

Physikalisches Kolloquium



Thursday, 04.07.2019, 16:15, HS 100
Reception with coffee & cookies 15:45
 (For university staff: please bring your own cup for sustainability reasons)

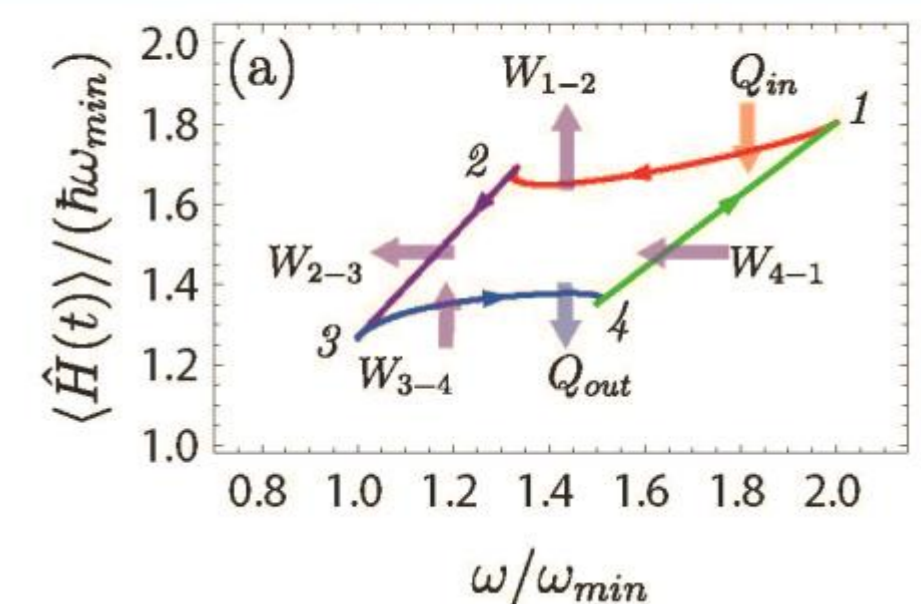
Prof. Ronnie Kosloff, The Hebrew University, Jerusalem, Israel:

The quantum Carnot engine and its quantum signature

Abstract

Quantum thermodynamics follows the tradition of learning by example. The Carnot cycle would be a primary candidate. The attempts to model the four stroke quantum Carnot cycle failed due to the difficulty to model the isothermal branches, where the working medium is driven while in contact to the thermal bath. Motivated by this issue we derived a time dependent Non Adiabatic Master Equation (NAME) with a fixed driving protocol. This master equation is consistent with thermodynamic principles. We then were able to generalise to protocols with small acceleration with respect to the fixed fast protocols. This approach was confirmed experimentally in a driven Ytterbium ion in a Paul trap. Using this construction we are able to find shortcuts to an isothermal transformation. Unlike unitary transformations the map changes entropy. After this journey, we are able close a Carnot like cycle in finite time and explore its performance. In the limit of short cycle times we are able to locate a quantum region of operation. Once the global coherence is eliminated the engines cannot operate.

Shortcut to four stroke quantum Carnot cycle



All of you interested in physics are cordially invited!