Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Quantum fluctuations in the superfluid state of the BCS-BEC crossover RAJDEEP SENSARMA, ROBERTO DIENER, MOHIT RANDERIA, The Ohio State University — While the Leggett-BCS mean-field approach gives a reasonable 'zeroth order' description of the superfluid ground state in the BCS-BEC crossover, there are many ways in which it is inadequate. In addition to quantitative discrepancies with quantum Monte Carlo and experimental results at unitarity and with exact results for dimer-dimer scattering in the BEC limit, the mean field theory also misses the qualitative effects of quantum depletion of the condensate in a strongly interacting Fermi system. To address these concerns, we include the effects of zero-point motion of collective excitations and of the pair continuum in calculating various ground state properties. We implement this RPA in a functional integral formalism which ensures that the feedback of the collective modes on the saddle point respects Goldstone's theorem. We will present results on the ground state energy, gap, compressibility and collective mode frequency as a function of $1/k_f a_s$.

Rajdeep Sensarma
The Ohio State University

Date submitted: 20 Nov 2006 Electronic form version 1.4