HL 43: Invited Talk: Stefan Ludwig

Time: Tuesday 15:00–15:30 Location: H2

Invited Talk HL 43.1 Tue 15:00 H2

Single phonon quantum interference and back-action in quantum-dot electrical circuits — Ghislain Granger[1], Daniela Taubert[2], Carolyn Young[3], L. Gaudreau[1], A. Kam[1], S. Studenikin[1], D. Harbusch[2], Dieter Schuh[4], Werner Wegscheider[4,5], Zbigniew Wasilew[2], Aashish Clerk[3], Andrew Sachrajda[1], and •Stefan Ludwig[2] — [1]NRC Canada — [2]Uni München — [3]McGill, Canada — [4]Uni Regensburg — [5]ETH Zürich

Lateral few-electron quantum-dot circuits are promising candidates for metrology and quantum information applications. Qubit readout typically involves a charge measurement made probing the current through a nearby biased quantum point contact (QPC). For quantum applications it is critical to understand the back-action disturbances resulting from such a measurement approach. It is well-established that QPC detectors emit phonons which are possibly reabsorbed by nearby qubits [1]. Here, we present the observation of a pronounced back-action effect in multiple dot circuits, where the absorption of detector-generated phonons is strongly modified by a quantum interference effect [2]. The reported phenomenon is well described by a theory incorporating both the QPC and coherent phonon absorption in coupled dots. It also promises applications: destructive interference allows strategies to suppress back-action during the qubit readout procedure. Furthermore, our experiments reveal the usability of coupled dots as a single phonon detector and spectrometer.

[1] D. Harbusch, et al., PRL **104**, 196801 (2010); [2] G. Granger, et al., Nat. Phys. **8**, 522 (2012).