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Title:Fano effect due to ponderomotive coupling in intersubband response of semiconductor quantum wells

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Abstract:Using terahertz-time-domain spectroscopy, it has been demonstrated before that an intersubband transition in photoexcited undoped quantum wells reveals a Fano-like line shape in transmission spectra due to the phase-sensitive coupling of ponderomotive and intersubband currents [D. Golde *et al.*, Phys. Rev. Lett. 102, 127403 (2009)]. In the present experimental study on GaAs/AlGaAs quantum wells we attempt to delineate the observability conditions of this phenomenon. We find that intensity-based Fourier-transform infrared (FTIR) spectroscopy cannot uncover these ponderomotive effects. However, for time-domain spectroscopy they are shown not to be limited to the case of optically excited electrons, but can be seen in doped samples as well.

Number of references:20

Inspec controlled terms:aluminium compounds - Fourier transform spectra - gallium arsenide - III-V semiconductors - infrared spectra - photoemission - semiconductor quantum wells - terahertz wave spectra

Uncontrolled terms:Fano effect - ponderomotive coupling - intersubband response - semiconductor quantum wells - terahertz-time-domain spectroscopy - intersubband transition - photoexcited undoped quantum wells - Fano-like line shape - transmission spectra - phase-sensitive coupling - ponderomotive currents - intersubband currents - intensity-based Fourier-transform infrared spectroscopy - FTIR - optically excited electrons - GaAs-AlGaAs

Inspec classification codes:A7865K Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures) - A7960E Photoelectron spectra of semiconductors and insulators - A7870G Microwave and radiofrequency interactions with condensed matter - A7830G Infrared and Raman spectra in inorganic crystals

Chemical indexing:GaAs-AlGaAs/int AlGaAs/int GaAs/int Al/int As/int Ga/int AlGaAs/ss Al/ss

As/ss Ga/ss GaAs/bin As/bin Ga/bin

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