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Magnetic impurities in real lattices: A DMRG and ECA study
CARLOS BUSSER, University of Wyoming, WY, GEORGE MARTINS, Oakland University, MI, KHALED AL-HASSANIEH, Los Alamos National Laboratory, NM, ADRIAN FEIGUIN, University of Wyoming, WY — Magnetic interactions between strongly correlated impurities coupled to a sea of conduction electrons is a subject of great interest from both, experimental and theoretical studies. When many magnetic impurities are attached to the same conduction band a rich phase diagram can arise. By one hand the magnetic impurities can be strongly coupled to the spin of the electrons of the conduction band forming a Kondo singlet. By the other, through electron of the conduction band, a spin-spin interaction between the impurities can appears as a consequence the RKKY interaction. A competition between this two singles is expected. For these two effects is important to have a good description of the electrons with energy close to the Fermi level. Systems like the square lattice, with a van-Hove singularity at the middle of the band, or Graphene, with Dirac electrons, or Carbon nanotubes with multiple bands and multiples van Hove singularities need a proper description of the electrons in the lattice Hamiltonian. In this work we present, through a canonical transformation, a numerical method to study problems with several magnetic impurities coupled to arbitrary lattices using DMRG or ECA techniques.

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