Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Signatures of topological superconductivity in quantum spin Hall/superconductor junctions[1] SHU-PING LEE, California Institute of Technology, KAREN MICHAELI, Weizmann Institute of Science, JASON ALICEA, California Institute of Technology, AMIR YACOBY, Harvard University — Interfacing s-wave superconductors with quantum spin Hall systems provides a highly favorable route to topological superconductivity and Majorana zero-modes. Indeed, once a proximity effect is successfully induced, topological superconductivity emerges very naturally – tuning of the chemical potential in the quantum spin Hall system is unnecessary, and moreover disorder effects are greatly suppressed since time-reversal symmetry breaking is not required. The ability to implement such systems raises fundamental questions; for instance, how can one definitively expose the topological superconducting phase experimentally? We provide a possible answer by studying long Josephson junctions in quantum spin Hall systems. In particular, we predict fingerprints of topological superconductivity related to the "fractional Josephson effect" that, remarkably, survive even in the presence of parity relaxation processes.

[1]NSF grant DMR-1341822, IQIM

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Date submitted: 15 Nov 2013 Electronic form version 1.4