

CONTENTS

1. Introduction	1
1.1 Historical Survey	1
1.2 The Nuclear Response	4
1.3 Accelerators and Detectors	8
References	13
2. The Electromagnetic Interaction	17
2.1 Introduction	17
2.2 The Electromagnetic Field in Interaction with Matter	18
2.3 The One-Photon Exchange Approximation	23
2.4 The Lepton Tensor	33
2.5 The Hadron Current	38
2.6 Exchange Currents	46
2.7 The Transition Current for Meson Production	59
References	77
3. Elastic Scattering	81
3.1 Introduction	81
3.2 The Cross Section for Elastic Electron Scattering	81
3.3 The Electromagnetic Form Factors of the Nucleon	91
3.4 Photon Scattering and Electromagnetic Polarizabilities	100
References	108
4. Form Factors of Excited Baryons	114
4.1 Introduction	114
4.2 The Baryon Excitation Spectrum	115
4.3 Electroproduction of Baryon Resonances	118
4.4 Analysis of Data	126
References	135
5. Inclusive Inelastic Scattering	138
5.1 Introduction	138
5.2 The Nuclear Current	139
5.3 The Hadron Tensor in Inclusive Inelastic Scattering	143
5.4 Longitudinal/Transverse Separation	146
5.5 Theoretical Analysis of Quasielastic Data	148

5.6	The Coulomb Sum Rule	172
5.7	The Delta-Resonance Excitation in Nuclei	178
	References	184
6.	Semi-Inclusive Inelastic Scattering	191
6.1	Introduction	191
6.2	The Hadron Tensor	192
6.3	The Hole Spectral Density	196
6.4	Structure Functions	199
6.5	Bound States	203
6.6	Final-state Interactions	215
6.7	Distortion of Electron Wave Functions	223
	References	226
7.	One-Nucleon Knockout Reactions	232
7.1	Introduction	232
7.2	Analysis of Quasifree Nucleon Knockout	233
7.3	Energy Spectrum and Momentum Distributions	242
7.4	Spectroscopic Factors	255
7.5	Nucleon Photoemission	260
7.6	Separation of Structure Functions	268
	References	275
8.	Two-Nucleon Emission	282
8.1	Introduction	282
8.2	Two-Nucleon Emission and Correlations	283
8.3	Structure Functions	288
8.4	Reaction Mechanisms	293
8.5	Two-Nucleon Knockout Reactions	302
8.6	Two-Nucleon Knockout Contributions to $(e,e'p)$ and (γ,N) Reactions	308
8.7	The $(e,e'd)$ Reaction	312
	References	315
9.	Meson Production	321
9.1	Introduction	321
9.2	Pion Production on the Nucleon	321
9.3	Pion Production off Nuclei	334
9.4	Eta Production	346
9.5	Electroproduction of Strangeness	348
	References	351
10.	The Deep Inelastic Response	358
10.1	Introduction	358
10.2	Deep Inelastic Scattering	359
10.3	y -Scaling	372
10.4	The Transparency of the Nuclear Medium	387

References	399
11. Spin Degrees of Freedom	407
11.1 Introduction	407
11.2 Spin Observables	407
11.3 Electron and Photon Polarizations	413
11.4 Hadron Tensor with Polarized Particles	417
11.5 Nucleon Recoil Polarization	422
11.6 Target Polarization	428
11.7 Photoreactions	431
11.8 Complete Determination of the Scattering Amplitudes	434
References	438
12. Polarization Experiments	441
12.1 Introduction	441
12.2 The Neutron Form Factors	442
12.3 Spin Structure of the Nucleon	445
12.4 The Charge Form Factors of the Deuteron	453
12.5 Spin Observables in Pion Production	455
12.6 Polarization in Nucleon Knockout Reactions	459
12.7 Polarization in Nucleon Photoemission	469
References	472
13. Perspectives	479
13.1 Open Problems and Future Programmes	479
13.2 Conclusions	482
Appendix	484
List of Abbreviations	487
Illustration Acknowledgements	489
Author Index	493
Subject Index	502