

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Quantum capacitance anomalies of two-dimensional non-equilibrium states under microwave irradiation JIAN MI, JIANLI WANG, Peking University, MICHAEL J. MANFRA, Purdue University, CHI ZHANG, Peking University — We report our direct study of the compressibility on ultra-high mobility two-dimensional electron system ($\mu = 1 \times 10^7 \text{ cm}^2/\text{Vs}$) in GaAs/AlGaAs quantum wells under microwave (MW) irradiation. The field penetration current results show that the quantum capacitance oscillates with microwave induced resistance oscillations (MIRO), however, the trend is opposite with respect to the compressibility for usual equilibrium states in the theoretical proposal. The anomalous phenomena at integer $j = \omega/\omega_C$ regime provide a platform for study on the non-equilibrium system under microwave. Moreover, the quantum capacitance indication for multi-photon process at $j = 1/2$ can be detected under intensive microwave below 30 GHz, although it does not appear in resistances.

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Date submitted: 22 Nov 2016

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