Influence of a Parallel Magnetic Field on the Microwave-Induced Resistance and Photovoltaic Oscillations

CHI ZHANG, KRISTJAN STONE, RUI-RUI DU, Rice University, CHANGLI YANG, Institute of Physics, CAS, China, LOREN PFEIFFER, KEN WEST, Bell Labs, Alcatel-Lucent — Microwave induced photovoltaic (PV) and resistance oscillations (MIRO) were studied in high-mobility ($\mu > 8 \times 10^6$ cm$^2$/V s) 2D electron gas in GaAs/Al$_x$Ga$_{1-x}$As Hall bar samples employing a two-axis magnet system (perpendicular field $B_\perp$ and parallel field $B//$). Consistent with the previous results, strong MIRO were observed and were found to diminish under a $B// \sim 1$ T. We observed two types of PV oscillations: 1) PV oscillations that are periodic in $1/B_\perp$, with a periodicity similar to MIRO, but are anti-symmetric with respect to $B_\perp = 0$; and, 2) PV oscillations due to edge magnetoplasmon modes, which are periodic in $B_\perp$ and are symmetric with respect to $B_\perp = 0$. Characteristically, the $1/B_\perp$ oscillations in PV were completely suppressed by a $B// \sim 1$ T, whereas the $B_\perp$-periodic oscillations retain their main features even in $B// = 2$ T. Experimental data and a brief discussion will be presented. The work at Rice was supported by NSF DMR-0706634.

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