Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Synthetic p-wave scattering in a degenerate Fermi gas BENJAMIN STUHL, National Institute of Standards and Technology and Joint Quantum Institute, LAUREN AYCOCK, Cornell University, Joint Quantum Institute, and National Institute of Standards and Technology, DINA GENKINA, University of Maryland, Joint Quantum Institute, and National Institute of Standards and Technology, IAN SPIELMAN, National Institute of Standards and Technology and Joint Quantum Institute — P-wave superfluids are fascinating for a number of reasons; perhaps the most notable of these is their ability to support Majorana-type excitations [1]. Unfortunately, attempts to use p-wave Feshbach resonances to produce superfluid states in ultracold, fermionic gases have substantially failed due to to the large inelastic loss rates associated with those resonances [2,3]. We demonstrate a new approach to the problem: we use optical Raman dressing to artificially engineer the scattering properties. This allows us to convert the scattering strength of an s-wave Feshbach resonance into a strong p-wave interaction in an ultracold gas of ^{40}K atoms. Our prior success in engineering d- and g-wave scattering in a degenerate Bose gas [4] is strong evidence for the viability of this technique.

[1] V. Gurarie and L. Radzihovsky, *Phys. Rev. B* **75**, 212509 (2007).
[2] C. Chin, et al., *Rev. Mod. Phys.* **82**, 1225 (2010).
[3] C. A. Regal, et al., *Phys. Rev. Lett.* **90**, 053201 (2003).
[4] R. A. Williams, et al., *Science* 335, 314 (2012).

Benjamin Stuhl
NIST / JQI

Date submitted: 31 Jan 2014 Electronic form version 1.4