Abstract Submitted
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Spectrometry of electron pumping by surface acoustic waves M.J. BENESH, M. KATAOKA[1], C.J.B. FORD, C.H.W. BARNES, J.P. GRIFFITHS, G.A.C. JONES, I. FARRER, D.A. RITCHIE, University of Cambridge — Surface acoustic waves (SAWs) generate an electrostatic potential wave when applied to a GaAs/AlGaAs heterostructure. Electrons may be captured in a SAW minimum, creating a dynamic quantum dot (QD). SAW-defined QDs may be useful for certain quantum computing schemes, since, for example, they provide reliable single-electron transport and reduce the need for fast gate switching. Surface gates above a 2D electron gas (2DEG) are used to define a quasi-1D channel (Q1DC) at a potential far above the Fermi level. A SAW pulse captures electrons from the 2DEG and pumps a number of them controllably through the Q1DC. As a SAW minimum rises up the potential slope at the channel entrance, the QD is squeezed and some electrons are ejected back into the 2DEG with energies above the Fermi level. In our experiment, we probe the range of energies at which the electrons are emitted using a narrow potential barrier as an energy spectrometer. We can also measure electrons that have been pumped through the channel. We compare these results with a model for the SAW capture/pumping process.

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