

Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

Coherent optical photons from shock waves in polarizable crystals EVAN REED¹, Lawrence Livermore National Laboratory, MARIN SOLJACIC, Massachusetts Institute of Technology, JOHN JOANNOPOULOS, Massachusetts Institute of Technology, RICHARD GEE, Lawrence Livermore National Laboratory — We predict that coherent electromagnetic radiation can be generated in polarizable crystalline materials when subject to a shock wave or shock-like propagating excitation. To our knowledge, this phenomenon represents a fundamentally new source of coherent optical radiation source in the 1-100 THz frequency range that is distinct from lasers and free-electron lasers. Analytical theory, finite-difference time-domain simulations of Maxwell's equations, and molecular dynamics simulations demonstrate coherence lengths on the order of mm (at 16 THz) and potentially greater.

¹Massachusetts Institute of Technology

Evan Reed
Lawrence Livermore National Laboratory

Date submitted: 08 Apr 2005

Electronic form version 1.4