## CONTENTS, VOLUME II

	Contents, Volume I: Single-Particle Motion	ix
	PREFACE	xv
Chapter <b>4</b>	ROTATIONAL SPECTRA	1
	4-1 Occurrence of Collective Rotational Motion Quantal Systems	n in 2
	<ul> <li>4-2 Symmetries of Deformation. Rotational</li> <li>Degrees of Freedom</li> <li>4-2a Degrees of Freedom Associated with</li> </ul>	
	Spatial Rotations 4-2b Consequences of Axial Symmetry 4-2c # Invariance	5 7 8
	<ul> <li>4-2d  \$\mathcal{P}\$ and \$\mathcal{T}\$ Symmetry</li> <li>4-2e Deformations Violating \$\mathcal{P}\$ or \$\mathcal{T}\$ Sym</li> </ul>	13
	<ul> <li>4-2f Combinations of Rotation and</li> <li>Reflection Symmetries</li> <li>4-2g Rotational Motion in Isospace</li> </ul>	15 20
	<ul> <li>4-3 Energy Spectra and Intensity Relations for Axially Symmetric Nuclei</li> <li>4-3a Rotational Energies</li> <li>4-3b E2-Matrix Elements within Band</li> <li>4-3c M1-Matrix Elements within Band</li> <li>4-3d General Structure of Matrix Element Illustrative Examples to Section 4-3</li> </ul>	22 23 44 54
	4-4 Coupling between Rotational and Intrinsic Motion for Axially Symmetric Nuclei Illustrative Examples to Section 4-4	145 154
	4-5 Rotational Spectra for Systems without Axial Symmetry	175

vi CONTENTS

	<ul> <li>4-5a Symmetry Classification for Even A</li> <li>4-5b Energy Spectra</li> <li>4-5c Systems with Small Asymmetry</li> <li>4-5d Symmetry Classification for Odd A</li> <li>4-5e States with Large I</li> <li>Illustrative Examples to Section 4-5</li> </ul>	176 181 185 187 190 194
	Appendix 4A: Particle-Rotor Model  4A-1 The Coupled System  4A-2 Adiabatic Approximation  4A-3 Nonadiabatic Effects	199 199 200 203
Chapter <b>5</b>	ONE-PARTICLE MOTION IN NONSPHERICAL NUCLEI	211
	5-1 Stationary States of Particle Motion in Spheroidal Potential 5-1a Symmetry and Shape of Nuclear	212
	Equilibrium Deformation  5-1b Deformed Potential  5-1c Structure of One-Particle	212 213
	Wave Functions	215 218
	Illustrative Examples to Section 5-1	
	5-2 Classification of Odd-A Spectra	239
	5-3 Moments and Transitions 5-3a One-Particle Transfer 5-3b Single-Particle Moments and Transitions 5-3c Pair Transfer and α Decay 5-3d Coupling of Particles to Rotational Motion Illustrative Examples to Section 5-3	243 243 244 248 249 253
	Appendix 5A: Scattering by Nonspherical Systems	319
	5A-1 Treatment in Terms of Coupled Channels 5A-2 Adiabatic Approximation	319 322
Chapter <b>6</b>	VIBRATIONAL SPECTRA	325
	6-1 Introduction	326
	<ul> <li>6-2 Quantal Theory of Harmonic Vibrations</li> <li>6-2a Creation Operators for Excitation Quanta</li> <li>6-2b Vibrational Amplitudes</li> <li>6-2c Collective Motion Generated by</li> </ul>	329 330 331
	Vibrational One-Body Potential	334

CONTENTS vii

6-3	Norn	nal Modes of Nuclear Vibration	341
	6-3a	Shape Oscillations. Spherical Equilibrium	341
	6-3b	Vibrations about Spheroidal Equilibrium	361
	6-3c	Collective Motion in Fission Process	365
	6-3d	Isospin of Vibrations. Polarization and	
		Charge Exchange Modes	375
	6-3e	Collective Modes Involving Spin	
		Degree of Freedom	383
	6-3f	Two-Nucleon Transfer Modes. Pair Vibrations	386
6-4		Rules for Multipole Oscillator Strength	399
	6-4a	Classical Oscillator Sums	399
	6-4b	Vibrational Oscillator Strength in Sum Rule Units	405
	6-4c	Tensorial Sums	408
	6-4d	Charge Exchange Contributions to	
		Eλ Oscillator Sum	412
6-5	Partie	cle-Vibration Coupling	416
	6-5a		417
	6-5b		420
	6-5c		424
		Particle-Phonon Interaction Energy	425
	6-5e		430
	6-5f	•	
	0-31	Two-Particle Interactions	432
	6.5~		433
	6-5g 6-5h		733
	0-3H	•	435
		Particle-Vibration Coupling	433
6-6	Anha	irmonicity in Vibrational Motion.	
		oupling of Different Modes	447
	6-6a		
		Quadrupole Mode	448
	6-6b	Coupling between Quadrupole and	
	0 00	Dipole Modes	453
	6-6c	Coupling between Vibration and Rotation	460
Illm		Examples to Chapter 6	464
IIIu		onse Function	464
		ares of Dipole Modes ( $\lambda \pi = 1 - 1$ )	474
		ares of Quadrupole Modes in Spherical Nuclei	507
		ares of Quadrupole Modes in Spherical Nuclei	307
		_	548
		formed Nuclei	
		ares of Octupole Modes	556
		ture of Shells in Single-Particle Spectra	578
		ures of Fission Mode	615
		ures of Spin Excitations	636
	Featu	ares of Pair Correlations	641

viii CONTENTS

	iquid-Drop Model of Vibrations nd Rotations	654
6A-1	Surface Vibrations about Spherically	
	Symmetric Equilibrium	654
6A-2	Large-Amplitude Deformations.	
	Fission Mode	661
6A-3	Compression Modes	666
6A-4	Polarization Modes in	
	Two-Fluid System	670
6A-5	Rotational Motion of Irrotational	1957 = 15
	Fluid	674
Appendix 6B: Th	ne Five-Dimensional Quadrupole Oscillator	677
6B-1	Shape and Angle Coordinates.	
	Vibrational and Rotational	
	Degrees of Freedom	677
6B-2	Oscillations about Spherical	
	Equilibrium	682
6B-3	Yrast Region for Harmonic Vibrations	683
6B-4	Many-Phonon States	688
BIBLIOGRAPHY	(CUMULATIVE FOR VOLUMES I AND II)	693
INDEX (CUMUL	ATIVE FOR VOLUMES I AND II)	731