Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Vortex Flipping in Superconductor-Ferromagnet Spin Valve Structures[1] EDGAR J. PATINO, Universidad de los Andes, MARCO APRILI, Laboratoire de Physique des Solides, MARK BLAMIRE, University of Cambridge, YOSHITERU MAENO, Kyoto University — We report in plane magnetization measurements on Ni/Nb/Ni/CoO and Co/Nb/Co/CoO spin valve structures with one of the ferromagnetic layers pinned by an antiferromagnetic layer. In samples with Ni, below the superconducting transition Tc, our results show strong evidence of vortex flipping driven by the ferromagnets magnetization. This is a direct consequence of proximity effect that leads to vortex supercurrents leakage into the ferromagnets. Here the polarized electron spins are subject to vortices magnetic field occasioning vortex flipping. Such novel mechanism has been made possible for the first time by fabrication of the F/S/F/AF multilayered spin valves with a thin-enough S layer to barely confine vortices inside as well as thin-enough F layers to align and control the magnetization within the plane. When Co is used there is no observation of vortex flipping effect. This is attributed to Co shorter coherence length. Interestingly instead a reduction in pinning field of about 400 Oe is observed when the Nb layer is in superconducting state. This effect cannot be explained in terms of vortex fields. In view of these facts any explanation must be directly related to proximity effect and thus a remarkable phenomenon that deserves further investigation.

[1]Programa Nacional de Ciencias Basicas COLCIENCIAS (No. 120452128168)

Edgar Patino
Universidad de los Andes

Date submitted: 15 Nov 2013 Electronic form version 1.4