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## Zero-energy pinning from interactions in Majorana nanowires

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Majorana zero modes at the boundaries of topological superconductors are charge-neutral, an equal superposition of electrons and holes. This ideal situation is, however, hard to achieve in physical implementations, such as proximitised semiconducting nanowires of realistic length. In such systems Majorana overlaps are unavoidable and lead to their hybridisation into charged Bogoliubov quasiparticles of finite energy which, unlike true zero modes, are affected by electronic interactions. We here demonstrate that these interactions, particularly with bound charges in the dielectric surroundings, drastically change the non-interacting paradigm. Remarkably, interactions may completely suppress Majorana hybridisation around parity crossings, where the total charge in the nanowire changes. This effect, dubbed zero-energy pinning, stabilises Majoranas back to zero energy and charge, and leads to electronically incompressible parameter regions wherein Majoranas remain insensitive to local perturbations, despite their overlap.

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