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Quantum Speed Limit in the Thermal Spin-Boson System with and without Tunneling.[1] SHAHRAM DEHDASHTI, College of Information Science and Electronic Engineering, Zhejiang University, Hangzhou 310027, China., M BAGHERI HAROUNI, Department of Physics, Faculty of Science, University of Isfahan, Isfahan, 81746-73441, Iran, A MAHDIFAR, Department of Physics, Faculty of science, Shahrekord University, Shahrekord, 88186-34141, Iran, H WANG, Z XU, Ocean College, Zhejiang University, Hangzhou 310058, China., B MIRZA, Department of Physics, Isfahan University of Technology, Isfahan 84156-83111, Iran, J SHEN, H CHEN, College of Information Science and Electronic Engineering, Zhejiang University, Hangzhou 310027, China. — In this study, we study the spin-bosonic model, with and without tunneling terms, in detail. The spin-bosonic model without tunneling is studied by using the thermofield dynamics approach. By considering temperature, we show that states of the environment, while they become entangled with system, approach thermal coherent states with different phases. In addition, by considering the tunneling term, we study the interplay of the environmental cut-off frequency as well as the impacts of environmental temperature on the quantum speed limit in both cases, i.e., spin-boson system with and without tunneling term.

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