

Abstract Submitted
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Topological Phases of Sound and Light VITTORIO PEANO
CAVASOLA, CHRISTIAN BRENDEL, MICHAEL SCHMIDT, FLORIAN MAR-
QUARDT, University of Erlangen-Nuernberg — Topological states of matter are
particularly robust, since they exploit global features insensitive to local perturba-
tions. In this talk, we describe how to create a Chern insulator of phonons in the
solid state. The proposed implementation is based on a simple setting, a dielectric
slab with a suitable pattern of holes. Its topological properties can be wholly tuned
in-situ by adjusting the amplitude and frequency of a driving laser that controls the
optomechanical interaction between light and sound. The resulting chiral, topologi-
cally protected phonon transport along the edges can be probed completely optically.
Moreover, we identify a regime of strong mixing between photon and phonon excita-
tions, which gives rise to a large set of different topological phases. This would be an
example of a Chern insulator produced from the interaction between two physically
very different particle species, photons and phonons.

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