

“Magnetic Gradient” edge magnetoplasmons in non-uniform magnetic field

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We have theoretically studied two-dimensional electron gas (2DEG) placed in a strong laterally non-uniform magnetic field, which appears due to ferromagnetic film (Fig 1.) We have found, that in this case 2DEG experiences static charge redistribution that strongly depends on presence and configuration of the gates on the surface of a heterostructure [1].

Also, it is shown that lateral inhomogeneity of a strong magnetic field allows itself “magnetic gradient” or “magnetic-edge” magnetoplasmons due to complex lateral structure of magnetic field gradient. This mechanism is different from usual “density gradient” edge magnetoplasmons [2]. We have investigated two families of different-chirality modes localized near the edge of the magnetic film. Each chirality’s mode family at small wave vector has one fundamental state with logarithmically large phase velocity.

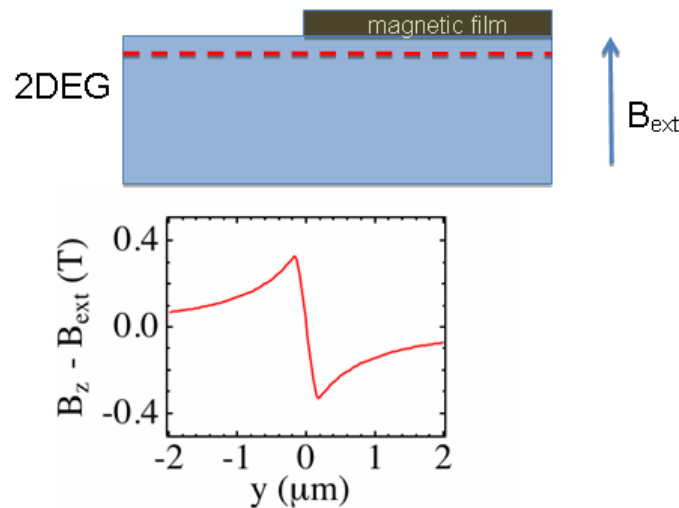


FIG. 1 Heterostructure layout and profile of the magnetic induction at edge of a saturated vertically magnetized saturated ferromagnetic film in perpendicular external field.

References:

- [1] I. A. Larkin, J. H. Davies, *Phys. Rev. B* **52**, 5535, (1995).
- [2] O. G. Balev and P. Vasilopoulos, *Phys. Rev. Lett.* **81**, 1481 (1998)

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