THE STUDY OF THE RAMAN SCATTERING IN MAGNETIZED SEMICONDUCTOR PLASMA

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Introduction

Radio frequency magnetoplasmic waves known as helicons will propagate in solid state plasmas of semiconductors when a strong magnetic field is applied. The excitation of helicons may be described by the effect similar to the Combination scattering {Raman effect} when a part of the high RF wave energy that passes through the active material is absorbed and re-emitted by magnetized solid state plasma [1].

Experimental

The Magnet No5 of the NHMFL DC Facility was used in 10-15 July 2006. The helicons were excited in InSb and Ge in the wide range of RF and magnetic fields (20–3000MHz and 0–32 Tesla).The semiconductor samples were in the form of plates (thickness 5mm). Excitation and pick-up coils with D=4mm.

Results

The helicon generation peaks were observed in the resonant regime. More than 100 graphs (pick–up signal versus field induction) were obtained. In all cases carrier density and mobility in the active material may be found with high accuracy. The results are being processed further in our laboratory. At the time being two publications are prepared but not published yet.

Conclusions

During the experiment the magnetoplasmic waves were excited by radio frequencies much higher than the helicon generation frequency. It is expedient to call the experimental device a Helicon Maser. The bandwidth of such maser is much narrower than the bandwidth of isolated semiconductor sample.

Acknowledgments

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References

[1] Jankauskas, Z., et al., Physica B, **346-347** (2004), 539-542.