

Abstract Submitted  
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**First and second sound in the BCS-BEC crossover in uniform Fermi superfluid gases** ALLAN GRIFFIN, EDWARD TAYLOR, University of Toronto — . The Landau two-fluid hydrodynamic equations are valid in the BCS-BEC crossover when the scattering length is very large. The frequencies of the in-phase and out-phase hydrodynamic modes at finite temperatures are determined by the equilibrium thermodynamic functions, including the temperature-dependent superfluid density. In turn, these depend on the Fermionic and Bosonic thermal excitations. We have calculated all these functions at finite temperatures in a uniform superfluid Fermi gas, including the particle-particle fluctuations using the well-known Nozieres-Schmitt-Rink approximation. These results will be extended to calculate the analogous hydrodynamic modes in a trapped superfluid gas, working within the LDA.

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