191. Title: Resonant acousto-optics in the terahertz range: TO-phonon polaritons driven by an ultrasonic wave

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Abstract: The resonant acousto-optic effect is studied both analytically and numerically in the terahertz range where the transverse-optical (TO) phonons play the role of a mediator which strongly couples the ultrasound and light fields. A propagating acoustic wave interacts with the TO phonons via anharmonic channels and opens band gaps in the TO-phonon polariton energy dispersion that results in pronounced Bragg scattering and reflection of the incoming light. The separation in frequency of different Bragg replicas, which is at the heart of acousto-optics, allows us to study the resonant acousto-optic effect in the most simple and efficient geometry of collinear propagation of electromagnetic and ultrasonic waves. The acoustically induced energy gaps, Bragg reflection spectra, and the spatial distribution of the electric field and polarization are calculated for CuCl parameters, in a wide range of frequencies and intensities of the pumping acoustic wave. Our results show drastic changes in terahertz spectra of semiconductor crystals that open the way for efficient and accessible manipulation of their infrared properties by tuning the parameters of the acoustic wave.