

Contents

Vacuum Ultraviolet Laser Spectroscopy of Small Molecules

C. R. Vidal

I. Introduction	1
II. Multiphoton Spectroscopy and Harmonic Generation	2
III. Coherent VUV Sources	6
IV. Absorption and Excitation Spectroscopy	8
V. Fluorescence Spectroscopy	15
VI. Photodissociation Spectroscopy	22
VII. Ionization Spectroscopy	23
VIII. Two-Step Excitation Spectroscopy	24
IX. Vacuum UV Multiphoton Spectroscopy	31
X. Summary	32
References	32

Foundations of the Relativistic Theory of Atomic and Molecular Structure

Ian P. Grant and Harry M. Quiney

I. Introduction	37
II. Preliminaries	39
III. From QED to Atomic Structure Theory	46
IV. New Developments—Approximation by Finite Basis Sets	64
V. Outlook and Conclusions	81
References	83

Point-Charge Models for Molecules Derived from Least-Squares Fitting of the Electric Potential

D. E. Williams and Ji-Min Yan

I. Introduction	87
II. Calculation of the Electric Potential	90
III. Calculation of the PD/LSF Point Charges in Molecules	94

IV. Examples	101
V. Conclusion	128
References	129

Transition Arrays in the Spectra of Ionized Atoms

J. Bauche, C. Bauche-Arnoult, and M. Klapisch

I. Introduction	132
II. Energy Distribution of Configuration States	137
III. Transition Arrays	142
IV. Comparisons with Experiment	155
V. Level Emissivity	164
VI. Extension to More Physical Situations	171
VII. Level and Line Statistics	179
VIII. Conclusion	186
IX. Appendix	192
References	192

Photoionization and Collisional Ionization of Excited Atoms Using Synchrotron and Laser Radiations

F. J. Wuilleumier, D. L. Ederer, and J. L. Picqué

I. Introduction	198
II. Experimental Techniques	201
III. Theoretical Background	209
IV. Photoionization of an Outer Electron in Excited Atoms	210
V. Results from Synchrotron Radiation Ionization of Laser-Excited Atoms	229
VI. Collisional Ionization of Laser-Excited Atoms	261
VII. Conclusion	278
References	279

Index	287
--------------	------------