

Abstract Submitted  
for the MAR08 Meeting of  
The American Physical Society

**Giant anisotropic magnetoresistance in ultra thin (Ga,Mn)As**  
RASHID GAREEV, MARKUS SCHLAPPS, Institute of Experimental and Applied Physics, University of Regensburg, Universitaetstrasse 31, 93040 Regensburg, Germany, JANUSZ SADOWSKI, MAX-Lab, Lund University, 22100 Lund, Sweden, WERNER WEGSCHEIDER, DIETER WEISS, Institute of Experimental and Applied Physics, University of Regensburg, Universitaetstrasse 31, 93040 Regensburg, Germany — We describe the effect of giant anisotropic magnetoresistance (GAMR) for epitaxial ultra thin (Ga,Mn)As below the metal-insulator transition (MIT). The GAMR is observed for 5 nm-thick Ga<sub>0.95</sub>Mn<sub>0.05</sub>As films after annealing in optimized conditions in planar geometry for patterned Hall bars at T<10K, where longitudinal resistance  $R_o \sim h/e^2$ . The GAMR manifests itself in magnetization-dependent high-resistance (HR) and low-resistance (LR) states along different crystallographic directions. We demonstrate that holes are strongly localized in HR states and localization depends on orientation of magnetization, amplitude of current and magnetic field. The decrease of current amplitude is accompanied by an enhancement of the GAMR for both in-plane and orthogonal-to-plane orientations of magnetic field. Changes of  $R_{xx}$  between HR and LR states reach~100% at T=1.7K. In the Hall geometry the changes of transverse component  $R_{xy}$  in magnetic field exceed 1000%. The behaviour of GAMR we ascribe to anisotropic spin-orbit scattering, strong localization below MIT and localization-delocalization effects in magnetic and electric fields.

Rashid Gareev  
Institute of Experimental and Applied Physics, University of Regensburg,  
Universitaetstrasse 31, 93040 Regensburg, Germany

Date submitted: 29 Nov 2007

Electronic form version 1.4