SFB/TRR 21 - Colloquium

21. Oktober 2011, Stuttgart

Prof. Hendrik Bluhm

(RWTH Aachen)

Coherence and coupling of GaAs two-electron spin qubits

Semiconductor spin qubits are promising candidates for quantum computation, but they suffer from decoherence due to hyperfine coupling to nuclear spins. We have developed effective techniques to mitigate this decoherence channel for two-electron spin qubits. Using a CPMG decoupling sequence, the coherence time can be extended to more than 200 ms.Alternatively, operating the qubit as a feedback loop that controls the nuclear bath also enhances the coherence time and enables universal single qubit control. A next milestones is to couple qubits in order to generate entanglement. Wedemonstrate a protocol to implement two-qubit gates using the Coulombinteraction between adjacent double dots while decoupling both qubitsfrom slow electrical fluctuations. Preliminary results indicate thatBell states can be created with sufficient fidelity to demonstrate entanglement.

21. Oktober 2011, 15:30 Uhr

Universität Stuttgart, NWZII, Raum 2.136
Pfaffenwaldring 57, 70569 Stuttgart

CO.CO.MAT