

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Propagation of second sound in a superfluid Fermi gas in the unitary limit** EMIKO ARAHATA, TETSURO NIKUNI, Tokyo University of Science — We study sound propagation in a uniform superfluid gas of Fermi atoms in the unitary limit. The existence of normal and superfluid components leads to appearance of two sound modes in the collisional regime, referred to as first and second sounds. The second sound is of particular interest as it is a clear signal of a superfluid component. Using Landau's two-fluid hydrodynamic theory, we calculate hydrodynamic sound velocities and these weights in the density response function. The latter is used to calculate the response to a sudden modification of the external potential generating pulse propagation. The amplitude of a pulse which is proportional to the weight in the response function is calculated, on the basis of the approach of Nozères and Schmitt-Rink for the BCS-BEC crossover. We show that, in a superfluid Fermi gas at unitarity, the second-sound pulse is excited with an appreciate amplitude by density perturbations.

Tetsuro Nikuni  
Tokyo University of Science

Date submitted: 20 Nov 2009

Electronic form version 1.4