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Helical Majorana surface states of strongly disordered topological superconductors with time-reversal symmetry RAQUEL QUEIROZ, ANDREAS SCHNYDER, Max Planck Institute for Solid State Physics — Noncentrosymmetric superconductors with strong spin-orbit coupling and the B phase of ^{3}He are possible realizations of topological superconductors with time-reversal symmetry. The nontrivial topology manifests itself at the material's surface in terms of linearly dispersive helical Majorana modes protected by symmetry from disorder weaker than the superconducting gap. Using extensive numerical simulations, we investigate the stability and properties of these Majorana states under strong surface disorder, which influences both bulk and surface states. A critical crossover from weak to strong disorder is observed in both two and three dimensions, through which an extended state exactly at zero energy always persists. The localization properties of the ingap states are studied through the distribution of the local density of states and level repulsion statistics.

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