**Electron transport in mesoscopic systems**

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This talk will be common knowledge of the scattering theory on nanoscale systems related to the mesoscopic physics. In mesoscopic systems, particles are coherent and strongly correlated with systems. I want to introduce essential features of nano and mesoscopic physics using simple examples.

Graphene is one of the most important examples which possesses a lot of positive natures such as high mobility, relativistic band structure, mechanically strong, tunability, etc. Quantum Hall effect on 2DEG or graphene is a very popular example of mesoscopic systems. It is known that the high fidelity of interference is assured in graphene Quantum Hall bar [1]. Since quantum Hall effect is reported on graphene relatively small magnetic field to 2DEG and coherence length is quite long, graphene is a good candidate for mesoscopic devices [2]. We introduce the graphene p-n junction emerging conducting edge modes on interfaces between parts of quantum Hall graphene plate distinguished by different gate potentials. The interface plays the role of QPC depending valley-isospin in graphene quantum Hall bar. The deformed graphene induces pseudo-magnetic field and the field confines Dirac particles on the area. The main investigation is measuring the localized states using quantum Hall graphene and the scattering states are affected by local deformation. It can be applicable to the valley-tronics and nano-electromechanical systems.

References

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