

Abstract Submitted  
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**Non-adiabatic Quantum Control of a Semiconductor Charge Qubit**<sup>1</sup> YULIYA DOVZHENKO, JIRI STEHLIK, KARL PETERSSON, JASON PETTA, Princeton University, HONG LU, ARTHUR GOSSARD, University of California, Santa Barbara — A GaAs double quantum dot is configured in the single-electron regime and operated as a charge qubit. The two basis states correspond to the electron being in either the left or the right dot. Non-adiabatic voltage pulses are applied to the depletion gates to drive coherent rotations, and the double dot occupation is read out using a nearby quantum point contact charge sensor. In contrast with previous work, where a single non-adiabatic pulse was applied for quantum control, we apply multiple pulses working towards a charge echo.[1,2] Data for  $\frac{\pi}{2} - \tau - \frac{\pi}{2}$  and the  $\frac{\pi}{2} - \tau_1 - \pi - \tau_2 - \frac{\pi}{2}$  “charge echo” pulse sequences are obtained and compared with numerical simulations of the charge qubit evolution. References:  
[1] K. D. Petersson *et al.*, Phys. Rev. Lett. (in press).  
[2] Y. Nakamura *et al.*, Phys. Rev. Lett. **88**, 047901 (2002).

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