

# Contents

<i>Preface</i>	v
1. Introduction	1
1.1 Wiener's and Feynman's integration . . . . .	4
1.2 The Feynman functional . . . . .	10
1.3 Infinite dimensional oscillatory integrals . . . . .	12
2. Infinite Dimensional Oscillatory Integrals	15
2.1 Finite dimensional oscillatory integrals . . . . .	15
2.2 The Parseval type equality . . . . .	19
2.3 Generalized Fresnel integrals . . . . .	23
2.4 Infinite dimensional oscillatory integrals . . . . .	32
2.5 Polynomial phase functions . . . . .	42
3. Feynman Path Integrals and the Schrödinger Equation	57
3.1 The anharmonic oscillator with a bounded anharmonic potential . . . . .	57
3.2 Time dependent potentials . . . . .	68
3.3 Phase space Feynman path integrals . . . . .	76
3.4 Magnetic field . . . . .	86
3.5 Quartic potential . . . . .	88
4. The Stationary Phase Method and the Semiclassical Limit of Quantum Mechanics	101
4.1 Asymptotic expansions . . . . .	101
4.2 The stationary phase method. Finite dimensional case . .	106

4.3	The stationary phase method. Infinite dimensional case . . . . .	115
4.4	The semiclassical limit of quantum mechanics . . . . .	128
4.5	The trace formula . . . . .	138
5.	Open Quantum Systems . . . . .	147
5.1	Feynman path integrals and open quantum systems . . . . .	147
5.2	The Feynman-Vernon influence functional . . . . .	155
5.3	The stochastic Schrödinger equation . . . . .	165
6.	Alternative Approaches to Feynman Path Integration . . . . .	177
6.1	Analytic continuation of Wiener integrals . . . . .	177
6.2	The sequential approach . . . . .	181
6.3	White noise calculus . . . . .	184
6.4	Poisson processes . . . . .	188
6.5	Further approaches and results . . . . .	189
Appendix A	Abstract Wiener Spaces . . . . .	191
A.1	General theory . . . . .	191
A.2	The classical Wiener space . . . . .	195
	<i>Bibliography</i> . . . . .	197
	<i>Index</i> . . . . .	215