

Abstract Submitted  
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**Phononic Phase Conjugation in an Optomechanical System<sup>1</sup>**

LUKAS BUCHMANN, University of Arizona, EWAN WRIGHT, PIERRE MEYSTRE, University of Arizona — We study theoretically the phase conjugation of a phononic field in an optomechanical system with two mechanical modes coupled to a common optical field. Phase conjugation becomes the dominant process for an appropriate choice of driving field parameters, and the effective coupling coefficients between phonon modes can result in amplification and entanglement, phase-conjugation or a mixture thereof. We discuss surprising consequences of mechanical phase-conjugation that could lead to the preparation of mechanical states with negative temperature, the improvement of quantum memories and the study of the quantum-classical transition.

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