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Presentation Title

Engagement between two single electron spins in diamond

Abstract

Coherent coupling between spins in solids is at heart of many modern technologies, including quantum information processing and communication. Using novel implantation techniques and advanced spin manipulation methods we were able to demonstrate coherent coupling between two engineered spins in diamond lattice. Remarkably, long coherent time of engineered spins in isotopically enriched diamond allow to reach high entanglement fidelity at kHz coupling strength. The charge state of NV defects was pre-selected using newly established optical control techniques. Further improvement can be obtained using robust control and entanglement pumping techniques. Our demonstration of coherent control over both electrons spins opens the way towards a room temperature solid state scalable quantum register. Since both electron spins are optically addressable, this solid state quantum device operating at ambient conditions provides a degree of control that is currently available only for atomic systems.