Abstract Submitted
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Exploring Strain Induced Magnetization Effects in Metamagnetic Artificial Multiferroics using Polarized Neutron Reflectometry STEVEN BENNETT, ANDREAS HERKLOTZ, ANTHONY WONG, THOMAS WARD, VALERIA LAUTER, Oak Ridge National Laboratory — There is currently a strong drive to realize a controllable magnetic ordering transition for use in next generation spintronic based memory and computation devices. One proposed method to gain such control is the use of a changing strain in a thin film metamagnetic artificial multiferroic system. While basic concepts using electric field actuated piezoelectric strain have been recently demonstrated[1], there is very little understanding of the details of strains effect on such magnetic phase transitions. Using the depth sensitive method of polarized neutron reflectometry we have been able to probe the fine details of strains contribution to the metamagnetic transition in thin films of metamagnetic FeRh[2]. Here we explore the effects of changing lattice strain as a function of depth using both a barium titanate substrate's structural phase transitions[3] and He ion implantation. These studies have discovered a remarkably large coupling between the systems strain state and the switching behavior across the magnetostructural metamagnetic transition. [1] Cherifi, R. O. et al. Nat. Mater. 31, 345–351 (2014), [2] Bennett, S. P. et al. Sci. Rep. 5, 9142 (2015), [3] Bennett, S. P. et al. submitted (2015)

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