

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Gate-defined wires in HgTe quantum wells as a robust Majorana platform¹ JOHANNES REUTHER, JASON ALICEA, Department of Physics, Caltech, AMIR YACOBY, Department of Physics, Harvard — We propose a new quasi-1D platform for Majorana zero-modes based on gate-defined wires in HgTe. Due to the Dirac-like band structure for HgTe such wires exhibit several remarkable properties. Most strikingly, modest gate-tuning allows one to modulate the Rashba spin-orbit energy from zero up to $\sim 30K$, and the effective g-factor from zero up to giant values of ~ 600 . The large achievable spin-orbit coupling and g-factor together allow one to access Majorana modes in this setting at exceptionally low magnetic fields while maintaining robustness against disorder. Moreover, gate-defined wires may facilitate the fabrication of networks required for realizing non-Abelian statistics and quantum information devices. The exquisite tunability of parameters further suggests applications in spintronics.

¹Research supported by the Deutsche Akademie der Naturforscher Leopoldina through Grant No. LPDS 2011-14.

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Date submitted: 05 Nov 2012

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