Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic degeneracy and C_4 symmetric magnetic phase in iron-based superconductors ILYA EREMIN, Ruhr-Universitaet Bochum, Theoretische Physik III, 44801 Bochum, Germany, ANDREY V. CHUBUKOV, Department of Physics, University of Wisconsin-Madison, Madison,Wisconsin 53706, USA — We analyze the magnetic phase diagram of iron pnictides by going beyond Ginzburg-Landau expansion and solving full non-linear equation for magnetic order parameter within itinerant model with hole pockets centered around (0,0) and electron pockets centered at (π,0) and (0, π) in the unfolded Brillouin zone. We extend our previous analysis of the itinerant model to higher carrier concentrations when Fermi surface nesting is weaker, and find that the phase diagram is richer than previously anticipated. We show that, in addition to stripe SDW order which breaks C_4 rotational symmetry, there exists, in some range of parameters, a different type of SDW order which preserves C_4 symmetry. The order parameter in this new phase is equally weighted combination of SDW components with wavevectors $Q_X = (\pi,0)$ and $Q_Y = (0,\pi)$. The new phase emerges from the stripe phase via a second transition at $T < T_N$. Such a phase is highly unlikely in the orbital scenario for magnetism in iron-based superconductors, because in this scenario the breaking of the symmetry between Q_X and Q_Y is the pre-condition for the magnetic transition. We discuss recent experiments in which the second low-T magnetic phase which does not break the symmetry between Q_X and Q_Y has been detected and argue that its observation is a strong indication that the magnetic order is of magnetic rather than of orbital origin.

Ilya Eremin
Ruhr-Universitaet Bochum, Theoretische Physik III,
44801 Bochum, Germany

Date submitted: 19 Nov 2012 Electronic form version 1.4