

DMRG study of the interorbital interaction in the periodic Anderson model

I. Hagymási,^{1,2} Ö. Legeza,¹ and J. Sólyom¹

¹*Strongly Correlated Systems "Lendület" Research Group,
Institute for Solid State Physics and Optics,
MTA Wigner Research Centre for Physics,
Budapest H-1525 P.O. Box 49, Hungary*

²*Department of Theoretical Physics, University of Szeged,
Tisza Lajos krt 84-86, H-6720 Szeged, Hungary*

We investigate an extended periodic Anderson model (EPAM), where besides the standard on-site f -electron interaction ($U_f \sum_j \hat{n}_{j\uparrow}^f \hat{n}_{j\downarrow}^f$) there is an on-site interaction between the f - and conduction electrons ($U_{cf} \sum_{j,\sigma,\sigma'} \hat{n}_{j\sigma}^f \hat{n}_{j\sigma'}^c$). We apply the density matrix renormalization group algorithm (DMRG) to calculate spin-spin and density-density correlation functions in the symmetric half-filled EPAM. We show that the antiferromagnetic spin correlations are suppressed for increasing U_{df} and the density-density correlation becomes dominant above a critical value of U_{df} . This critical point is determined by examining the block entropy. The charge and spin gaps are also calculated for a wide range of parameters and we study other band fillings as well.