Majorana states in helical Shiba chains and ladders\textsuperscript{1} TEEMU OJA-
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sity, NANOThEORY TEAM — Motivated by recent proposals to realize Majorana
bound states in chains and arrays of magnetic atoms deposited on top of a supercon-
ductor, we study the topological properties of various chain structures, ladders and
two-dimensional arrangements exhibiting magnetic helices. We show that magnetic
domain walls where the chirality of a magnetic helix is inverted support two pro-
tected Majorana states giving rise to a tunneling conductance peak twice the height
of a single Majorana state. Multiple overlapping Majorana states are protected by
chiral symmetry which is present in systems exhibiting planar magnetic textures.
Thus the topological properties of coupled chains exhibit nontrivial behaviour as a
function of the number of chains beyond the even-odd dichotomy expected from $Z_2$
classification. In addition, it is possible that a ladder of two or more coupled chains
exhibit Majorana edge states even when decoupled chains are trivial.

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