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Dynamics of Quantal Heating in Electron Systems with Discrete Spectra WILLIAM MAYER, SCOTT DIETRICH, SERGEY VITKALOV, Physics Department, City College of the City University of New York, New York 10031, USA, ALEXEY BYKOV, Novosibirsk State University, Novosibirsk 630090, Russia; A.V.Rzhanov Institute of Semiconductor Physics, Novosibirsk 630090, Russia — The temporal evolution of quantal Joule heating of 2D electrons in GaAs quantum well placed in quantizing magnetic fields is studied using a difference frequency method. The method is based on measurements of the electron conductivity oscillating at the beat frequency $f = f_1 - f_2$ between two microwaves applied to 2D system at frequencies f_1 and f_2. The method provides *direct* access to the dynamical characteristics of the heating and yields the inelastic scattering time τ_{in} of 2D electrons. The obtained τ_{in} is strongly temperature dependent, varying from 0.13 ns at 5.5K to 1 ns at 2.4K in magnetic field B=0.333T. When temperature T exceeds the Landau level separation the relaxation rate $1/\tau_{in}$ is proportional to T^2, indicating the electron-electron interaction as the dominant mechanism limiting the quantal heating. At lower temperatures the rate tends to be proportional to T^3, indicating considerable contribution from electron-phonon scattering.
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