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Electron Spin Resonance on Mobile and Confined States in Gated Modulation Doped Si/SiGe Heterostructures JIANHUA HE, H. MALISSA, TZU-MING LU, S. SHANKAR, A.M. TYRYSHKIN, S.A. LYON, Princeton University, HUNG-MING CHEN, CHIEH-HSIUNG KUAN, National Taiwan University — Electron spins in quantum dots in Si/SiGe heterostructures are promising qubits but controlling and measuring spins in gated dots is challenging. Fortunately, electrons confined into natural quantum dots by interface disorder can capture the spin physics with minimal processing, exhibiting long T_1 and T_2 at the Si/SiO_2 interface[1]. Natural quantum dots in the Si/SiGe system may be similarly useful. As a first step, we have fabricated a 2.2 x 13mm^2 Hall bar on a Si/SiGe substrate gated with an Al gate above an Al_2O_3 insulator, and performed electron spin resonance (ESR) at gate voltages above and below threshold. The ESR signal arising from the Si quantum well evolves with gate voltage, and its intensity (spin susceptibility) is measured as a function of temperature down to 0.4K. The susceptibility follows a Pauli dependence when the gate is biased above threshold, while it is Curie-like below threshold, indicating an evolution from a mobile 2D system towards localized states confined in natural dots by the intrinsic disorder in the quantum well. This work is supported by LPS and ARO. [1] S. Shankar, et al., *Physica E*, 40, 1659-1661 (2008).

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