A quantum-dot heat engine operated near its theoretical efficiency limits

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In my talk, I will discuss recent progress in theoretical and experimental research on thermoelectric effects in nanoscale systems, with a particular focus on quantum dots defined in semiconductor nanowires. I will briefly discuss how thermoelectric measurements can provide additional spectroscopic information about the devices compared with standard conductance measurements. The main focus, however, will be on an experimental realization of a quantum dot-based thermoelectric generator, where a heat gradient gives rise to a current across a resistor, thereby generating electric power. The experimental data are in excellent agreement with theoretical calculations. Based on the experimentally measured output power and the theoretically calculated heat currents, we estimate that the heat engine operates close to the theoretical efficiency limits, in particular in the regime of large output power.