Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Transport and noise in 90nm n-GaAs Epilayers[1] A. GILBERTSON, J.D. MOORE, G. PERKINS, J. GALLOP[2], L.F. COHEN, Imperial College, A.K.M. NEWAZ, S.A. SOLIN[3], Washington University — Extraordinary Magnetoresistance (EMR) belongs to the family of EXX effects which form the basis for a number of devices that offer the potential for high sensitivity applications. Such devices would benefit from minimising the active volume of the sensor. To reduce that volume and minimize wafer fabrication complexity it is desirable to employ unltra-thin GaAs epilayers. Accordingly, we report here the transport and noise properties of 90nm Si-doped GaAs films grown by molecular beam epitaxy which have been fabricated into both microscopic EMR devices and macroscopic van der Pauw geometries. These films exhibit a room temperature electron mobility and density of 3225 $cm^2V^{-1}s^{-1}$ and1.45x10$^{17}cm^{-3}$, respectively, and show only a 6% variation over the temperature range $2K < T < 290K$. Their noise power spectrum is proportional to f$^{-0.88}$ below 10KHz and is linear with bias current. The integration of such epilayer EMR devices into a home-built scanning microscope rig designed for imaging the magnetic flux distribution of functional magnetic materials will be discussed.

[1]Research supported by the NSF, NIH and EPSRC (UK)
[2]Visiting Professor from the National Physical Lab (UK)
[3]On sabbatical at Imperial College for the 08-09 academic year.

Stuart Solin
Washington University

Date submitted: 20 Nov 2008 Electronic form version 1.4