## Optimal Control and Non-Markovianity in Quantum Thermal Machines

**P. Abiuso**[a] and V. Giovannetti[b]

[a]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology,08860 Castelldefels (Barcelona), Spain
[b]NEST, Scuola Normale Superiore and Istituto Nanoscienze-CNR, I-56126 Pisa, Italy

We study how the non-Markovian character of the coupling with thermal reservoirs can improve the thermodynamic performance of a quantum thermal engine. To do so, we we optimise the control for a two-levels engine explicitly: for a Carnot cycle, we use the powerful Slow-Driving technique[1] which efficiently solves the approximate dynamics of a system in the low-dissipation regime[2], and in turn allows us to concentrate the information about the thermal relaxation in a simple model-dependent amplitude. We solve then the Otto case exactly. In the model non-Markovianity is introduced by allowing remote degrees of freedom of the reservoirs to be taken into account explicitly and share correlations with the engine by Hamiltonian coupling. We discuss why non-Markovianity can enhance the speed of thermalization and the links between the S-D technique, optimal control and the universal low-dissipation regime of the machine.

[1]V. Cavina *et al.* Phys. Rev. Lett. **119**, 050601 (2017)
[2]M. Esposito *et al.* Phys. Rev. Lett. **105**, 150603