

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Size-dependent giant-magnetoresistance in millimeter scale GaAs/AlGaAs 2D electron devices¹ R.G. MANI, Georgia State University, A. KRIISA, Emory University, W. WEGSCHEIDER, ETH-Zurich — This study examines a “bell-shape” negative Giant Magneto-Resistance (GMR) that grows in magnitude with decreasing temperatures in mm -wide devices fabricated from the high-mobility GaAs/AlGaAs 2-Dimensional Electron System (2DES). Experiments show that the span of this magnetoresistance on the magnetic-field-axis increases with decreasing device width, W , while there is no concurrent Hall resistance, R_{xy} , correction. A multi-conduction model, including negative diagonal-conductivity, and non-vanishing off-diagonal conductivity, reproduces experimental observations. The results suggest that boundary scattering in the mm -wide 2DES with mm -scale electron mean-free-paths might be responsible for the observed “non-ohmic” size-dependent negative GMR [1]

[1] R. G. Mani, A. Kriisa, and W. Wegscheider, Sci. Rep. 3, 2747 (2013).

¹Supported by the DOE-BES under DE-SC0001762 and by the ARO under W911NF-07-01-015.

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Date submitted: 14 Nov 2013

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