Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Controlling Spin-Density Wave Periodicity in Thin $Cr_{1-x}V_x$ Films
OLEG KRUPIN, University of Oregon, ELI ROTENBERG, Advanced Light Source, S. D. KEVAN, University of Oregon — Chromium is an itinerant antiferromagnet with a spin-density wave (SDW) ground state driven by a nesting of Fermi surface sheets around the Gamma and H points of the Brillouin zone. Periodicity of the SDW plays an important role in mediating magnetic interactions in magnetic multilayer structures providing a giant magnetoresistance effect and potentially interesting for application in spintronic devices. Therefore control of SDW in thin chromium films is of the high importance. It requires a detailed understanding of phenomena related to stabilization of SDW. We used angle-resolved photoemission to characterize spin-density wave and Fermi surface topology in thin $Cr_{1-x}V_x$films as a function of the film thickness, temperature, composition and hydrogen surface coverage. A key feature of our results is the ability to control the magnetic structure of thin films of Cr with an external perturbation: balancing the surface energetic interactions favored commensurate state of SDW vs. the energy associated with Fermi surface topology stabilizing SDW incommensurate phase in the bulk.

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Date submitted: 20 Nov 2006 Electronic form version 1.4