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2DEG effect on vibration of piezoelectric plates ALEXEY SUSLOV, National High Magnetic Field Laboratory, Tallahassee, FL — Resonances of a GaAs wafer with a GaAs/AlGaAs heterostructure grown on one of its sides were studied in the temperature range 0.05-10K in magnetic fields of up to 18 T. To the best of our knowledge, this is the first use of the Resonant Ultrasound Spectroscopy in a dilution refrigerator. Observed quantum oscillations of the resonance frequencies and linewidths were caused by the Quantum Hall Effect in the 2DEG. The wafer with the 2D gas can be conceived as a film with field dependent conductivity deposited on a piezoelectric plate. Being dielectric, the film does not affect properties of GaAs and, thus, the resonance frequencies are defined only by the elastic, piezoelectric, and dielectric constants of GaAs. Being metallic, the 2D sheet effectively screens the parallel electric field, so the ultrasound wave velocities and resonance frequencies decrease with the increase of the sheet conductivity. Oscillations of the resonance linewidth reflect the influence of the 2D system on the ultrasound attenuation. A metallic film as well as a dielectric one does not affect this attenuation but at some finite nonzero value of the conductivity the linewidth approaches a maximum value. The observed phenomena can be described by the relaxation type equations.

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