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Quantum Monte Carlo investigation of Knight shift anomaly in Periodic Anderson model MI JIANG, NICHOLAS CURRO, RICHARD SCALETTAR, Univ of California - Davis, UC DAVIS TEAM, UC DAVIS TEAM
— We report a Determinant Quantum Monte Carlo investigation of the Knight shift anomaly observed in nuclear magnetic resonance (NMR) of heavy fermion materials. As opposed to normal Fermi liquids, the Knight shift in heavy fermion materials deviates from the total susceptibility χ below a crossover temperature T^*. This deviation is believed to originate in the different temperature dependence of the conduction electron and local moment components of the total susceptibility χ. Here we quantify the behavior of $\chi_{cc}(T), \chi_{cf}(T)$, and $\chi_{ff}(T)$ in the framework of periodic Anderson model (PAM), focussing on the evolution with different degree of conduction electron-local moment hybridization. These results confirm several predictions of the two-fluid theory of the Knight shift anomaly, including the demonstration of a universal logarithmic divergence of the contribution of the heavy electrons to the Knight shift. This universal behavior, which occurs with decreasing temperature below T^* in the paramagnetic state, agrees well with experimental findings, and indicates that different heavy fermion materials exhibit a common scaling, differing only in the coherence temperature scale, T^*.

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