Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Quantum-size induced giant spin-orbit splitting S. MATHIAS, JILA and Department of Physics, University of Colorado, Boulder, USA, A. RUFFING, F. DEICKE, I. SAKAR, M. AESCHLIMANN, University of Kaiserslautern and Research Center OPTIMAS, Kaiserslautern, Germany, M. WIESENMAYER, M. BAUER, IEAP, Universitaet Kiel, Kiel, Germany, G. BIHLMAYER, Institut fuer Festkoerperforschung and Institute for Advanced Simulation, FZ Juelich, Juelich, Germany, Y.M. KOROTEEV, Institute of Strength Physics and Materials Science, Tomsk, Russia, E.V. CHULKOV, P.M. ECHENIQUE, DIPC, San Sebastian, Spain and CSIC-UPV/EHU San Sebastian, Spain — We report on the observation of a giant spin-orbit splitting of quantum-well states in the unoccupied electronic structure of a Bi monolayer on Cu(111). Up to now, Rashba-type splittings of this size have been reported exclusively for surface states in a partial bandgap. With these quantum-well states we have experimentally identified a second – and broader – class of states that show a huge spin-orbit splitting. First-principle electronic structure calculations show that the origin of the spin-orbit splitting is due to the perpendicular potential at the surface and interface of the ultrathin Bi film. This finding allows for the direct possibility to tailor spin-orbit splitting by means of thin film nanofabrication.

Stefan Mathias
JILA and Dep. of Physics, Univ. of Colorado, Boulder, USA

Date submitted: 02 Dec 2009 Electronic form version 1.4