

Abstract Submitted  
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**Enhanced Coherence and High Figure of Merit in a Silicon Charge qubit** ZHAN SHI, CHRISTIE SIMMONS<sup>1</sup>, DANIEL WARD, JONATHAN PRANCE<sup>2</sup>, TECK SENG KOH, JOHN GAMBLE, XIAN WU, DONALD SAVAGE, MAX LAGALLY, MARK FRIESEN, SUSAN COPPERSMITH, MARK ERIKSSON, University of Wisconsin - Madison — Coherent manipulation of a charge qubit is an essential step in the use of pulsed gate voltages [1] to manipulate a quantum dot hybrid spin qubit [2]. Here, we demonstrate coherent manipulation of a charge qubit in Si/SiGe double quantum dot. We perform Larmor oscillations (x-rotations on the Bloch sphere) between the (2,1) and (1,2) charge states, measuring a  $T_2^*$  time of 2.1 ns at the charge degeneracy point. We find an increased coherence time (3.7 ns) and higher figure of merit (37) away from the charge degeneracy point, arising from a second charge anti-crossing involving a low lying excited state in the right dot – the desired structure for a hybrid spin qubit. We also observe Ramsey fringes (z-rotations on the Bloch sphere) and measure a  $T_2^*$  of 179 ps at detunings away from any protective energy level structures.

[1] Teck Seng Koh, et al., e-print: <http://arxiv.org/abs/1207.5581>

[2] Zhan Shi, et al., *Phys. Rev. Lett.* **108**, 140503 (2012). e-print: <http://arxiv.org/abs/1110.6622>

[3] Zhan Shi, et al., e-print: <http://arxiv.org/abs/1208.0519>

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