Error Correction using NV-center

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Abstract

In quantum computation decoherence from environment interaction, faulty gates and quantum noise may result in higher error rates than those of classical computation. The no cloning theorem, the fact that measurements collapses the quantum state and the continuous nature of qubit errors, demand new techniques for detecting and correcting error.

We present the results of the paper by G. Waldherr et al. [1] where they show quantum error correction in a heterogenous, solid-state spin system. They demonstrate that joint initialization, projective readout and fast local and nonlocal gate operations can all be achieved in diamond spin systems. With these techniques, we explain how they implemented three-qubit phase flip error correction, with fidelities approaching those needed for fault-tolerant quantum operation.

References

[1] S. Zaiser M. Jamali T. Schulte-Herbrüggen H. Abe T. Ohshima J. Isoya J. F. Du P. Neumann J. Wrachtrup G. Waldherr, Y. Wang. Quantum error correction in a solid-state hybrid spin register. *Nature*, 506, 2014.