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**Phosphorus donor qubits in Silicon:
Electrical read-out and decoherence**

The “Kane proposal” for solid-state quantum information hardware based on donors in Silicon is particularly attractive due to its possible integration with scaled-down microelectronic devices. Several groups are investigating the physical principles of donor spin manipulation and read-out and are developing the nanofabrication technologies needed for a successful implementation of this proposal.

The talk will start with a brief overview of the fabrication of single-donor devices and a summary of the properties of P donors in unstrained and strained Si. I will then discuss in some detail the purely electrical read-out of the donor-spin state recently demonstrated for donor ensembles via spin-to-charge transfer at Si/SiO₂-interface states. Finally, I will describe more advanced pulsed electrically detected magnetic resonance experiments which we use e.g. for the determination of the decoherence times characteristic for donors in device structures.



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