Talk-1

The Quantum Hall Effect - A Phenomenon for all Area in Physics

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Abstract

The Quantum Hall Effect (QHE) is a synonym for electrons in strong magnetic fields with connections to many fields in science like astrophysics (edge states in gravity and black hole physics), high energy physics and string theory (quantum Hall quarks and higher dimensional quantum Hall physics) and metrology (fundamental constants) which explains the high publication rate of about one QHE-publication per day during the last 10 years. However all experimental demonstrations of the QHE are connected to solid state physics and the presentation will concentrate on experimental aspects.

The talk will start with applications of the quantum Hall effect. Experiments show that the QHE can be used to realize a resistance standard R_K which is just a fundamental constant: $R_K=h/e^2=25.812,807\ \Omega$. This resistor is not only the basis for all resistance calibrations but is also important for the realization of the capacitance unit Farad, electrical current unit Ampere, and mass unit Kilogram. The importance of fundamental constants for a new definition of our *International System of Units* (SI units) will be discussed.

The second part of the talk will give an introduction into the physics of the quantum Hall effect with an outlook to new research activities in this field.