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Generation of acoustical phonons by femtosecond laser pulses in GaAs in the presence of external electric field

Philippe Babilotte, Pascal Ruello, Denis Mounier, Daniel Pugliese, Mathieu Edely, Alain Bulou, Jean-Marc Breteau and Vitali Gusev
LPEC/UMR 6087/CNRS/Université du Maine, Avenue Olivier Messiaen, 72085 Le Mans Cedex 09, France

Experimental results on the generation and the detection by fs laser pulses of the acoustical phonons at frequencies from tens to hundreds GHz in GaAs in the presence of external electric field are presented. The influence of the magnitude and the direction of the applied electric field on the parameters of ps ultrasound is investigated. Results obtained in GaAs and low-temperature GaAs are compared. The experimental opportunities to discriminate the acoustical phonons produced by laser-induced inverse piezoelectrical effect and the acoustical phonons due to the thermoelastic mechanism and to the mechanism of electron-phonon deformation potential are discussed. This study was supported by ANR project BLAN06-3-136284.