

Ronnie Kosloff

(Hebrew University, Jerusalem, Israel)

Quantum Refrigerators: The quest for the absolute zero

Quantum thermodynamics was initiated by Einstein in 1905 demanding consistency of black body radiation with thermodynamics. This was the seed from which quantum mechanics was born. In modern context we reverse the argument checking the consistency of thermodynamics with quantum mechanics. We follow thermodynamical tradition of studying model engines based on quantum principles. I will show the emergence of Carnot efficiency in a model 3-level amplifier. Reciprocating and continuous quantum refrigerator are employed with the purpose of determining the limitations of cooling to absolute zero. We seek a dynamical description of the third law of thermodynamics: The scaling of the optimal cooling power as the cold bath temperature vanishes $T_c \rightarrow 0$.

- [1] Yair Rezek, Peter Salamon, Karl Heinz Homann and Ronnie Kosloff, The quantum refrigerator: The quest for the absolute zero, Euro. Phys. Lett. **85**, 30008 (2009)
- [2] Tova Feldmann and Ronnie Kosloff, Minimal temperature of quantum refrigerators, Euro. Phys. Lett. **89**, 20004 (2010)

