Seminar/Talk

Quantum coherent interface of an electron and a nuclear ensemble

Dorian Gangloff
University of Cambridge

Host: Andrew Higginbotham

Coherent excitation of an ensemble of quantum objects offers the opportunity to realise robust entanglement generation and information storage in a quantum memory. In quantum dots, a single electron spin qubit is a coherent interface to an isolated nuclear spin ensemble. Recently, we have developed an all-optical electron spin resonance technique that, together with our ability to optically cool the nuclear ensemble [1], has allowed us to perform complex qubit manipulations on the electron spin, such as to run a spin-locking sequence [2], to coherently excite spin-wave modes in the nuclear spin ensemble [3], and to sense the effective magnetic field from a single nuclear-spin excitation [4]. Combined, these results open a promising avenue for quantum state engineering of a mesoscopic ensemble, and we have recently proposed a realistic path to a nuclear quantum memory based on electron-activated spin waves in GaAs quantum dots [5]. In my talk, I will briefly summarise these recent experimental results and proposals for the future.[1] thier-Majcher, Gangloff et al., (2017), Phys. Rev. Lett. 119, 130503[2] Bodey et al. (2019) npj Quantum Information 5 (95)[3] Gangloff, thier-Majcher, et al. (2019) Science 364 (6435)[4] Jackson, Gangloff, et al. manuscript in preparation[5] Denning, Gangloff, et al. (2019) Phys. Rev. Lett. 123, 140502

Monday, March 16, 2020 10:30am - 11:30am

Mondi Seminar Room 2, Central Building

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.