

Quantum heat engine perspective on controlling optical measurements with quantum light

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We present a consistent optimization procedure for the optical measurements in open quantum systems using recently developed incoherent control protocol [1]. Assigning an effective hot bath for the two-entangled-photon pump we recast the transmission of classical probe as a work in a quantum heat engine framework. We demonstrate that maximum work in such a heat engine can exceed that for the classical two-photon and one-photon pumps, while efficiency at maximum power can be attributed to conventional boundaries obtained for three-level maser heat engine [2]. Our results pave the way for incoherent control and optimization of optical measurements in open quantum systems that involve two-photon processes with quantum light.

- [1] Qutubuddin Md, and Konstantin E. Dorfman, “Incoherent control of optical signals: Quantum-heat-engine approach”, *Phys. Rev. Res.* 3, 023029 (2021).
- [2] Qutubuddin Md, and Konstantin E. Dorfman, “Incoherent control of two-photon induced optical measurements in open quantum systems: quantum heat engine perspective”, arXiv:2203.04268 (2022).