O 98: Overview Talk Ralph Claessen

Time: Friday 13:15–14:00 Location: HSZ 03

Invited Talk O 98.1 Fri 13:15 HSZ 03

Surfaces go topological – third generation 2D quantum materials — •Ralph Claessen — Physikalisches Institut and Würzburg-Dresden Cluster of Excellence ct.qmat, Universität Würzburg, Germany

Metal atom-decorated semiconductor surfaces have long been studied as model systems for the formation of electrical contacts to semiconductor devices. More recently, atomic monolayers on semiconductors have come into focus as two-dimensional designer quantum materials. A case in point are two-dimensional topological insulators (2D-TIs) which host 1D metallic and spin-polarized edge states, giving rise to the quantum spin Hall (QSH) effect. Starting from the notion that a 2D honeycomb lattice favors a topologically non-trivial band structure, I will discuss several examples of such synthetic 2D-TIs, ranging from bismuthene (Bi/SiC(0001)) [1-3], whose large gap even allows the optical generation of excitons in a topological band structure [4], to indenene (In/SiC(0001)), a triangular 2D lattice of In atoms with emerging honeycomb physics and first example of a real-space obstructed QSH insulator [5, 6].

[1] Science 357, 287 (2017) [2] Nat. Phys. 16, 47 (2020) [3] Nat. Commun. 13, 3480 (2022) [4] Nat. Commun., 13, 6313 (2022) [5] Nat. Commun. 12, 5936 (2021) [6] Phys. Rev. B 106, 195143 (2022)