Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Dispersive shock waves in optical lattices SHU JIA, WENJIE WAN, JASON FLEISCHER, Princeton University — We study dispersive, superfluid-like shock waves in optical lattices. Compared with the homogeneous case, the presence of a periodic potential inhibits shock propagation, both via Peierls-Nabarro trapping forces and through Bragg reflections. Photonic experiments are performed in SBN photorefractive crystals, using optical induction to create nonlinear waveguide arrays. By applying defocusing (repulsive) nonlinearity, we directly observe the nonlinear properties of shock waves as a function of the intensity of lattice, *i.e.* the depth of the potential wells. Direct comparisons are made between a plane-wave background, suitable for homogeneous systems, and Bloch-wave backgrounds, which are more appropriate for arrays. Nonlinear coupling between transmission bands is demonstrated, with numerical simulations showing excellent agreement with experimental results. Similarities between photonic systems and cold atom systems in periodic potentials will be discussed.

Shu Jia
Princeton University

Date submitted: 20 Nov 2006 Electronic form version 1.4