models and experimental observations. Bringing together surface science concepts and advanced techniques for the fabrication of atomically well defined magnet-superconductor hybrid systems is a key ingredient for this exciting new research area which ultimately will allow for the realization of topological quantum computation schemes. [1] N. Romming et al., *Science* 341, 6146 (2013). [2] S. Heinze et al., *Nature Physics* 7, 713 (2011). [3] H. Kim et al., *Science Advances* 4, eaar5251 (2018). [4] A. Palacio-Morales et al., *Science Advances* 5, eaav6600 (2019).