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Magnetic polarons in a one-dimensional antiferromagnetic chain
I. GONZALEZ, Oak Ridge National Lab., USA, J. CASTRO, D. BALDOMIR, Universidade de Santiago de Compostela, Spain, A.O. SBOYCHAKOV, A.L. RAKHMANOV, K.I. KUGEL, Institute for Theoretical and Applied Electrodynamics, Russia — We present several results concerning magnetic polarons in a double-exchange system. We use a simplified model consisting on an antiferromagnetic (AF) chain doped with donor impurities. First, we study the "back-effect" in the AF background of a conduction electron bound to its donor impurity. We show that a region with extended spin distortions appear in the AF structure, similar to a domain wall and stabilizing the magnetic polaron. Second, we discuss the effect of these distortions in a system doped with a finite density of donor impurities. We show that from a critical density a non-trivial energy dependence on conduction electrons density appears, which can be interpreted as an attractive interaction between magnetic polarons. Third, we analyze temperature evolution of such a system of magnetic polarons. We show that they remain stable up to rather high temperatures, larger than the Néel temperature of the undoped chain. Our results may be relevant to understand the physics of low-doped manganites.

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