

Abstract Submitted
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Majorana Fermions in Chiral Topological Ferromagnetic Nanowires¹ EUGEN DUMITRESCU, BRENDEN ROBERTS², SUMANTA TEWARI, Clemson University, JAY D. SAU, University of Maryland — Motivated by a recent experiment in which zero-bias peaks have been observed in STM experiments performed on chains of magnetic atoms on a superconductor, we show that a multichannel ferromagnetic wire deposited on a spin-orbit coupled superconducting substrate can realize a non-trivial chiral topological superconducting state with Majorana bound states localized at the wire ends. The non-trivial topological state occurs for generic parameters requiring no fine tuning, at least for very large exchange spin splitting in the wire. We theoretically obtain the signatures which appear in the presence of an arbitrary number of Majorana modes in multi-wire systems incorporating the role of finite temperature, finite potential barrier at the STM tip, and finite wire length. These signatures are presented in terms of spatial profiles of STM differential conductance which clearly reveal zero energy Majorana end modes and the prediction of a multiple Majorana based fractional Josephson effect.

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