Abstract Submitted for the MAR13 Meeting of The American Physical Society

Dispersive Readout of a Few-Electron Double Quantum Dot with Fast rf Gate-Sensors¹ ALICE MAHONEY, JAMES COLLESS, JOHN HORNI-BROOK, ANDREW DOHERTY, DAVID REILLY, ARC Centre of Excellence for Engineered Quantum Systems, School of Physics, The University of Sydney, Sydney, NSW 2006, Australia., HONG LU, ART GOSSARD, Materials Department, University of California, Santa Barbara, California 93106, USA. — We report the dispersive charge-state readout of a double quantum dot in the few-electron regime using the *in situ* gate electrodes as sensitive detectors. We benchmark this gatesensing technique against the well established quantum point contact (QPC) charge detector and find comparable performance with a bandwidth of ~ 10 MHz and an equivalent charge sensitivity of ~ $6.3 \times 10^{-3} \text{ e}/\sqrt{\text{Hz}}$. Dispersive gate-sensing alleviates the burden of separate charge detectors for quantum dot systems and promises to enable readout of qubits in scaled-up arrays.

¹We acknowledge funding from the U.S. Intelligence Advanced Research Projects Activity (IARPA), through the U.S. Army Research Office and the Australian Research Council Centre of Excellence Scheme (Grant No. EQuS CE110001013)

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Date submitted: 27 Nov 2012