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Accessing topological superconductivity via a combined STM and renormalization group analysis WERNER HANKE, LARS ELSTER, CHRISTIAN PLATT, RONNY THOMALE, EWELINA HANKIEWICZ, Institute for Theoretical Physics, Würzburg University, WÜRZBURG UNIVERSITY TEAM — The search for topological superconductors (SC) has recently become a key issue in condensed matter physics, because of their possible relevance to Majorana states, non-Abelian statistics and fault-tolerant quantum computing. A new scheme is proposed here, which links as directly as possible the experimental search to a material-based microscopic theory. To this, the scanning tunneling microscopy (STM), which typically uses a phenomenological Ansatz for the SC gap functions is elevated to a theory, where a multi-orbital functional RG (fRG) analysis allows for an unbiased microscopic determination of the material-dependent pairing potentials. The conductance spectra are predicted for a normal metal-insulator-topological superconductor (N-I-S) junction, which imitates the STM setup and, therefore, is directly accessible to spectroscopic experiments. The strength of the combined approach is demonstrated for hexagonal systems, i.e. doped graphene and water-intercalated sodium cobaltates, where the lattice symmetry and eletronic correlations can lead to a time-reversal symmetry breaking (chiral) topological SC state.

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