Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Teleportation-induced entanglement of two nanomechanical oscillators coupled to a topological superconductor STEFAN WALTER, University of Basel, JAN CARL BUDICH, Stockholm University — A one-dimensional topological superconductor features a single fermionic zero mode that is delocalized over two Majorana bound states located at the ends of the system. We study a pair of spatially separated nanomechanical oscillators tunnel-coupled to these Majorana modes. Most interestingly, we demonstrate that the combination of electron-phonon coupling and a finite charging energy on the mesoscopic topological superconductor can lead to an effective superexchange between the oscillators via the non-local fermionic zero mode. We further show that this teleportation mechanism leads to entanglement of the two oscillators over distances that can significantly exceed the coherence length of the superconductor.

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Date submitted: 15 Nov 2013 Electronic form version 1.4