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Majorana fermions in topological Yu-Shiba-Rusinov chains and lattices with or without spin-orbit interaction. PANAGIOTIS KOTETES, Center for Quantum Devices, Niels Bohr Institute, University of Copenhagen, 2100 Copenhagen, Denmark — Recent spin polarized scanning tunneling microscopy (SP-STM) experiments in magnetic chains (S. Nadj-Perge et al., Science 2014) opened new routes for detecting the elusive Majorana fermions (MFs). Within the deep Yu-Shiba-Rusinov (YSR) limit we calculate [1] the spatially resolved tunneling conductance of topological ferromagnetic chains [2] measured by means of SPSTM. Our analysis reveals novel signatures of MFs arising from the interplay of their strongly anisotropic spin-polarization and the magnetization content of the tip. We investigate the occurrence and evolution of zero/finite bias peaks for a single or two coupled chains forming a Josephson junction, when a preexisting chiral symmetry controlling the number of MFs per chain edge is preserved or weakly broken. We also reveal alternative pathways for engineering MFs without spin-orbit interaction (SOI). On one hand, we highlight that antiferromagnetic YSR chains become topological by inducing an artificial SOI using external fields [3], while on the other, we pursue mechanisms for stabilizing magnetic textures and topological YSR lattices [4] following the self-organization principle for topological spiral chains [5]. [1] P. Kotetes et al., Physica E 74, 614 (2015), [2] A. Heimes, D. Mendler, and P. Kotetes, New J. Phys. 17 023051 (2015), [3] A. Heimes, P. Kotetes, and G. Schön,PRB 90, 060507(R) (2014), [4] M. Schecter, P. Kotetes, K. Flensberg, and J. Paaske, [5] M. Schecter et al., arXiv:1509.07399.

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