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**Non-local spin transport and accumulation measurements in Si:AlGaAs with tunable carrier density**[1] JENNIFER MISURACA, J.-I. KIM, Florida State University, K.K. MENG, L. CHEN, J. LU, J.H. ZHAO, Institute of Semiconductors, Chinese Academy of Sciences, P. XIONG, S. VON MOLNAR, Florida State University — The spin lifetime in GaAs varies strongly with carrier density near the insulator to metal transition (IMT), possibly peaking at the transition [1]. However, determining the optimal spin lifetime in this material is challenging because many replica samples need to be fabricated and measured. This difficulty can be circumvented by employing Si:$Al_{0.3}Ga_{0.7}As$, a persistent photoconductor, as the spin transport medium. This material has been characterized and has an effective carrier density which can be tuned *in situ* via photo-excitation from $10^{14}$ to $10^{18}cm^{-3}$ and a critical carrier density for the IMT of 9.0 x $10^{16}cm^{-3}$ at 5K [2]. Heterostructures have been grown by MBE, consisting of 2 $\mu$m Si:AlGaAs, a thin epitaxial Fe layer, and an AlGaAs graded junction to create Schottky tunnel barrier contacts. Non-local spin devices have been fabricated and measured. Based on non-local 4 terminal (NL 4T) and local and NL 3T Hanle effect measurements, the initial electrical spin transport and accumulation measurements in this material are reported. The spin lifetimes range from 600 ps to 2.8 ns for multiple carrier densities, ranging from 3.5 x $10^{16}$ to 2.4 x $10^{17}cm^{-3}$. [1] J. M. Kikkawa et al., Phys. Rev. Lett. 80, 4313 (1998). [2] J. Misuraca et al., Phys. Rev. B. 82, 125202 (2010).

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