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Transport phenomena in a gate selective vertical double quantum dot VICTORIA RUSSELL, University of Cambridge & Toshiba Research Europe Ltd., SIMON CHORLEY, FRANCOIS SFIGAKIS, University of Cambridge, STUART HOLMES, Toshiba Research Europe Ltd., DAVID ANDERSON, GEB JONES, CRISPIN BARNES, IAN FARRER, CHARLES SMITH, DAVID RITCHIE, MICHAEL PEPPER, University of Cambridge — Certain proposals for a spin qubit require gate control of the position of an electron in a selected 2DEG composition. Conventionally this depends upon patterning of both top and backgates on to a substrate to a precision of within a few nanometres, a non-trivial process. Here we report an attempt to control relative population of two vertical quantum dots using only surface gates. The dots are defined using electrostatic surface gates on a double GaAs quantum well structure with a 7nm barrier. An additional top gate is used to control electron density and coupling between the two dots and hence the dominant transport path. In the crossover regime we observe Fano resonances and charge detection signatures in the conductance through the double dot. This is the first step towards control of the position of a single electron in a vertical double quantum dot composed of different semiconductor materials using only surface gates.

Victoria Russell
University of Cambridge & Toshiba Research Europe Ltd.

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