Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Low-temperature evolution of the spectral weight of a spin-up carrier moving in a ferromagnetic background[1] MIRKO MOELLER, MONA BERCIU, Univ British Columbia — The motion of a charged particle in a magnetically ordered background determines the electronic behavior of many weakly doped, magnetically ordered insulators and semiconductors. This problem can be solved exactly for a single charge carrier in a ferromagnetic background at T=0. There are two different cases to be considered (i) the carrier spin is oriented antiparallel with respect to the FM background and (ii) the carrier spin is aligned with the background. For the former case the solution is a spin-polaron, a dressed quasiparticle consisting of a charged particle and a bound magnon. For the latter case, on the other hand, the formation of a spin-polaron is impossible at T=0 due to the absence of spin-flip excitations. The T=0 spectrum of the spin-up carrier is therefore identical to that of a free carrier shifted by the z-part of the magnetic interaction. This changes at finite-T where thermal magnons are present in the system. To study this change, we derived the lowest-T correction to the self-energy of the spin-up carrier. This allows us to investigate how the T=0 quasiparticle peak broadens into a continuum at finite-T. Furthermore we find that spectral weight is shifted to energies outside of this continuum, which can be associated with the spin-polaron state.

[1]This work was supported by NSERC and QMI.

Mirko Moeller
Univ British Columbia

Date submitted: 13 Nov 2013 Electronic form version 1.4