Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Radiation Effects in GMR Devices[1] TURHAN CARROLL, S.C. PARKS, A. HAUSER, C. ROBINETTE, J. LUCY, D. PELEKHOV, P.C. HAMMEL, F.Y. YANG, E. JOHNSTON-HALPERIN, Department of Physics, J. TALNAGI, T. BLUE, Department of Mechanical Engineering, The Ohio State University, J.P. MATHIS, Department of Physics, Norfolk State University — Current information technology relies heavily on magnetic materials via GMR read heads and magnetic random access memory (MRAM). The presumption is that these materials are radiation hard with respect to both photons and particles, potentially indicating utility for nuclear energy and space based applications. However, to date there are few detailed studies of magnetism in GMR devices in radioactive environments. This work explores the effects of gamma ray and neutron irradiation on GMR multilayers. The layer structure used in this experiment is Py/Cu/Py/FeMn/Ge. To study the effects of radiation three probes of magnetization, VSM, MR, and MOKE, are correlated pre and post radiation. We present characterization of the devices for multiple device geometries and doses up to 50Mrad for gamma rays and a minimum fast flux of (E_n >0.5MeV) of 6.3E12 nv for neutrons, both of which are well above the failure threshold for radiation-hard semiconducting devices.

[1]Partial support provided by the NSF MRSEC program: DMR-0820414.

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Date submitted: 20 Nov 2009 Electronic form version 1.4