Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Topological properties and edge mode effects in classical thermal transport CHIHCHUN CHIEN, University of California, Merced, KIRILL VELIZHANIN, Los Alamos National Laboratory, YONATAN DUBI, Ben Gurion University, Israel, MICAEL ZWOLAK, National Institute of Science and Technologies — Classical harmonic chains, with suitable parametrizations, can resemble quantum systems exhibiting interesting topological phases. By analytically solving the equations of motion of harmonic chains with alternating masses and coupling constants, the energy bands bear striking resemblance to topological electronic bands of the Su-Schrieffer-Heeger model. As a consequence, localized topological edge modes associated with topological invariants of the system arise in classical harmonic chains. Effects from topological properties on thermal transport through patterned harmonic chains are analyzed and the results are supported by molecular-dynamics simulations. We also found edge modes as a hindrance to achieving the maximal intrinsic thermal conductance. Possible applications in polymers will be discussed.

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Date submitted: 03 Dec 2015 Electronic form version 1.4