

Contents

LIST OF CONTRIBUTORS

ix

Resonances in Electron Atom and Molecule Scattering

D. E. Golden

I. Introduction	1
II. Theoretical Considerations	5
III. Experimental Considerations	10
IV. Results	36
References	78

The Accurate Calculation of Atomic Properties by Numerical Methods

*Brian C. Webster, Michael J. Jamieson, and
Ronald F. Stewart*

I. Introduction	88
II. Time-Independent Applications	92
III. The Solution of Coupled Equations	106
IV. Time-Dependent Applications	109
V. Conclusion	121
References	122

(e, 2e) Collisions

Erich Weigold and Ian E. McCarthy

I. Introduction	127
II. Experimental Methods	130
III. Basic Theory	139
IV. Reaction Mechanism at Intermediate to High Energies	151
V. Structure of Atoms and Molecules	164
VI. Conclusions	176
References	177

Forbidden Transitions in One- and Two-Electron Atoms

Richard Marrus and Peter J. Mohr

I. Introduction	182
II. Preliminary Survey	183
III. Magnetic Dipole Decay	188
IV. Magnetic Quadrupole Transitions	194
V. Two-Photon Decay	199
VI. Intercombination Transitions	209
VII. Nuclear-Spin-Induced Decays	211
VIII. Electric-Field-Induced Decays	214
References	220

Semiclassical Effects in Heavy-Particle Collisions

M. S. Child

I. Introduction	225
II. Elastic Atom-Atom Scattering	233
III. Inelastic and Reactive Scattering	246
IV. Nonadiabatic Transitions	262
V. Summary	274
References	275

Atomic Physics Tests of the Basic Concepts in Quantum Mechanics

Francis M. Pipkin

I. Introduction	281
II. Conceptual Framework of Quantum Mechanics	284
III. Experimental Tests	293
IV. Conclusions	336
References	337

Quasi-Molecular Interference Effects in Ion-Atom Collisions

S. V. Bobashev

I. Introduction	341
II. Quasi-Molecular Interference in Inelastic Scattering	342
III. Total Cross Sections for Inelastic Ion-Atom Collision Processes	348

IV. Long-Range Interaction and Polarization of Emitted Light	355
V. Conclusions	361
References	362

Rydberg Atoms

S. A. Edelstein and T. F. Gallagher

I. Introduction	365
II. Spectroscopy and Field Ionization	368
III. Lifetime and Collision Studies of Rydberg Atoms	379
IV. Directions for Future Research	389
References	389

UV And X-Ray Spectroscopy in Astrophysics

A. K. Dupree

I. Introduction	393
II. General Considerations	396
III. The Beryllium Sequence	407
IV. The Boron Sequence	414
V. The Sodium Sequence	421
VI. The Nonequilibrium Solar Plasma	422
VII. Concluding Remarks	426
References	428

AUTHOR INDEX	433
SUBJECT INDEX	451
CONTENTS OF PREVIOUS VOLUMES	461