

Contents

LIST OF CONTRIBUTORS

ix

Atomic Hartree-Fock Theory

M. Cohen and R. P. McEachran

I. Introduction	2
II. The Hartree-Fock Method	4
III. Properties of Hartree-Fock Wave Functions	12
IV. Properties of the Frozen Core Approximation	16
V. The Extended Frozen Core Approximation	23
VI. Improved Frozen Core Approximations	34
VII. Conclusions	49
Appendix: Relativistic Corrections to the Energy Levels	50
References	52

Experiments and Model Calculations to Determine Interatomic Potentials

R. Düren

I. Introduction	55
II. Electronic Model Potentials and Interatomic Potentials	58
III. Experimental Sources	70
IV. Interatomic Potentials Determined with Model Potentials	91
V. Conclusions	96
References	97
Note Added in Proof	100

Sources of Polarized Electrons

R. J. Celotta and D. T. Pierce

I. Introduction	102
II. Source Characteristics	104
III. Chemi-ionization of Optically Oriented Metastable Helium	107

IV.	Photoionization of Polarized Atoms	112
V.	The Fano Effect Source	116
VI.	Field Emission from Ferromagnetic Europium Sulfide on Tungsten	120
VII.	Low-Energy Electron Diffraction	127
VIII.	Photoemission from GaAs	134
IX.	Summary	152
	References	154

Theory of Atomic Processes in Strong Resonant Electromagnetic Fields

S. Swain

I.	Introduction	159
II.	Master Equations	165
III.	Resonance Fluorescence	171
IV.	The Optical Autler-Townes Effect	190
V.	Conclusion	196
	References	196

Spectroscopy of Laser-Produced Plasmas

M. H. Key and R. J. Hutcheon

I.	Introduction	202
II.	Ionization	203
III.	Population Densities of Bound Levels	213
IV.	Intensity of Line Radiation	217
V.	Line Broadening	225
VI.	Continuum Emission	234
VII.	Radiative Transfer	238
VIII.	Structure and Spectroscopic Characteristics of Laser-Produced Plasmas	246
IX.	Spectroscopic Diagnostics of Laser-Produced Plasmas	251
	References	272
	Note Added in Proof	280

Relativistic Effects in Atomic Collisions Theory

B. L. Moiseiwitsch

I.	Introduction	281
II.	Excitation and Ionization	282
III.	Electron Capture	307
	References	316

Parity Nonconservation in Atoms: Status of Theory and Experiment*E. N. Fortson and L. Wilets*

I.	Introduction	319
II.	The Neutral Current Interaction in Atoms	321
III.	Observable Effects	324
IV.	Atomic Calculations	328
V.	Optical Rotation Experiments: Bismuth	338
VI.	Stark Interference Experiments: Cesium and Thallium	357
VII.	Atomic Hydrogen Experiments	367
VIII.	Conclusions	370
	References	371
	INDEX	375
	CONTENTS OF PREVIOUS VOLUMES	387