

Sudhansu S Mandal

IIT Kharagpur

Title: Overview of Fractional Quantum Hall Effect

I will begin with a brief description of classical Hall effect followed by the integer quantum Hall effect for effectively non-interacting electrons in two-dimensional electron gas. Fractional quantum Hall effect (FQHE) occurs due to the interaction between electrons in the partially filled Landau levels. The effective interaction between electrons is different in different Landau levels, and their overlaps when the magnetic field is not too large. This gives rise to varieties of fractional quantum Hall states (FQHS) in different Landau levels and different hosts of the two-dimensional electron gas. The quasiparticle excitations of the FQHS states have fractional charge and obey nontrivial fractional braiding statistics. The topologies of these states are protected by edge modes. There are two kinds of braiding statistics, namely, Abelian and non-Abelian. The FQHS with non-Abelian braiding are particularly interesting as these states support neutral Majorana edge mode. Together with an overview on FQHE, I will discuss some of the open questions.