

标题: Modeling picosecond electron dynamics of pump-probe intersubband spectroscopy in n-type Ge/SiGe quantum wells

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摘要: We present an energy-balance model of the electronic intersubband relaxation in optically excited n-type Ge/SiGe quantum wells with absorption resonance in the THz range. To this aim, the energy relaxation rates of the electron system due to interactions with both nonpolar optical and acoustic phonons are calculated. The time dependence of the relative differential transmission is also evaluated and compared with experimental data from recent pump-probe measurements. The energy relaxation rates due to acoustic and optical phonon are investigated for different electron temperatures, set by the pump beam intensity. We find that the relaxation dynamics strongly depends on the intersubband energy spacing when this is close to the optical phonon energy. Finally, our results evidence that in this material system the time dependence of the depolarization shift may have a strong influence on the relative differential transmission signal.

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