Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Nuclear spin phase transition in the presence of interacting two-dimensional electrons ROBERT ŻAK, University of Basel, DMITRII MASLOV, University of Florida, DANIEL LOSS, University of Basel — The recent study of the RKKY interaction between localized moments, e.g., nuclear spins of Ga and As atoms in a GaAs heterostructure, mediated by interacting two-dimensional electrons, has shown a possibility of polarizing nuclear spins at currently accessible temperatures [1]. This ferromagnetic phase transition is governed by: (i) anisotropy of the electron spin susceptibility, χ, in the presence of Rashba spin-orbit interaction (RSOI) and (ii) nonanalyticity in momentum dependence of χ. In this talk I will argue that on top of the anisotropy in χ caused by the RSOI at zero momentum [2], the momentum dependence of χ is anisotropic itself: while the linear scaling of χ_{zz} with momentum saturates at the energy scale set by the RSOI, that of the $\chi_{xx} = \chi_{yy}$ continues through this energy scale (in this way it resembles the temperature and magnetic field dependence of χ in the presence of the RSOI [2]). The effect of the renormalization of the backscattering amplitude in the Cooper channel will be taken into account as well. In the end I will elaborate on possible implications of our results for the stability and nature of the nuclear spin ordered phase. References: [1] P. Simon and D. Loss, PRL **98**, 156401 (2007), P. Simon, B. Braunecker, and D. Loss, PRB **77**, 045108 (2008); [2] R. A. Żak, D. Maslov, and D. Loss, PRB **82**, 115415 (2010).

Robert Żak
University of Basel

Date submitted: 18 Nov 2010 Electronic form version 1.4