Abstract Submitted
for the TSF12 Meeting of
The American Physical Society

Majorana Fermions Under Stress LI MAO, MING GONG, Department of Physics, the University of Texas at Dallas, Richardson, TX, 75080 USA, SUMANTA TEWARI, Department of Physics and Astronomy, Clemson University, Clemson, SC, 29634 USA, CHUANWEI ZHANG, Department of Physics, the University of Texas at Dallas, Richardson, TX, 75080 USA — Spin-orbit coupled semiconductor nanowires with Zeeman splitting in proximity contact with bulk s-wave superconductivity have recently been proposed as a promising platform for realizing Majorana fermions. However, in this setup the chemical potential of the nanowire is generally pinned by the Fermi surface of the superconductor. This makes the tuning of the chemical potential by external electrical gates, a crucial requirement for unambiguous detection of Majorana fermions, very challenging in experiments. Here we show that tunable topological superconducting regime supporting Majorana fermions can be realized in semiconductor nanowires using uniaxial stress. For n-type nanowires the uniaxial stress tunes the effective chemical potential, while for p-type systems the effective pairing may also be modified by stress, thus significantly enhancing the topological minigap. We show that the required stress, of the order of 0.1%, is within current experimental reach using conventional piezo crystals.

Li Mao
Department of Physics, the University of Texas at Dallas,
Richardson, TX, 75080 USA

Date submitted: 07 Sep 2012 Electronic form version 1.4