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Exploring signatures of Majorana fermions in Fe chains on Pb using a dilution refrigerator scanning tunneling microscope BENJAMIN E. FELDMAN, ILYA K. DROZDOV, MALLIKA T. RANDERIA, JIAN LI, B. ANDREI BERNEVIG, ALI YAZDANI, Princeton University — Recently, it was shown that Majorana fermions can be realized by depositing chains of magnetic atoms on a superconductor if the spins are non-collinear or if they are ferromagnetic and subject to large spin-orbit coupling. Scanning tunneling microscopy (STM) studies of Fe chains on a Pb(110) surface revealed zero-energy states localized to the ends, and a spin-polarized tip was used to show ferromagnetism in the chains as well as spin-orbit coupling on the Pb surface, providing strong evidence for Majorana fermions. These measurements were performed at 1.4 K, and the width of the zero-energy mode was limited by thermal broadening. In this talk, I will present subsequent measurements in which we extend these results to temperatures below 250 mK using a dilution refrigerator STM. The low temperature allows us to obtain significantly higher energy resolution, and I will discuss our results in the context of Majorana fermions.

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