Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

X-ray studies of acoustic vibrations from semiconductor superlattices. MARIANO TRIGO, YU-MIIN SHEU, DAVID REIS, ROBERTO MERLIN, MATTHEW REASON, RACHEL GOLDMAN, University of Michigan — We present ultrafast X-ray studies of acoustic phonons transmitted from a GaAs/AlAs superlattice. An ultrafast laser pulse impulsively excites coherent acoustic waves in the superlattice which subsequently transmit into the GaAs substrate. A short x-ray pulse can be used to probe the wave packet traveling in the bulk material, without the need of a transducer such as a second SL by detecting sidebands of Bragg diffraction. Unlike optical probes, the short wavelength of the x-rays allows momentum resolved detection over a wide range of wavevectors. This method should in principle be able to detect the whole spectrum of the generated excitations. Furthermore, the coherent part of the excitation is followed by a much slower thermal diffusion which, as we will show, can also be studied by time resolved x-ray scattering. [1] R. Merlin, Solid State Comm. 102, 207 (1997). [2] D. A. Reis et al., Phys. Rev. Lett. 86, 3072 (2001)

Mariano Trigo
University of Michigan

Date submitted: 20 Nov 2006 Electronic form version 1.4