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Nota di contenuto	Preface: A Description of Contents; Acknowledgments; Contents; 1. Introduction: A Summary of Mathematical and Physical Background for One-Particle Quantum Mechanics; 2. Spreading and Asymptotic Decay of Free Wave Packets: The Method of Stationary Phase and van der Corput's Approach; 3. The Relation Between Time-Like Decay and Spectral Properties; 3.1 Decay on the Average Sense; 3.1.1 Preliminaries: Wiener's, RAGE and Weyl theorems; 3.1.2 Models of exotic spectra, quantum KAM theorems and Howland's theorem 3.1.3 UH measures and decay on the average: Strichartz-Last theorem and Guarneri-Last-Combes theorem3.2 Decay in the L^p -Sense; 3.2.1 Relation between decay in the L^p -sense and decay on the average sense; 3.2.2 Decay on the L^p -sense and absolute continuity; 3.2.3 Sojourn time, Sinha's theorem and time-energy uncertainty relation; 3.3 Pointwise Decay; 3.3.1 Does decay in the L^p -sense and/or absolute continuity imply pointwise decay?; 3.3.2 Rajchman measures, and the connection between ergodic theory, number theory and analysis; 3.3.3 Fourier dimension, Salem sets and Salem's method 3.4 Quantum Dynamical Stability4. Time Decay for a Class of Models with Sparse Potentials; 4.1 Spectral Transition for Sparse Models in $d =$

1; 4.1.1 Existence of "mobility edges"; 4.1.2 Uniform distribution of Prüfer angles; 4.1.3 Proof of Theorem 4.1; 4.2 Decay in the Average; 4.2.1 Anderson-like transition for "separable" sparse models in $d = 2$; 4.2.2 Uniform Hölder continuity of spectral measures; 4.2.3 Formulation, proof and comments of the main result; 4.3 Pointwise Decay; 4.3.1 Pearson's fractal measures: Borderline time-decay for the least sparse model; 4.3.2 Gevrey-type estimates 4.3.3 Proof of Theorem 4.75. Resonances and Quasi-exponential Decay; 5.1 Introduction; 5.2 The Model System; 5.3 Generalities on Laplace-Borel Transform and Asymptotic Expansions; 5.4 Decay for a Class of Model Systems After Costin and Huang: Gamow Vectors and Dispersive Part; 5.5 The Role of Gamow Vectors; 5.6 A First Example of Quantum Instability: Ionization; 5.7 Ionization: Study of a Simple Model; 5.8 A Second Example of Multiphoton Ionization: The Work of M. Huang; 5.9 The Reason for Enhanced Stability at Resonances: Connection with the Fermi Golden Rule
6. Aspects of the Connection Between Quantum Mechanics and Classical Mechanics: Quantum Systems with Infinite Number of Degrees of Freedom 6.1 Introduction; 6.2 Exponential Decay and Quantum Anosov Systems; 6.2.1 Generalities: Exponential decay in quantum and classical systems; 6.2.2 Quantum Anosov systems; 6.2.3 Examples of quantum Anosov systems and Weigert's configurational quantum cat map; 6.3 Approach to Equilibrium; 6.3.1 A brief introductory motivation; 6.3.2 Approach to equilibrium in classical (statistical) mechanics 1: Ergodicity, mixing and the Anosov property. The Gibbs entropy
6.3.3 Approach to equilibrium in classical mechanics 2

Sommario/riassunto

Time decays form the basis of a multitude of important and interesting phenomena in quantum physics that range from spectral properties, resonances, return and approach to equilibrium, to quantum mixing, dynamical stability properties and irreversibility and the "arrow of time". This monograph is devoted to a clear and precise, yet pedagogical account of the associated concepts and methods.
