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Proposal for detecting measurement-induced entanglement between remote mechanical oscillators KJETIL BORKJE, ANDREAS NUNNENKAMP, STEVEN M. GIRVIN, Yale University — In optomechanical systems where an optical cavity mode interacts with a mechanical oscillator, the light leaking out of the cavity has sidebands at the mechanical frequency. The photon statistics of these sidebands contain information about the mechanical oscillator. We consider driving two similar optical cavities, containing one mechanical system each, in such a way that the mechanical oscillators are laser cooled close to the ground state. When the output fields of the two cavities are made indistinguishable by combining them on a beamsplitter, the detection of sideband photons can lead to measurement-induced entanglement between the two non-interacting mechanical oscillators. We show how this short-lived entanglement between remote mechanical oscillators can be verified through measurements of higher-order coherences of the optical output field.

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