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Majorana end modes in STM Fabricated Atomic Chains on the Surface of a Superconductor: Theory & Experiment STEVAN NADJ-PERGE, ILYA DROZDOV, JUNGPIL SEO, ANDREI BERNEVIG, ALI YAZDANI, Princeton University — The search for Majorana fermions (MF) in solid state devices has been hampered by the possible affects of disorder which may induce signatures similar to those expected by novel MF boundary states. Therefore it is important to identify clean solid state systems in which MF modes can be easily distinguished from disorder related effects. In this talk, we will present theoretical calculations and preliminary experimental results on chains of magnetic atoms on the surface of an s-wave superconductors. The theoretical efforts show that surprisingly short magnetic chains (20 atoms long or more) support MF under specific conditions depending on spins of the magnetic atoms and their coupling. We will describe these theoretical results along with experiments in which a scanning tunneling microscopy (STM) has been used to assemble chains of magnetic atoms (3d transition metals) on Nb and Pb single crystals. Presence of Majorana boundary modes in these structures can be probed using spatially-resolved STM spectroscopy.

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