

Abstract Submitted
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Collective excitations in a superfluid of color-flavor locked quark matter KENJI FUKUSHIMA, KEI IIDA, RIKEN BNL Research Center — By using the Nambu-Jona-Lasinio (NJL) model in the mean-field approximation, we derive the spectra both for the normal and color-flavor locked (CFL) superfluid phases at zero and finite temperature. In the normal phase, we obtain zero sound as a low-lying collective mode in the particle-hole (vector) channel. In the CFL phase, when the excitation energy, ω , is smaller than the threshold given by twice the pairing gap Δ ($\omega < 2\Delta$), a phonon corresponding to fluctuations in the U(1) phase of Δ appears as a sharp peak in the particle-particle (H) channel. The excitation energy goes up and asymptotically approaches $\omega = 2\Delta$ with increasing momentum of the phonon. Above the threshold for pair excitations ($\omega > 2\Delta$), zero sound manifests itself in the vector channel. We also find that in the long wavelength limit the phonon mode has its spectral weight in the H channel alone, while the spectral function vanishes in the vector channel.

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