

Lecture Series in Condensed Matter and Statistical Physics I

Textures in Quantum Hall Systems, Past and New Developments

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Confinement of electron gases results in exotic states with peculiar behavior. This confinement may be geometric, such as electron gases in two dimensional quantum wells inside semiconducting heterostructures or graphene mono or multilayers. The confinement may be caused further by strong magnetic field resulting in the freezing of the kinetic energy of electrons. Coulomb interactions in such states of matter dictate interesting dynamics. Spin, charge degree of freedom as well as disorder all coupled, play important role in understanding the outcomes of observation of transport and other signatures of such systems. Exotic configurations of spin and charge density of a collection of electrons known as “textures” have essential role in such observations.

In this series of talks, we review some important developments in the past and present in understanding the ground state of electron systems confined in two dimensional quantum wells and graphene in strong magnetic fields. Our focus will be in parts of the phase diagram where textures naturally exist. These talks would be beneficial the most to audience who are already familiar with basic field and quantum many body theory as well as some basics of electronic band structure of graphene.

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