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Title:Strong correlation of electronic and lattice excitations in GaAs/AlGaAs semiconductor quantum wells revealed by two-dimensional terahertz spectroscopy
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Abstract:Coulomb-mediated interactions between intersubband excitations of electrons in GaAs/AlGaAs double quantum wells and longitudinal optical phonons are studied by two-dimensional spectroscopy in the terahertz frequency range. The multitude of diagonal and off-diagonal peaks in the 2D spectrum gives evidence of strong polaronic signatures in the nonlinear response. A quantitative theoretical analysis reveals a dipole coupling of electrons to the polar lattice that is much stronger than in bulk GaAs, due to a dynamic localization of the electron wave function by scattering processes.
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