

Low-lying Excitations in Strongly Interacting Fermi Gases

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The physical properties of many-body quantum systems can be quantified through measurements of the elementary excitations. We use two-photon Bragg spectroscopy to probe the excitation spectra of strongly interacting Fermi gases as a function of both the temperature and interactions. At temperatures below the superfluid transition, the Bogoliubov-Anderson phonon mode is the dominant excitation and its frequency and width provide the sound speed and damping rate, respectively. For higher energies, single particle excitations become accessible allowing a direct measurement of the pairing gap. Bragg spectra of gases at unitarity show a strong dependence on the temperature, particularly near the superfluid transition, providing insight into the mechanisms for phonon damping.