Optics of 2D materials in high magnetic fields

C. Faugeras

Laboratoire National des Champs Magnétiques Intenses,

CNRS-UGA-INSA-UPS, Grenoble, France

Magnetic field is among the few thermodynamical parameters that can be tuned continuously in laboratory to tune the properties of an electronic system. It couples to both the orbital motion giving rise to cyclotron resonance and possibly to Landau quantization, and to the spin degree of freedom allowing for Zeeman spectroscopy. The study, by optical means, of these two effects in two-dimensional materials gives a comfortable access to material parameters, to the electronic band structure, and to novel phenomena, induced or revealed by the magnetic field.

After introducing the basic concepts of magneto-optical spectroscopy and the associated experimental techniques, the lecture will be divided in two parts: i) a first part concerning the magneto-spectroscopy of graphene, a 2D semi metal, by means of infrared transmission and of Raman scattering, and ii) a second part dedicated to monolayers of semiconducting transition metal dichalcogenides studied in the visible range of energy where their electronic band gap lies, by photoluminescence and reflectivity techniques.