PAUL SCHERRER INSTITUT

Invitation

LMU-Seminar

Title: **Quantization of heat flow in the fractional quantum Hall regime**

Speaker: **Prof. Mitali Banerjee**
École polytechnique fédérale de Lausanne, Switzerland

Time: **Tuesday, March 10th 2020, 14:00**

Place: **WBGB/021**

Abstract:

Topological states of matter are characterized by topological invariants, which are physical quantities whose values are quantized and do not depend on details of the measured system. Among them the electrical Hall conductance, which is expressed in units of e^2/h (e the electron charge, h the Planck constant), is easiest to probe. In the fractional quantum Hall effect (FQHE) regime, fractional quantized values of the electrical Hall conductance attest to topologically ordered states, which are states that carry quasi-particles with fractional charge and (expected) anyonic statistics. Another topological invariant, which is much harder to measure, is the thermal Hall conductance, KT, expressed in units of $\kappa_0 T=(\pi^2 k_B^2/3h)T$ (k_B the Boltzmann constant, T the temperature). Remarkably, in one-dimensional transport it does not depend on the particles charge, particles exchange statistics, and is even insensitive to the interaction strength among the particles. A fractional value of the quantized thermal Hall conductance shows that the probed state of matter is non-abelian. Quasiparticles in non-abelian states lead to a ground state degeneracy and perform topological unitary transformations among ground states when braided. As such, they may be useful for topological quantum computation. In this talk, I will report our measurements of the thermal Hall conductance in several quantum Hall states in the lowest and first excited Landau levels. Remarkably, we find the thermal Hall conductance of the $\nu=5/2$ state to be fractional, with a value $K=2.5\kappa_0$, implying non-abelian nature of the state.