

Contents

LIST OF CONTRIBUTORS	vii
CONTENTS OF PREVIOUS VOLUMES	ix

Nonadiabatic Transitions between Ionic and Covalent States

R. K. Janev

I. Introduction	1
II. The Concept of Nonadiabatic Transitions between Molecular States	3
III. Methods for Calculation of Ionic-Covalent Nonadiabatic Coupling	10
IV. Electron Transition Probability	20
V. Physical Processes Governed by Ionic-Covalent Nonadiabatic Transitions	29
References	34

Recent Progress in the Theory of Atomic Isotope Shift

J. Bauche and R.-J. Champeau

I. Introduction	39
II. Phenomenology	41
III. Separation of Mass- and Field-Shift Contributions	55
IV. <i>Ab Initio</i> Interpretations	63
V. Conclusion	80
Appendix	81
References	83

Topics on Multiphoton Processes in Atoms

P. Lambropoulos

I. Introduction	87
II. The Perturbation Theory of Multiphoton Processes	89
III. Field Correlation (Photon Statistics) Effects	109
IV. Resonance Multiphoton Processes	114
V. Angular Momentum and Polarization Effects	133
VI. Concluding Remarks	154
Postscript	158
References	158

Optical Pumping of Molecules*M. Broyer, G. Gouedard, J. C. Lehmann, and J. Vigué*

I. Introduction	165
II. Experimental Methods	166
III. Theory	172
IV. Review of Molecules	196
V. Iodine Investigations	201
VI. Conclusion	209
References	211

Highly Ionized Ions*Ivan A. Sellin*

I. Introduction	215
II. Characteristics of Highly Ionized and Excited Ions Produced in Accelerator Beams	217
III. Spontaneous Lifetimes of Few-Electron Ions of Fundamental Interest	244
IV. Accelerator-Based Experiments on Other Fundamental Properties of Highly Ionized Ions: Present and Future	262
References	275

Time-of-Flight Scattering Spectroscopy*Wilhelm Raith*

I. Introduction	281
II. Examples of Application	297
III. General Considerations	323
IV. Experimental Techniques	343
V. Summary	365
References	366
Note Added in Proof	373

Ion Chemistry in the D Region*George C. Reid*

I. Introduction	375
II. Sources of D-Region Ionization	377
III. Experimental Techniques	384
IV. D-Region Positive-Ion Chemistry	386
V. D-Region Negative-Ion Chemistry	399
VI. Model Calculations	408
VII. Conclusion	409
References	410

AUTHOR INDEX	415
SUBJECT INDEX	432