

Fast-forward of adiabatic dynamics: from generation of entangled states to quantum thermodynamics

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We review the idea of fast-forward of adiabatic dynamics proposed by Masuda and Nakamura. This idea has been applied to diverse areas of physics. Here we show that the generation of entangled states is fast-forwarded and speeded up by application of a suitable driving protocol. Then we treat a dynamical system coupled with the dissipative environment. The fast-forward evolution of Gibbs state (: canonical distribution) is guaranteed by innovating the detailed balance condition for coefficients of the dissipator, which makes possible the existence of quantum analog of Carnot-like 4-stroke heat engine with arbitrarily finite power.

References:

Original idea of FF theory: S. Masuda and K. Nakamura, Proc. R. Soc. A 466, 1135-1154 (2010).

Review of FF theory: S. Masuda and K. Nakamura, Philosophical Transactions of the Royal Society A 380, 20210278 (2022).

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