SEMINAR: Thermal Susceptibility of Hole Spin Qubits in Silicon

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March 20, 2025
12:00 to 13:00
Seminar Room

Spins in semiconducting materials hold great promise for large-scale quantum computing due to their compactness and compatibility with standard CMOS processes. However, scaling spin-based quantum processors presents a key challenge: maintaining qubit fidelity as system size increases. In state-of-the-art devices, heating effects - primarily caused by dissipation from control pulses - have emerged as a limiting factor. Notably, systematic drifts in the Larmor frequency of spins have been observed following microwave excitations, revealing a complex temperature dependence whose origin remains elusive.
In this presentation, I will discuss the fundamental properties of hole spins in silicon, with a focus on their spin-orbit interaction. I will examine the thermal susceptibility of hole spins and explore its potential electrical origin. Finally, I will demonstrate how to study dissipation associated with qubit manipulation in quantum dot arrays. These insights are crucial for mitigating thermally induced dephasing in spin-based quantum architectures.
Hosted by: Prof. Dr. Adrian Bachtold