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Yuki Shiomi

Anomalous and Topological Hall Effects in Itinerant Magnets

Doctoral Thesis accepted by
the University of Tokyo, Tokyo, Japan

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Author
Dr. Yuki Shiomi
Department of Applied Physics
The University of Tokyo
Tokyo
Japan

Supervisor
Prof. Yoshinori Tokura
Department of Applied Physics
The University of Tokyo
Tokyo
Japan

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Supervisor's Foreword

The anomalous Hall effect, i.e., the transverse response of current by internal magnetization, was discovered by Edwin Hall in 1881, soon after his discovery of the normal Hall effect induced by a magnetic field. Nevertheless, an accurate theoretical understanding in terms of topology in the momentum space or real space has been attained only in recent years. This new stage in condensed-matter physics is now going to provide a more fertile ground for materials science and spintronic technology than what was anticipated previously. This book summarizes the Ph.D. thesis work by Yuki Shiomi on anomalous and topological Hall effects in itinerant magnets. Versatile new Hall phenomena and the interpretations in terms of modernized theoretical models are described here as precious fruits of his diligent study for six years in our laboratory.

One of the highlights described in this book is the study of the Hall effects induced by a heat current, i.e., the Righi-Leduc and Nernst-Ettingshausen effects. Dr. Shiomi has revealed unique properties of the anomalous and topological Hall effects by combining the measurements with electrical and heat currents. I hope that the contents of this book are useful as well as stimulating for researchers and students who are interested in magnetotransport properties of itinerant magnets.

Tokyo, December 2012 Yoshinori Tokura

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