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Kondo destruction in the Bose-Fermi Kondo model with a singular dissipative spectrum: Exact solutions and their implications[1] JIANHUI DAI, Zhejiang University, C.J. BOLECH, QIMIAO SI, Rice University — Quantum dissipation induces a critical destruction of the Kondo screening, which is of interest in the contexts of quantum critical heavy fermions and magnetic mesoscopic structures. The sub-Ohmic Bose-Fermi Kondo (BFK) model provides a setting to study such an effect. Here, we show that this many-body problem is exactly solvable when the spectrum of the dissipative bosonic bath, $J(\omega)$, is singular, such that $J(\tau) = \text{const.}$. We determine the exact results for the local spin correlation functions, which imply that the singular longitudinal fluctuations of the bosonic bath play a dominant role. We also demonstrate how the large-N limit of an SU(N) generalization of the same model fails to capture the $N = 2$ physics in the cases of a singular dissipative bosonic spectrum, due to an interesting under-treatment of the longitudinal fluctuations. Our results resolve an apparent inconsistency between the previous results respectively found using numerical renormalization group and large-N treatments, providing evidence that the local quantum critical solution of the extended dynamical mean field approach to the Kondo lattice model indeed has a zero residual entropy.

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