Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Quantum phase transitions across p-wave Feshbach resonance[1]
VICTOR GURARIE, LEO RADZIHOVSKY, University of Colorado, Boulder, ANTON ANDREEV, University of Washington — We study a single-species polarized Fermi gas tuned across a narrow p-wave Feshbach resonance. We show the existence of a magnetic field-tuned quantum phase transition as detuning sweeps across the Fermi energy, between a p_x-wave BCS superfluid and a $p_x + ip_y$ molecular superfluid in the BEC regime. The latter state, that spontaneously breaks time-reversal symmetry, furthermore undergoes a topological $p_x + ip_y$ to $p_x + ip_y$ transition at zero chemical potential, μ. In two-dimensions, for $\mu > 0$ it is characterized by a Pfaffian ground state exhibiting topological order and non-Abelian excitations familiar from fractional quantum Hall systems.

[1]DMR-0321848 (L. R.), DMR-9984002 (A.A.), Packard Foundation (L.R., A.A.)

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Date submitted: 24 Nov 2004 Electronic form version 1.4