

Abstract Submitted  
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**Multi-qubit read-out of spin qubits in GaAs in a CCD like manner: the Spin qubit CCD** TIM BAART, MOHAMMAD SHAFIEI, JULES VAN OVEN, Kavli Institute of Nanoscience, Delft University of Technology, CHRISTIAN REICHL, WERNER WEGSCHEIDER, Solid State Physics Laboratory, ETH Zurich, LIEVEN VANDERSYPEN, Kavli Institute of Nanoscience, Delft University of Technology — Efficient implementation and characterization of quantum information protocols requires the ability to measure multiple qubits individually and in a single-shot manner. We reported a successful demonstration of two-qubit read-out in [1]. We now demonstrate the next step by reading out three individual spin qubits formed by a linear array of three quantum dots where each electron forms a single spin qubit. We introduce several strategies for multi-qubit measurements in dot arrays and demonstrate and implement the following protocol experimentally. We first read-out the right qubit using standard spin-to-charge conversion [2]. Next we shuttle the centre electron to the right dot and read out its spin state. Afterwards we shuttle the left qubit through the centre dot to the right, and complete the three-qubit read-out. Due to its resemblance with reading out a CCD, we coin this the Spin qubit CCD. This is the first demonstration of reading out multiple qubits through the same reservoir and allows scaling to larger arrays of qubits.

[1] K.C. Nowack *et al.*, Science **333**, 1269 (2011).

[2] J.M. Elzerman *et al.*, Nature **430**, 431-435 (2004).

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