**Dynamics of Two-dimensional Electron Gas in Non-uniform magnetic field.**

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We have theoretically studied dynamics of the two-dimensional electron gas (2DEG) placed in a strong laterally non-uniform magnetic field, which appears due to ferromagnetic film on the top of heterostructure.

It is shown that lateral inhomogeneity of a strong magnetic field allows itself “magnetic gradient” or special magnetic-edge magnetoplasmons due to complex lateral structure of magnetic field distribution. This mechanism is different from usual “density gradient” edge magnetoplasmons.

We have solved self-consistently Poisson equation for non-uniform density distribution of the 2DEG for realistic heterostructure together with hydrodynamic equation of 2D Fermi liquid. As a result eigen value problem has been obtained that corresponds to the motion of charge density wave perpendicular to magnetic gradient. It is shown that for non-monotonic distribution of magnetic field “magnetic gradient” magnetoplasmon may move in both directions.

To solve eigen value problem we have compared two types of numerical approaches: (i) grid method that diagonalizes large Hermitian matrix and (ii) semi-analytical approach that expand each eigen mode on the set of orthogonal functions. Proper choice of parameters of the basis permits to reduce size of the matrix substantially preserving reasonable accuracy.