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Phonons rectification in picosecond laser ultrasonics

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In standard ultrafast acoustic experiments very short coherent acoustic pulses are generated by the absorption of a femtosecond laser pulse in a thin metallic transducer deposited on the sample. Subsequently the acoustic pulses and the heat generated in the transducer cross the sample and are partially transmitted in the underlying substrate. At low temperature, heating of the metallic transducer gives rise to the emission of incoherent phonons wave packets which propagate ballistically over large distances in the substrate. We report on a series of experiments which demonstrate the acoustic rectification [1-3] of these wave packets as they propagate through large GaAs or Si substrates.

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