Influence of anti-crossing effects in a resonator with 2D electrons on liquid helium

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The details of the structure of the eigenmode for a resonator cavity with a two-dimensional electron system (2DES), formed on liquid helium, inside it are investigated. It is shown that anti-crossing phenomena occur near the crossing point $\omega_0 = \omega_c$, where ω_0 is the eigenmode of the resonator and ω_c is the cyclotron frequency. The structure of the coupling constant is established. It is a flexible parameter, i.e., sensitive to both magnetic field and electron density. A finite coupling leads to a perturbation, $\delta\omega$, of the eigenmode of the resonator in presence of the 2DES. Corresponding calculations and measurements of $\delta\omega$ are realized. The theory fits the experimental data quite well. The coupling between anti-crossing phenomena and the behaviour of the CR line width is discussed.