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Universal parity-crossing statistics in dirty hybrid normal-superconductor nanostructures INANC ADAGIDELI, Sabanci University — We focus on topologically protected crossings of Andreev bound states in normal-superconductor hybrid structures [1]. Such crossings, signaling a change in the ground state fermion parity, became the focus of recent attention as they are regarded to be precursors to Majorana fermions that appear in the long-wire limit. In recent work, we showed how a topological state can be induced from regular or irregular scattering in (i) p-wave superconducting wires and (ii) Rashba wires in proximity to an s-wave superconductor. We also related the topological properties of such nanowires to their normal state properties such as conductance [2]. In the present work, we build on these results and study the correlation between parity-crossings in the superconducting state and the normal state properties of a hybrid nanostructure. Surprisingly, we find that the crossing points as well as their statistics are universal and are described solely by their normal-state properties. We obtain formulae for mean spacing between parity crossings as well as crossing statistics in disordered wires/cavities. We finally discuss under what conditions these crossings signal Majorana fermions. [1] I. Adagideli et al . [2] I. Adagideli, M. Wimmer, A. Teker, Phys Rev B 89, 144506 (2014)

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