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Application of the Dual Fermion-Dynamical Cluster Approach to the 1D Falicov Kimball Model SANDEEP PATHAK, ZI YANG MENG, S.-X. YANG, MARK JARRELL, JUANA MORENO, Louisiana State University — The Falicov Kimball model is the simplest model for correlated electrons. It was introduced to study metal-insulator transitions. In one dimension, it is known to possess a charge density wave (CDW) instability at zero transition temperature (T_c). However, finite cluster methods like Dynamical Mean Field Theory (DMFT), Dynamical Cluster Approximation (DCA), Cellular Dynamical Mean Field Theory (CDMFT) , etc. show finite temperature CDW transition. In this paper, we study the model using the recently developed Dual Fermion-Dynamical Cluster approach that takes into account large length scale correlations through the auxiliary particles known as dual Fermions. We find that T_c obtained from this method is lower than that obtained from the cluster methods. In particular, we study the scaling behavior of T_c with the linear cluster size and also the scaling of other one-particle and two-particle quantities near the criticality.

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