Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Using interference for high fidelity quantum state transfer in optomechanics[1] YING-DAN WANG, AASHISH A. CLERK, McGill University — We present a theoretical study of a two-cavity optomechanical system (e.g. a single mechanical resonator coupled to both a microwave and an optical cavity), investigating how interference can be used to perform mechanically-mediated quantum state transfer between the two cavities. We show that this optomechanical system possesses an effective "mechanically-dark" mode which is immune to mechanical dissipation; utilizing this feature allows highly efficient transfer of intra-cavity states, as well as of itinerant photon states. Simple analytic expressions for the fidelity of transferring both Gaussian and non-Gaussian states are provided. Our work has relevance to ongoing experimental efforts in quantum optomechanics (e.g., C. A. Regal and K. W. Lehnert, J. Phys.: Conf. Ser. 264, 012025 (2011); A. H. Safavi-Naeini and O. Painter, New J. Phys. 13, 013017 (2011)).

[1]This work was supported by the DARPA ORCHID program under a grant from the AFOSR.

Ying-Dan Wang
McGill University

Date submitted: 07 Nov 2011 Electronic form version 1.4