Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Two-dimensional atomic-scale magnetic skyrmion lattice of Fe/Ir(111) STEFAN HEINZE, Instiute of Theoretical Physics and Astrophysics, University of Kiel, Germany, KIRSTEN VON BERGMANN, Institute of Applied Physics, University of Hamburg, Germany, GUSTAV BIHLMAYER, Institut fuer Festkoerperforschung, Forschungszentrum Juelich, Germany, MATTHIAS MENZEL, ANDRE KUBETZKA, ROLAND WIESENDANGER, Institute of Applied Physics, University of Hamburg, Germany, STEFAN BLUEGEL, Institut fuer Festkoerperforschung, Forschungszentrum Juelich, Germany — Skyrmions are topologically protected field configurations with particle-like properties which were believed to crystallize only under non-equilibrium conditions. Recently, it has been predicted that they can also become ground states in magnetic systems with broken inversion symmetry [1]. We give theoretical evidence of a two-dimensional lattice of atomic-scale skyrmions as the magnetic ground state of a monolayer Fe on Ir(111), a system which has been studied by spin-polarized scanning tunneling microscopy [2]. We apply an extended Heisenberg model based on parameters determined from first-principles to identify the four-spin interaction as its microscopic origin. This interaction couples degenerate spin spirals and enforces a square-symmetry on the skyrmionic spin texture decoupled from the underlying hexagonal atomic lattice. [1] U. K. Rößler et al., Nature 442, 797 (2006). [2] K. von Bergmann et al., PRL 96, 167203 (2006).

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Date submitted: 09 Dec 2009 Electronic form version 1.4