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Unpaired Majorana fermions in a layered topological superconductor[1] BABAK SERADJEH, Indiana University, Bloomington, EYTAN GROSFELD, Ben Gurion University — We study the conditions for the existence of unpaired Majorana modes at the ends of vortex lines or the side edges of a layered topological superconductor. We show that the problem is mapped to that of a general Majorana chain and extend Kitaev's condition for the existence of its nontrivial phase by providing an additional condition when a supercurrent flows in the chain. Unpaired Majorana bound states may exist in a vortex line that threads the layers if the spin-orbit coupling has certain in-layer components but, interestingly, only if a nonzero supercurrent is maintained along the vortex. We discuss the exchange statistics of vortices in the presence of unpaired Majorana modes and comment on their experimental detection.

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