

1. Record Nr.	UNISA996483172503316
Autore	Nicola Fabio
Titolo	Wave packet analysis of Feynman path integrals / / Fabio Nicola, S. Ivan Trapasso
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2022] ©2022
ISBN	3-031-06186-1
Descrizione fisica	1 online resource (220 pages)
Collana	Lecture notes in mathematics ; ; Volume 2305
Disciplina	515.43
Soggetti	Feynman integrals Gabor transforms Quantum theory Integrals de Feynman Teoria quàntica Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Preface -- Contents -- Outline -- 1 Itinerary: How Gabor Analysis Met Feynman Path Integrals -- 1.1 The Elements of Gabor Analysis -- 1.1.1 The Analysis of Functions via Gabor Wave Packets -- 1.2 The Analysis of Operators via Gabor Wave Packets -- 1.2.1 The Problem of Quantization -- 1.2.2 Metaplectic Operators -- 1.3 The Problem of Feynman Path Integrals -- 1.3.1 Rigorous Time-Slicing Approximation of Feynman Path Integrals -- 1.3.2 Pointwise Convergence at the Level of Integral Kernels for Feynman-Trotter Parametrices -- 1.3.3 Convergence of Time-Slicing Approximations in $L(L_2)$ for Low-Regular Potentials -- 1.3.4 Convergence of Time-Slicing Approximations in the L_p Setting -- Part I Elements of Gabor Analysis -- 2 Basic Facts of Classical Analysis -- 2.1 General Notation -- 2.2 Function Spaces -- 2.2.1 Lebesgue Spaces -- 2.2.2 Differentiable Functions and Distributions -- 2.3 Basic Operations on Functions and Distributions -- 2.4 The Fourier Transform -- 2.4.1 Convolution and Fourier Multipliers -- 2.5 Some More Facts and Notations -- 3 The Gabor Analysis of Functions -- 3.1 Time-Frequency Representations --

3.1.1 The Short-Time Fourier Transform -- 3.1.2 Quadratic Representations -- 3.2 Modulation Spaces -- 3.3 Wiener Amalgam Spaces -- 3.4 A Banach-Gelfand Triple of Modulation Spaces -- 3.5 The Sjöstrand Class and Related Spaces -- 3.6 Complements -- 3.6.1 Weight Functions -- 3.6.2 The Cohen Class of Time-Frequency Representations -- 3.6.3 Kato-Sobolev Spaces -- 3.6.4 Fourier Multipliers -- 3.6.5 More on the Sjöstrand Class -- 3.6.6 Boundedness of Time-Frequency Transforms on Modulation Spaces -- 3.6.7 Gabor Frames -- 4 The Gabor Analysis of Operators -- 4.1 The General Program -- 4.2 The Weyl Quantization -- 4.3 Metaplectic Operators -- 4.3.1 Notable Facts on Symplectic Matrices.
4.3.2 Metaplectic Operators: Definitions and Basic Properties -- 4.3.3 The Schrödinger Equation with Quadratic Hamiltonian -- 4.3.4 Symplectic Covariance of the Weyl Calculus -- 4.3.5 Gabor Matrix of Metaplectic Operators -- 4.4 Fourier and Oscillatory Integral Operators -- 4.4.1 Canonical Transformations and the Associated Operators -- 4.4.2 Generalized Metaplectic Operators -- 4.4.3 Oscillatory Integral Operators with Rough Amplitude -- 4.5 Complements -- 4.5.1 Weyl Operators and Narrow Convergence -- 4.5.2 General Quantization Rules -- 4.5.3 The Class $\text{FIO}'(S, \text{vs})$ -- 4.5.4 Finer Aspects of Gabor Wave Packet Analysis -- 5 Semiclassical Gabor Analysis -- 5.1 Semiclassical Transforms and Function Spaces -- 5.1.1 Sobolev Spaces and Embeddings -- 5.2 Semiclassical Quantization, Metaplectic Operators and FIOs -- Part II Analysis of Feynman Path Integrals -- 6 Pointwise Convergence of the Integral Kernels -- 6.1 Summary -- 6.2 Preliminary Results -- 6.2.1 The Schwartz Kernel Theorem -- 6.2.2 Uniform Estimates for Linear Changes of Variable -- 6.2.3 Exponentiation in Banach Algebras -- 6.2.4 Two Technical Lemmas -- 6.3 Reduction to the Case $.12\text{em}.1\text{em}\text{dotted}\text{dotted}\text{dotted}.76\text{dotted}$.
 $6h=(2)-1$ -- 6.4 The Fundamental Solution and the Trotter Formula -- 6.5 Potentials in M_0, s -- 6.6 Potentials in C_b -- 6.7 Potentials in the Sjöstrand Class $M, 1$ -- 6.8 Convergence at Exceptional Times -- 6.9 Physics at Exceptional Times -- 7 Convergence in $L(L^2)$ for Potentials in the Sjöstrand Class -- 7.1 Summary -- 7.2 An Abstract Approximation Result in $L(L^2)$ -- 7.3 Short-Time Analysis of the Action -- 7.4 Estimates for the Parametrix and Convergence Results -- 8 Convergence in $L(L^2)$ for Potentials in Kato-Sobolev Spaces -- 8.1 Summary -- 8.2 Sobolev Regularity of the Hamiltonian Flow -- 8.3 Sobolev Regularity of the Classical Action.
8.4 Analysis of the Parametrices and Convergence Results -- 8.5 Higher-Order Parametrices -- 9 Convergence in the L^p Setting -- 9.1 Summary -- 9.2 Review of the Short Time Analysis in the Smooth Category -- 9.3 Wave Packet Analysis of the Schrödinger Flow -- 9.4 Convergence in L^p with Loss of Derivatives -- 9.5 The Case of Magnetic Fields -- 9.6 Sharpness of the Results -- 9.7 Extensions to the Case of Rough Potentials -- Bibliography -- Index.
