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Interaction-driven strong topology on the boundary of a weak topological superconductor DANIEL MENDLER, Inst. für theo. Festkörperphysik, Inst. of Nanotechnology, Karlsruhe Inst. of Technology, PANAGIOTIS KOTETES, Center for Quantum Devices, Niels Bohr Inst., U. of Copenhagen/Inst. für theo. Festkörperphysik, Karlsruhe Inst. of Technology, GERD SCHÖN, Inst. für theo. Festkörperphysik, Inst. of Nanotechnology, Karlsruhe Inst. of Technology — We focus on a class of topological superconductors (TSCs) which exhibit a bulk energy gap and support Majorana flat bands (MFBs) on the surface. In contrast to previous proposals relying on strong TSCs with nodal bandstructure, here MFBs are solely protected by a weak topological invariant reflecting a global or local strong anisotropy. In the present case interactions play a dual role, on one hand driving the spontaneous symmetry breaking to an anisotropic superconducting phase and on the other, gapping out the arising MFBs yielding a strong topological phase on the boundary. The prototype system showing this kind of behavior is the nematic p_z-superconductor, which supports surface MFBs. While the interactions stabilize the p_z-SC phase in the bulk and induce the MFBs, suppressed bulk p-wave pairing terms occur on the surface, thus lifting the MFB-degeneracy. A similar situation can take place if the nematic features are only local, a scenario which is realizable in a heterostructure consisting of a conventional superconductor in proximity to a topological insulator surface with intrinsic magnetic order.

Daniel Mendler
Inst. für theo. Festkörperphysik, Inst. of Nanotechnology, Karlsruhe Inst. of Technology

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