Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Temperature-induced Domain Shrinking in Dipolar Frustrated Ising Ferromagnet DANILO PESCIA, ALESSANDRO VINDIGNI, OLIVER PORTMANN, Laboratory for Solid State Physics, ETH Zurich, 8093 Zurich, Switzerland, PAOLO POLITI, Istituto dei Sistemi Complessi, Consiglio Nazionale delle Ricerche, 50019 Sesto Fiorentino, Italy — Motivated by recent experimental observations on ultrathin Fe/Cu(001) films, we performed a theoretical analysis of magnetic domain pattern evolution in 2D Dipolar Frustrated Ising Ferromagnet. Due to the competition between long-ranged dipolar interaction and nearest neighbor ferromagnetic exchange interaction, the ground state is given by a succession of saturated domains of positive and negative magnetization, which alternate in a sharp striped pattern of characteristic domain width L_{gs}. Close to the Curie temperature T_C, the Mean Field theory predicts the occurrence of a cosine modulation with a much smaller spatial period ($L(T_C)$). We found that these two limits are connected continuously in the temperature range $0 \leq T \leq T_C$. But, as translational invariance does not hold, the interplay between thermal fluctuations and the two competing interactions gives rise to a non-trivial magnetization profile at intermediate temperatures.

Danilo Pescia
Laboratory for Solid State Physics, ETH Zurich, 8093 Zurich, Switzerland

Date submitted: 20 Nov 2006 Electronic form version 1.4