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Single-shot correlations and two-qubit gate of solid-state spins¹

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Recent advances in nanotechnology and quantum engineering have made it possible to probe single spins in the solid-state. Here we report independent single-shot read-out of two electron spins in a double quantum dot. The read-out method is all-electrical, cross-talk between the two measurements is negligible, and read-out fidelities are $\sim 86\%$ on average. This allows us to directly probe the anti-correlations between two spins prepared in a singlet state and to demonstrate the operation of the two-qubit exchange gate on a complete set of basis states. Ongoing work focuses on integration with single-spin rotations, scaling and extending coherence times.

K.C. Nowack, M. Shafiei, M. Laforest, G.E.D.K. Prawiroatmodjo, L.R. Schreiber, C. Reichl, W. Wegscheider and L. M. K. Vandersypen, Single-shot correlations and two-qubit gate of solid-state spins, *Science* 330, 1269 (2011)

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