

Contents

Preface

I. Introduction

I1 Introduction (C.M. Schneider)

A. Fundamentals of Electron Theory

- A1 Electronic States in Solids (G. Bihlmayer)*
- A2 Electronic Basis of Magnetism (R. Zeller)*
- A3 Magnetism in Reduced Dimensions (S. Blügel)*
- A4 Highly Correlated Electron Materials: Dynamical Mean Field Theory (A. Liebsch)*
- A5 Electronic Structures of Transition-Metal Oxides (F. Ishii)*
- A6 Introduction to Multiferroics (M. Ležaić)*
- A7 Berry Phase in Solid State Physics (M.-C. Chang)*

B. Spin-Dependent Transport Processes: Basics

- B1 Spin Polarization: From the EPR Paradox to the GMR Effect (P. Grünberg)*
- B2 Theory of Tunneling Magnetoresistance (D. Wortmann)*
- B3 Spin Injection into Semiconductors (B. Beschoten)*
- B4 Spin Filter (M. Müller)*
- B5 Spin-Orbit Coupling in Semiconductor Devices (A. Bringer)*
- B6 Spin Relaxation in Nonmagnetic Metals and Semiconductors (P. Mavropoulos)*
- B7 Galvanomagnetic Transport: From Hall Effect to AMR (P.S. Bechthold)*

C. Spin-Dependent Transport: Advanced Concepts

- C1 The Standard Model of Spin Injection (J. Fabian)*
- C2 Anomalous Hall Effect (Y. Mokrousov)*
- C4 Quantum Spin Hall Effect (H. Buhmann)*
- C5 Electron Spins in Carbon Based Materials (M. Morgenstern)*
- C6 Spin and Transport through Quantum Dots (M.R. Wegewijs)*

D. Spin Dynamics

- D1 Micromagnetism (R. Hertel)*
- D2 Spin Waves in Confined Systems (S.O. Demokritov)*
- D3 Spin-Transfer Torque Dynamics (D.E. Bürgler)*
- D4 Femtosecond Opto-Magnetism: Ultrafast Laser Manipulation of Spins (T. Rasing)*

E. Spin-Based Quantum Information

- E1 Fundamental Concepts of Quantum Information Processing (T. Schäpers)*
- E2 Quantum Computing with Semiconductor Quantum Dots (C. Meyer)*
- E3 Donors for Quantum Information Processing (M.S. Brandt)*
- E4 Quantum algorithms (M. Richter)*

F. Applications

- F1 Technology of Hard Disk Drives (A. Berger)*
- F3 Magnetic Logic (G. Reiss)*

Index