Abstract Submitted
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Ab-initio simulation of magnetic exchange force mycroscopy of the antiferromagnetic Fe monolayer on W(001) CESAR LAZO, STEFAN HEINZE, Institute of Applied Physics, University of Hamburg, Germany, VASILE CACIUC, HENDRIK HOELSCHER, Institute of Physics, University of Muenster, Germany — Magnetic exchange force microscopy (MExFM) is a promising new technique to perform magnetic imaging with atomic resolution by measuring the magnetic exchange force between a magnetically coated tip and a magnetic sample [1]. Here, we apply density functional theory using the full-potential linearized augmented plane wave (FP- LAPW) method to investigate the exchange forces on the antiferromagnetic monolayer Fe on W(001) [2]. We use an Fe cluster as a tip model and include relaxations of the cluster and the surface. Surprisingly, relaxation effects of tip and sample depend sensitively on the local magnetic configuration. Therefore, relaxations play a crucial role for the magnetic signal. In particular, the onset of the exchange forces is shifted to larger distances, which facilitates their experimental observation. Based on the calculated force-distance curves we simulate MExFM images which display a competition of chemical and magnetic forces. Our simulations can explain the experimentally observed magnetic contrast [3]. [1] U. Kaiser *et al.*, Nature 446, 522 (2007). [2] A. Kubetzka *et al.*, Phys. Rev. Lett. 94, 087204 (2005). [3] R. Schmidt, C. Lazo, *et al.*, submitted (2007).

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