Pseudogap Phenomena of an Ultracold Fermi Gas with a P-wave Feshbach Resonance

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We investigate strong-coupling effects on single-particle properties of an ultracold Fermi gas with a p-wave Feshbach resonance. Including p-wave paring fluctuations within a strong-coupling T-matrix theory, we calculate the single-particle density of states (DOS), as well as the spectral weight (SW), above the superfluid transition temperature $T_{\rm c}$. Starting from the weak-coupling regime, we show that the so-called pseudogap structure becomes remarkable near $T_{\rm c}$, with increasing the interaction strength. However, when one approaches the strong-coupling regime, the pseudogap is found to gradually disappear, due to the momentum dependence of the p-wave interaction. Such non-monotonic interaction dependence of the pseudogap structure is quite different from the case with a s-wave interaction, where the pseudogap in DOS and SW simply becomes large in the BCS-BEC crossover. Thus, our results clarify how the symmetry of the paring interaction affects the pseudogap phenomena in strong correlated Fermi systems. We also show how the pseudogap structure in DOS and SW disappears, as one increases the temperature above $T_{\rm c}$. This work was supported by Global COE Program "High-Level Global Cooperation for Leading-Edge Platform on Access Spaces (C12)".