

Contents

1. Introduction	1
2. Basic Concepts	5
2.1 Description of Polarized Electrons	5
2.2 Spin-Orbit Interaction	8
2.3 Exchange Interaction	14
2.4 Diffraction of Spin-Polarized Electrons	17
2.4.1 Kinematic Approximation	17
2.4.2 Symmetry Properties	24
2.4.3 Dynamical Theory	30
2.5 Photoemission	39
2.5.1 Photoemission from Crystals	40
2.5.2 Polarized Photoelectrons	47
a) Initial State Effects	47
b) Operator Effects	49
c) Final State Effects	51
2.6 Inelastic Processes	53
2.6.1 Inelastic LEED	54
2.6.2 Spin-Dependent Energy Losses	56
3. Experimental Considerations	61
3.1 Detectors of Polarized Electrons	61
3.1.1 The LEED Detector	62
3.1.2 The Adsorbed Current Detector	71
3.2 Sources of Polarized Electrons	74
3.2.1 The GaAs Source	74
3.2.2 Other Sources	78
4. Results from Non-Magnetic Crystals	80
4.1 Spin-Polarized Electron Diffraction	80
4.1.1 Symmetry Relations	80
4.1.2 Structure Analysis	83

4.1.3	Surface Resonances and Threshold Effects	88
4.1.4	Temperature Effects	92
4.1.5	Adsorbates	96
4.2	Spin-Polarized Photoemission	99
4.2.1	Operator Effects	100
4.2.2	Final State Effects	106
5.	Results from Magnetic Materials	111
5.1	Electron Scattering	111
5.1.1	Elastic Scattering	112
5.1.2	Inelastic Scattering	124
5.1.3	Core Level Excitations	127
5.2	Electron Emission	131
5.2.1	Auger Electron Emission	131
5.2.2	Secondary Electron Emission	132
5.2.3	Photoemission	134
5.3	Isochromat Spectroscopy	137
6.	Outlook	144
	References	147
	Subject Index	151

