

Exact wave functions and excitation spectra of the one-dimensional double-exchange model with one mobile electron

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Motivated by recent studies of the in-gap (or nonquasiparticle) states in the half-metallic ferromagnets, we study the one-dimensional double-exchange model with one mobile electron. We solve the Schrödinger equation analytically and obtain the energies and wave functions for all the eigenstates exactly. As an application, we compute the single-particle Green's function and dynamical density correlation function. We show that the single-particle spectrum is entirely incoherent and the lowest band has an infinite band mass; i.e., the single electron is localized due to its interaction with the spin excitations, whereas the density correlation function consists of a single sharp peak with a very simple dispersion. Implication on the observed in-gap states in the half-metallic ferromagnets is considered. See Ref. [1] for details.

Reference:

[1] K. Nakano, R.Eder, and Y. Ohta, preprint (2011).