Redistribution of 2D Electrons on Liquid Helium under Pulse-Modulated MW Irradiation

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Previously the microwave-induced vanishing of magnetoresistance in a two-dimensional electron system (2DES) on the surface of liquid helium was reported: the zero-resistance states (ZRS) were observed under conditions of the resonant intersubband absorption of continuous microwave (MW) irradiation.[1] Recently it was also shown that under periodic on/off switching of MW radiation (pulse-modulated MW irradiation) the transitions into/out of the ZRS regime were accompanied by electron density oscillations – periodic spatial redistribution of electrons from the center to the edge of electron pool.[2] The oscillations were registered by measurement of the electric currents going through top Corbino electrodes capacitively coupled to the 2DES, and consisted of a number of frequency modes, a nature of which was not clear.[3] Here we present results of further experimental investigations of the redistribution effect. Analysis of the data, obtained in experiments with different liquid helium depths, shows that some of the observed frequency modes can be explained by considering the 2DES and the top electrodes of a cell in the frames of an equivalent RLC-circuit model.

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