

Title: Quantum thermodynamics and quantum control

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**Abstract:** The recent research in quantum control and quantum thermodynamics has seen growing popularity of so-called “shortcuts to adiabaticity”, i.e., fast processes with the same outcome as an ideal, infinitely slow process. Although various techniques of realising effective adiabatic dynamics are known, a critical assessment of the energetic resources required for their implementation is still lacking. In this talk, by considering some paradigmatic settings, I will assess the cost of implementing high fidelity control and provide a hierarchy in the resource intensiveness of quantum control. In the end I will present the applications of quantum control in enhancing performance of quantum thermal machines and fast generation of nonclassical states.

Reference:

- [1] **O. Abah**, R. Puebla and M. Paternostro, *Quantum state engineering by Shortcut to adiabaticity in interacting spin-boson systems*, Phys. Rev. Lett. **124**, 180401 (2020)
- [2] **O. Abah**, M. Paternostro and E. Lutz, *Shortcut-to-adiabaticity quantum Otto refrigerator*, Phys. Rev. Research **2**, 023120 (2020).