

Bonn-Cologne Graduate School of Physics and Astronomy

Intensive Week Course

The travel of heat in solids

September 18-24, 2018, 9-16 h

Seminar room - II. Phys. Institute, University of Cologne



Main Lecturer:

Prof. Kamran Behnia (Ecole Supérieure de Physique et de Chimie Industrielles Paris, FRANCE)

Abstract:

Heat propagates in a solid thanks to phonons, superposition of atomic vibrations, which can carry entropy over a distance before being scattered by other phonons or crystal defects. In metallic solids, the presence of mobile electrons complicates the picture in several directions. Electrons can carry entropy as well and can scatter other heat carriers including phonons. Moreover, the heat flow entangles with charge flow, leading to thermoelectric phenomena, which follows the rules set by irreversible thermodynamics as demonstrated by Onsager in early 20th century.

The lectures, conceived for graduate students of condensed-matter physics, will begin by an account of the history of the exploration of entropy transport in solids and the discoveries made by Fourier, Seebeck, Peltier, Kelvin, Nernst, Ettingshausen, Bridgman and Onsager, followed by the picture sketched by the quantum theory of solids. The link between transport coefficients, the fundamental constants and the material-related properties will be stressed. Finally, the thermal and thermoelectric properties of quantum materials, as a research theme will be discussed by focusing on a few examples.

Course will take place Tue, Wed, Thu, Fri & Mon. The lectures in the morning will be accompanied by exercises in the afternoon.

The number of attendants will be limited to about 15. Due to organizational reasons, we require you to register. Please indicate that you need the credit points upon registration.

Please, send your informal registration requests until 01.09.2018 to hemberger@ph2.uni-koeln.de.

