

CONTENTS

Summary: Nice Problems in Atomic Physics	1
J. P. Connerade	

ATOMS IN ELECTRIC AND MAGNETIC FIELDS

Atoms in Static Electric and Magnetic Fields:	
The Experimental Aspect	17
J. Pinard	
Theory of the Zeeman Effect in Highly-Excited Atoms	43
K. T. Taylor	
Theory of the Stark Effect in Highly-Excited Atoms	61
D. A. Harmin	
Hydrogen Atom in a Strong Uniform Electric Field	107
R. Damburg	
Hydrogen in Strong DC and Low-Frequency Fields	133
M. H. Nayfeh, D. Humm, and K. Ng	
Elliptic Atomic States	155
A. Bommier, D. Delande, and J. C. Gay	
Diamagnetism of the Hydrogen Atom in the Quasi-Landau Regime	175
A. Holle, J. Main, G. Wiebusch, H. Rottke, and K. H. Welge	
Magneto-Optical Spectroscopy in Strong Fields	189
J. P. Connerade	
The Single-Atom Maser, Chaos and Order of Ions in a Trap, and Rydberg Atoms in Crossed Electric and Magnetic Fields	213
H. Walther	

CHAOS

Chaos in Quantum Dynamics: An Overview	231
G. Casati	
Hydrogen Atom in a Uniform Magnetic Field - A Hamiltonian System Exhibiting Chaos	247
H. Friedrich	

Classical Chaos in One-Dimensional Hydrogen in Strong DC and AC External Fields	269
D. C. Humm and M. H. Nayfeh	
PHENOMENA IN VERY STRONG FIELDS	
Resonant Pair Production in Strong Electric Fields	277
G. Tiktopoulos	
Research on Strong-Field Processes in the Ultraviolet Region	283
K. Boyer, G. Gibson, H. Jara, T. S. Luk, I. A. McIntyre, A. McPherson, R. Rosman, C. K. Rhodes, and J. C. Solem	
LARGE-ORDER PERTURBATION THEORY	
High-Order Perturbation Theory and its Application to Atoms in Strong Fields	295
H. J. Silverstone	
Energies and Widths of the Ground and Excited States of Hydrogen in a DC Field via Variationally-Based Large-Order Perturbation Theory	309
J. N. Silverman and C. A. Nicolaides	
NONPERTURBATIVE THEORY	
Nonperturbative Treatment of Molecule-Radiation Interactions - A Coupled Equations Approach	337
A. Bandrauk	
Many-Electron, Many-Photon Theory of Atoms in Strong Fields	353
C. A. Nicolaides and Th. Mercouris	
LASERS AND FINAL STATE EFFECTS	
Introduction to the High Intensity Physics of Atoms and Free Electrons	381
P. H. Bucksbaum	
Unified Theory of Above-Threshold Ionization, Multi-Harmonic Radiation, and Radiative Electron Scattering in Strong Laser Fields	407
F. H. M. Faisal	
The Keldysh Theory of Strong-Field Ionization and its Extensions	425
H. R. Reiss	
Treatment of Continuum-Continuum Coupling in the Theoretical Study of Above-Threshold Ionization	447
L. Pan	
Final-State Interaction and Field Polarization Effects in the Multiphoton Ionization of Atoms	457
F. Trombetta, S. Basile, and G. Ferrante	

MULTIPLY EXCITED STATES

Laser Experiments on the Alkaline Earths	475
P. Camus	
Highly-Excited Double-Rydberg States in Barium	477
J. Boulmer, P. Camus, J.-M. Lecomte, and P. Pillet	
Autoionizing 4dnf States and Multiphoton Ionization Studies in Strontium	485
P. Camus, M. Kompitsas, S. Cohen, C. Nicolaides, M. Aymar, M. Crance, and P. Pillet	
Properties of Multiply Excited States	493
C. A. Nicolaides, Y. Komninos, M. Chrysos, and G. Aspromallis	

MOLECULES IN INTENSE LASER FIELDS

Molecules in Intense Laser Fields	509
S. N. Dixit and V. McKoy	
Laser-Molecule Interactions at High Intensities	513
K. Codling and L. J. Frasinski	
Multiphoton Fragmentation of H ₂ in Intense UV Radiation	529
M. H. Nayfeh, D. C. Humm, A. Wriegat, K. Ng, and J. Mazumder	

INDICES

Contributors Index	535
Subject Index	536