ESR impact on the longitudinal resistance in a quantum Hall regime

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The electron spin resonance (ESR) of two-dimensional (2D) electrons was studied experimentally near even and odd filling factors in the integer quantum Hall effect in ZnO/MgZnO heterojunctions [1] at $T = 0.5$ K. The detection of ESR was based on the extreme sensitivity of the longitudinal resistance R_{xx} of the 2D channel to the microwave radiation absorption. Spin resonance was observed as a sharp peak in variation δR_{xx} when the magnetic field was slowly swept and the radiation frequency was kept constant. Surprisingly, the ESR impact on the longitudinal resistance was comparable between even and odd fillings. Another crucial feature is that it is of a different sign at odd and even filling factors, suggesting the possible change of the impact mechanism. In this work the explanation of different ESR impact at odd and even filling factors on the longitudinal resistance is suggested. High-quality MgZnO/ZnO heterojunction is an object where the electron-electron interaction effect in 2DES is of great importance. The Fermi-liquid model is used. The longitudinal resistance near the integer filling-factors depends mostly of deviation of integer filling (the number of free electrons ore holes). It is not true to account the longitudinal resistance variation for the intensity of microwave radiation absorption. For the odd filling factors the absorption is expected to be stronger, but the most of excitations are exciton-like and only a few are free extra quasiparticles important for the resistance increase. For the even filling factors the absorption is only on small account due to the temperature ore the deviation of even integer fillings, but spin polarization is diminished, and as a result the resistance is decreased.

[1] Shchepetilnikov A V, Khisameeva A R, Nefyodov Y A and Kukushkin I V 2021 *Phys. Rev. B* **104** 075437