

Abstract

Quantum coherence is being viewed as a possible resource that could improve the performance of quantum technologies. This thesis analyzes a quantum heat engine model inspired by Dorfman et al. (PNAS vol. 110 no. 8) while using a standard Markovian quantum optical master equation in the Lindblad form. Steady-state coherence arises from the degeneracy of the two upper energy levels and its effects become significant for near-perfect alignment of the associated transition dipole moments. For the maximum alignment, the steady-state current becomes highly dependent on the relative phase and exhibits quantum interference. The performed numerical calculations show some promise of possible enhancement of the current above the classical limit.