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Finite T spectral function of a single carrier injected into an Ising chain: a comparison of 3 different models[1] MIRKO MOELLER, MONA BERCIU, Univ British Columbia — When studying the properties of complex, magnetic materials it is often necessary to work with effective Hamiltonians. In many cases the effective Hamiltonian is obtained by mapping the full, multiband Hamiltonian onto a simpler, single band model. A prominent example is the use of Zhang-Rice singlets to map the multiband Emery model for cuprates onto the single band $t-J$-model. Such mappings are usually done at zero temperature (T) and it is implicitly assumed that they are justified at finite T, as well. We present results on 3 different models of a single charge carrier (electron or hole) injected into a ferromagnetic Ising chain. Model I is a two band, two sublattice model, Model II is a two band, single sublattice model, and Model III is a single band model, the so called $t-J_z$-model. Due to the absence of spin-flip terms, a numerically exact solution of all 3 Models is possible, even at finite T. At zero T a mapping between all 3 models results in the same low energy physics. However, this is no longer true at finite T. Here the low energy behavior of Model III is significantly different from that of Models I and II. The reasons for this discrepancy and its implications for more realistic models (higher dimension, inclusion of spin-flip terms) are discussed.

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Mirko Moeller
Univ British Columbia

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