274. Title: Two-dimensional terahertz correlation spectra of electronic excitations in semiconductor quantum wells

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Source title: Journal of Physical Chemistry B
Volume:115
Issue:18
Issue date:May 12, 2011
Publication year:2011
Pages:5448-5455
Language:English
Document type:Journal article (JA)

Abstract:We discuss a novel approach for nonlinear two-dimensional (2D) spectroscopy in the terahertz (THz) frequency range which is based on a collinear interaction geometry of a sequence of THz pulses with the sample. The nonlinear polarization is determined by a phase-resolved measurement of the electric field transmitted through the sample as a function of the delay T between two phase-locked pulses and the "real" time t. The information provided by a single 2D scan along the T and t axes is equivalent to that from a noncollinear photon-echo setup equipped with four local oscillators, each interacting with adifferent diffracted order. We address basic concepts of collinear 2D THz spectroscopy, in particular data analysis and phasing issues. Different rephasing and nonrephasing contributions to the third-order response are separated and 2D correlation spectra derived. As a prototype application, 2D correlation spectra of intersubband excitations of electrons in semiconductor quantum wells are presented.