Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Non-adiabatic excitation and detection of coherent oscillations of single electrons** MATTHEW BENESH, CHRISTOPHER FORD, CRISPIN BARNES, ADAM THORN, JON GRIFFITHS, GEB JONES, IAN FARRER, DAVID RITCHIE, University of Cambridge — Surface acoustic waves (SAWs) are used to drive single-electron quantum dots along a complex depleted channel defined by various split gates. As the electron moves through this potential landscape at the SAW velocity (2800m/s), the evolution of the electron's wavefunction may be probed by detecting oscillations in the probability of tunnelling through a narrow barrier on one side of the channel. Coherent oscillations of the wavefunction are generated by non-adiabatic potential changes on a time-scale of tens of ps. We present here results of work in which this phenomenon is observed in two separate tunnelling regions, indicating a charge coherence time $> 500$ picoseconds. Additionally, we show that the initial state of the oscillations may be determined a significant distance from the tunnelling region through the use of suitably tuned gate voltages.

Matthew Benesh
University of Cambridge

Date submitted: 09 Nov 2012 Electronic form version 1.4