

Quantum Cooling Simulation in an Opto-mechanical Cavity, Using Python

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Abstract

In cavity opto-mechanical cooling, driving laser optical field exerts extra decay to the mechanical mode of cavity and causes a return to the ground state. In this study, quantum cooling of an opto-mechanical cavity, in contact with a thermal bath, has been simulated by using Quantum Toolbox in Python “QuTiP”. Simulation results show that the cavity cooling process takes more time with increasing the decay rate of optical modes and go faster with increasing the decay rate of mechanical modes. Also, this process takes less time with increasing coupling constant of optical and mechanical modes. By adding a qubit to the system, simulation shows that the cooling process could happen faster compared to the past.

Keywords: Quantum cooling, Opto-mechanical cavity, Qubit, Python.

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