Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Enhancing the gate fidelity of silicon-based singlet-triplet qubits under symmetric exchange control using optimized pulse sequences[1]

CHENGXIAN ZHANG, City Univ of Hong Kong, ROBERT THROCKMORTON, Condensed Matter Theory Center and Joint Quantum Institute, Department of Physics, University of Maryland, College Park, Maryland, USA, XU-CHEN YANG, XIN WANG, City Univ of Hong Kong, EDWIN BARNES, Department of Physics, Virginia Tech, VA and Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, College Park, MD, USA — We perform Randomized Benchmarking of a family of recently introduced control scheme for singlet-triplet qubits in semiconductor double quantum dots, which is optimized to have substantially shorter gate times. We study their performances under the recently introduced symmetric control scheme of changing the exchange interaction by raising and lowering the barrier between the two dots (barrier control) and compare these results to those under the traditional tilt control method in which the exchange interaction is varied by detuning. It has been suggested that the barrier control method encounters a much smaller charge noise. We found that for the cases where the charge noise is dominant, corresponding to the device made on isotopically enriched silicon, the optimized sequences offer much longer coherence time under barrier control compared to the tilt control method of the strength of the exchange interaction.

[1]This work was supported by the Research Grants Council of Hong Kong SAR (No. CityU 21300116) and the National Natural Science Foundation of China (No. 11604277), and by LPS-MPO-CMTC.

Chengxian Zhang
City Univ of Hong Kong

Date submitted: 10 Nov 2016 Electronic form version 1.4