

Spin quantum registers and their use in sensing and quantum communication

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Small spin quantum registers have a central role in various quantum techniques. Scalable communication and quantum repeater schemes for example require few qubit memories to store single photon states, which need to be robust against multiple readout. They also need to have local processing capabilities for e.g. error correction of entanglement purification. Less prominent is the use in sensing application. Here, robust memories are central for e.g. high resolution NMR. Entanglement enables high precision measurement, both with respect to sensitivity and spectral resolution. The talk shall discuss the physics of nuclear spin quantum registers in diamond and SiC as processing and memory qubits under relevant operation conditions and demonstrate applications.