复旦大学物理系 物质科学报告

Time: 4:00pm, Friday, 2018.10.26

Location： Physics Building, Room C108

The quantized thermal Hall conductance -- and issues of particle-hole symmetry in a partially full Landau level

Bertrand I. Halperin

Department of Physics, Harvard University

Quantized Hall states occur in two-dimensional electrons systems in a strong magnetic field at low temperatures. In addition to having a precisely quantized Hall conductance, it has been predicted that these states should have a quantized thermal Hall conductance, of the form $\kappa = K\ \kappa_0\ T$, where T is the temperature, κ_0 is a combination of fundamental constants, and K is a quantum number, which is usually and integer but can be a non-integer rational number in some cases. Recently, experimenters have been able to overcome formidable technical difficulties and have measured the thermal conductance for a number of quantized Hall states, including one where the Hall quantum number is the even-denominator fraction $\nu = 5/2$. Although the measured values of K agree with theoretical predictions in all other cases, the value obtained at $\nu = 5/2$ was in striking disagreement with expectations. The reason for this discrepancy is still debated, and the issue is linked to a number of open questions about particle-hole symmetry in systems where a Landau level is close to ½ full. The talk will present an overview of these problems and the attempts to understand them.

Bertrand Halperin is Hollis Professor of Mathematicks and Natural Philosophy, Emeritus, at Harvard University, where he has been a faculty member since 1976. Before that he spent ten years at Bell Laboratories. His current research is largely focused on quantum properties of interacting electrons in confined geometries, including small semiconducting and superconducting devices, at low temperatures, and often in strong magnetic fields. His awards include the 1982 Buckley Prize and the 2001 Onsager Prize of the American Physical Society, the 2003 Wolf Prize in Physics, and the 2007 Dannie Heinemann Prize of the Göttingen Academy of Sciences, and he has been designated to receive the 2019 APS Medal for Exceptional Achievements in Research.