

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**p-wave superfluid with imbalanced atomic population in harmonic trap**<sup>1</sup> AMMAR KIRMANI, KHANDKER QUADER, MAXIM DZERO, Kent State Univ - Kent — We consider the problem of  $p$ -wave superfluid pairing in an atomic Fermi gas across Feshbach resonance for imbalanced populations in presence of an optical trap. For our harmonic trapping potential, we employ Local Density Approximation (**LDA**) through chemical potential. In two-channel mean field approximation pairing model, we show that depending on the distance from the trap's center, the  $p$ -wave superfluid state will have the lowest energy. The ground state order parameter configuration we find is not invariant under parity and time-reversal symmetry operations. We also present phase diagrams and density profiles in one-channel model for our singlet  $p$ -wave pairing and show that the center of trap is occupied by  $p$ -wave superfluid. The work of A. K. and M. D. was financially supported by the National Science Foundation Grant No. DMR-1506547.

<sup>1</sup>National Science Foundation Grant No. DMR-1506547

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Date submitted: 09 Nov 2016

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