

Invitation to IQST Seminar

on Monday, November 13th, 2017, 10am
Ulm University
N24, Room 101
Albert-Einstein-Allee 11



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Fundamental limit for cooling of driven quantum systems

ABSTRACT

I will review recent results on the asymptotic behavior of a special class of quantum refrigerators. These refrigerators are built with a set of parametrically driven oscillators which are coupled with arbitrary bosonic reservoirs. Their goal is, as in an ordinary fridge, to cool one of the reservoirs by pumping energy into others. For this type of system it is possible to identify the fundamental process enforces the validity of the third law of thermodynamics. As I will show, what prevents us from cooling a cold reservoir to arbitrarily low temperatures is the non resonant creation of excitations pairs in the reservoirs (a process which is closely related with the so called dynamical Casimir effect). I will show that the results can be applied to understand, in a simple way, the fundamental limits for laser cooling of a single trapped ion (both in the limit of resolved and non resolved sidebands).

Hosts: Prof. Dr. Wolfgang Schleich, Institut für Quantenphysik,
Prof. Dr. Tommaso Calarco, Institut für Komplexe Quantensysteme