Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Dynamics of domain walls in thin films with out-of-plane magnetization[1] IMAM MAKHFUDZ, Johns Hopkins University, BENJAMIN KRÜGER, University of Hamburg, OLEG TCHERNYSHYOV, Johns Hopkins University — A thin magnetic film with a strong easy-axis anisotropy favoring the out-of-plane direction breaks up into mesoscopic magnetic domains separated by Bloch domain walls. Depending on magnetic history, these domains can form ordered stripes or disordered labyrinthine patterns. The physics of these domain walls is strongly influenced by dipolar interactions that mediate a long-range interaction between domain walls and make the wall tension negative [1]. Here we point out that the dominance of the gyrotropic force over the viscous one makes the dynamics of Bloch walls rather unusual. Low-frequency waves on such a wall are chiral: the speed of propagation is different for the two directions along the wall. The puzzling star-shaped trajectory of a magnetic bubble noted in [2] is a result of superposition of two waves with the same wavenumber and different frequencies running in opposite directions along the wall that surrounds the bubble. We point out a similarity to the edges of a quantum Hall state. [1] S. A. Langer, R. E. Goldstein, and D. P. Jackson, Phys. Rev. A **46,** 4894 (1992). [2] C. Moutafis, S. Komineas, and J. A. C. Bland, Phys. Rev. B **79,** 224429 (2009).

[1]This work was supported in part by the NSF Grant DMR-0520491

Oleg Tchernyshyov
Johns Hopkins University

Date submitted: 20 Nov 2009 Electronic form version 1.4