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Nonequilibrium phonon occupation in carbon nanotube quantum dots[1] LUTFE SIDDIQUI, School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47907, AVIK GHOSH, Department of Electrical and Computer Engineering, University of Virginia, Charlottesville, VA 22903, SUPRIYO DATTA, School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47907 — We present a formalism for electron transport through a coulomb blockaded quantum dot strongly coupled with vibrations and weakly with leads and the thermal environment. By calculating the joint electron-phonon probability distribution, we show that recently observed anomalous conductivity through single-walled carbon nanotube (SWCNT) quantum dots arises from 'hot' phonons that are generated by the current at a faster rate than their extraction rate by the surrounding. We explain semi-quantitative details of the experiment and predict a nontrivial temperature dependence of the phonon population arising from a subtle interplay between phonon emission and absorption rates at specific bias voltage values.

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