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Backaction due to Resonant Phonon Absorption in Quantum Dots Measured by a Quantum Point Contact CAROLYN YOUNG, AASHISH CLERK, McGill University — Recent experiments have observed unexplained periodic resonances in the charging diagrams of both double [1] and triple [2] quantum dots (DQDs and TQDs). These resonances correspond to the generation of inelastic transitions, driven by energy transfer from a biased quantum point contact (QPC) charge detector used for measurement. In this talk, we present theoretical results describing how quantum backaction due to hot phonons, generated by the out-of-equilibrium QPC, can lead to excited state occupation under certain "blocking" conditions that result in slow ground state filling. We propose that recent experiments can be understood in terms of resonant phonon absorption in DQDs and TQDs; a process complementary to resonant phonon emission [3]. Our results shed light on an important contribution to the backaction of the QPC readout scheme widely used for QD-based quantum computation.

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[2] L. Gaudreau et al., App. Phys. Lett., 99, 193101 (2009).
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