

Abstract Submitted  
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**Surpassing the shot-noise limit by homodyne-mediated feedback.**<sup>1</sup>

GUOFENG ZHANG, HANJIE ZHU, BeiHang University — Entangled systems with large quantum Fisher information (QFI) can be used to outperform the standard quantum limit of the separable systems in quantum metrology. However, the interaction between the system and the environments inevitably leads to decoherence and decrease of the QFI, and it is not clear whether the entanglement systems can be a better resource than separable systems in the realistic physical condition. In this work, we study the steady QFI of two driven and collectively damped qubits with homodyne-mediated feedback. We show that the steady QFI can be significantly enhanced both in the cases of symmetric feedback and nonsymmetric feedback, and the shot-noise limit of separable states can be surpassed in both cases. The QFI can even achieve the Heisenberg limit for appropriate feedback parameters and initial conditions in the case of symmetric feedback. We also show that an initial-condition-independent steady QFI can be obtained by using nonsymmetric feedback.

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