

Abstract Submitted  
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**Quantum Point Contacts and Valley Filters on a 6-fold Degenerate Hydrogen-terminated Si(111) Surface** LUKE D. ROBERTSON, U. of Maryland, BINHUI HU, NIST Gaithersburg, B. E. KANE, U. of Maryland — Hydrogen-terminated Si(111) surfaces preserve the 6-fold valley degeneracy and anisotropic electron mass predicted in bulk Si, providing a unique environment for 2-D electron systems (2DESs). Our group has demonstrated high mobility as well as the fractional quantum Hall effect for electrons confined on the Si(111) surfaces, establishing evidence that they are ideal platforms for 2DESs and lower dimensional systems. Recently, we have succeeded in fabricating high mobility ambipolar devices and have found that heavily p-doped regions can be used as lateral depletion gates for confinement of 2DESs induced by a top gate [1]. Here, we describe our efforts to extend this technology to the nanoscale and in particular towards the fabrication of quantum point contacts (QPCs). QPCs realized in materials with anisotropic electron mass may exhibit valley filter phenomena [2] leading to extreme sensitivity to single donor occupancy, and thus are of interest to measurement schemes for donor-based quantum information processing. Preliminary measurements and fabrication techniques will be discussed. [1] B. Hu, et al, arXiv, 1509.03849 (2015) [2] Gunawan et al, Phys. Rev. B, 74, 155436 (2006)

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