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Are quantum effects beneficial for quantum thermodynamics?

Abstract: When entering into the field of quantum thermodynamics with a quantum information background, one naturally wonders whether quantum effects can enhance thermodynamic tasks, just like in other areas such as metrology, cryptography or computation. The first answer to this question is negative: The laws of thermodynamics are remarkably robust to the underlying physics, hence being valid even in the presence of coherence or entanglement (when resources are properly accounted for). Nevertheless, advantages can appear when, e.g., one considers finite time processes. In this talk, this will be illustrated by showing that collective energy transfer can become faster in the presence of entanglement.