

Abstract Submitted  
for the DAMOP17 Meeting of  
The American Physical Society

**Thermodynamics and Structural Transition of Binary Fermi-Bose Mixtures of Ultracold Atoms** TOM KIM, CHIH-CHUN CHIEN, University of California, Merced — A mixture of spin-polarized fermionic and repulsive bosonic ultracold atoms can go through phase separation if the boson-fermion interaction is sufficiently large and the temperature sufficiently low. By evaluating the grand partition function from standard statistical mechanics, we obtain the thermodynamic free energies and its associated quantities at finite temperatures. We examine the stability of a mixture from the structure of the free energy. For a uniform box potential, strong interspecies repulsion separates the two components, and the thermodynamic quantities of each component can be systematically determined. A mixture in a harmonic trap distorts the density profiles. By using the local density approximation, we found several different structures, such as partially mixed regions or fully separated regions, depending on the mass ratio and interactions.

Tom Kim  
University of California, Merced

Date submitted: 26 Jan 2017

Electronic form version 1.4