Contents

	Symbols Defined in the Text	**vii**
1	**Introduction**	**1**
1.1	The Structure of Quantum Theory	1
1.2	The Orders of Magnitude of Atomic Systems	3
2	**The Mathematical Formulation of Quantum Mechanics**	**9**
2.1	Linear Spaces	9
2.2	Algebras	21
2.3	Representations on Hilbert Space	38
2.4	One-Parameter Groups	54
2.5	Unbounded Operators and Quadratic Forms	68
3	**Quantum Dynamics**	**84**
3.1	The Weyl System	84
3.2	Angular Momentum	95
3.3	Time-Evolution	104
3.4	The Limit $t \to \pm \infty$	122
3.5	Perturbation Theory	142
3.6	Stationary Scattering Theory	165
4	**Atomic Systems**	**187**
4.1	The Hydrogen Atom	187
4.2	The Hydrogen Atom in an External Field	202
4.3	Helium-like Atoms	214

4.4 Scattering Theory of Simple Atoms 244
4.5 Complex Atoms 260
4.6 Nuclear Motion and Simple Molecules 272

Bibliography **287**

Index **297**