Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Collective excitations of a resonantly interacting Fermi gas across the superfluid transition SASCHA HOINKA, CARLOS KUHN, JAMES DENIER, IVAN HERRERA, PAUL DYKE, CHRIS VALE, Swinburne University of Technology, JAMI KINNUNEN, Aalto University, GEORG BRUUN, University of Aarhus — We explore the temperature dependence of the elementary excitations across the superfluid phase transition in a homogeneous unitarity Fermi gas using low-momentum Bragg spectroscopy. At long wavelength, Bragg scattering probes collective excitations of the gas which are closely linked to the superfluid order parameter. In the experiments, we shine two tightly focussed laser beams into the central, nearly homogeneous, volume of an optically trapped cloud of lithium-6 atoms with equal spin population and measure the density-density response. The dominant feature in the measured Bragg spectra is a peak corresponding to the phonon mode, which dramatically changes in both amplitude and width across the superfluid to normal fluid transition. We can use this to study dynamic properties such as damping and the evolution of the speed of sound. The latter allows also us to link the density response to the thermodynamics of the system via the pressure equation of state.

Sascha Hoinka
Swinburne University of Technology

Date submitted: 26 Jan 2018 Electronic form version 1.4