Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Depth dependent magnetization profiles of hybrid exchange springs R. KNUT, Uppsala University - Sweden, T.N. ANH NGUYEN, S. CHUNG, Q. TUAN LE, S.M. MOHSENI, Royal Institute of Technology - Sweden, V. FALLAHI, Amirkabir University of Technology - Iran, S. PERDEKOV, Lund University - Sweden, O. KARIS, Uppsala University - Sweden, R.K. DUMAS, University of Gothenburg - Sweden, C.W. MILLER, Rochester Institute of Technology - USA, J. AKERMAN, Royal Institute of Technology - Sweden — We report on the magnetization depth profile of a hybrid exchange spring system in which a Co/Pd multilayer with perpendicular anisotropy is coupled to a CoFeB thin film with in-plane anisotropy. Such materials allow for additional control of the magnetization dynamics in magnetic nanostructures, and suggest the possibility of improved spin transfer torque-MRAM switching behavior and thermal stability. The competition between these two orthogonal anisotropies promotes a strong depth dependence of the magnetization orientation. The angle of the magnetization vector is sensitive both to the strength of the individual anisotropies and to the local exchange constant, and is thus tunable by changing the thickness of the CoFeB layer and by substituting Ni for Pd in one layer of the Co/Pd stack. The resulting magnetic depth profiles are directly probed by element-specific x-ray magnetic circular dichroism of the Fe and Ni layers located at different average depths. The experimental results are corroborated by micromagnetic simulations.

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Date submitted: 13 Nov 2014 Electronic form version 1.4