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Coupling localized spins with free fermions - A model for magnetic interfaces RUBEM MONDAINI, Physics Department, The Pennsylvania State University, 104 Davey Laboratory, University Park, Pennsylvania 16802, USA, THEREZA PAIVA, Instituto de Fisica, Universidade Federal do Rio de Janeiro Cx.P. 68.528, 21941-972 Rio de Janeiro RJ, Brazil, RICHARD SCALETTAR, Physics Department, University of California, Davis, California 95616, USA — The study of transport and magnetism in surfaces is a topic of intense research and with potential applications to several materials as manganites and Cu/CuO interfaces. We study a model in which an insulating magnetic material described by a collection of localized spins couples to a metallic region. For this we introduce a stacking of antiferromagnetic spin planes on top of free-fermion planes. The interaction of the spins with the free fermions is tuned and several fermionic and spin observables are calculated in a vast region of temperatures. To obtain it, the phase space of spin configurations is spanned by a usual Metropolis algorithm and allows us to have exact values for fermionic quantities, both magnetic and transport ones, at each of the visited configurations. We observed that the increase of this interaction not only helps in localizing the fermions in the adjacent plane but turns the magnetic order in the localized spin plane more robust by increasing its critical temperature when Ising spins are considered. On the situation this coupling is large, the more distant fermionic planes start to lose connection with the rest of the system and the information regarding magnetic ordering is not propagated in the free region.

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