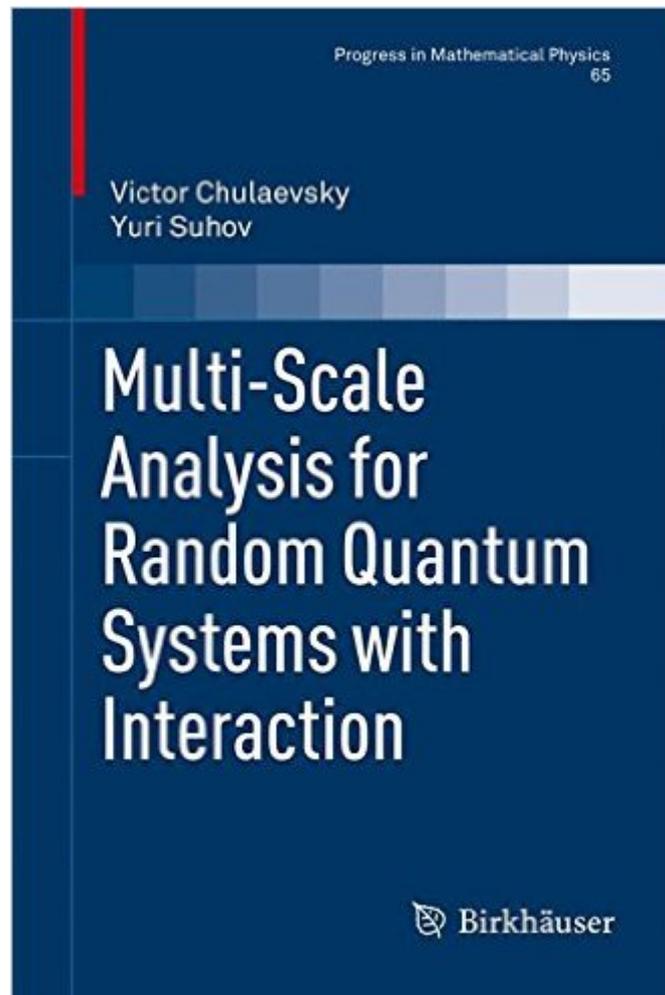# Multi-scale Analysis For Random Quantum Systems With Interaction (Progress In Mathematical Physics)

Synopsis

The study of quantum disorder has generated considerable research activity in mathematics and physics over past 40 years. While single-particle models have been extensively studied at a rigorous mathematical level, little was known about systems of several interacting particles, let alone systems with positive spatial particle density. Creating a consistent theory of disorder in multi-particle quantum systems is an important and challenging problem that largely remains open. Multi-scale Analysis for Random Quantum Systems with Interaction presents the progress that had been recently achieved in this area. The main focus of the book is on a rigorous derivation of the multi-particle localization in a strong random external potential field. To make the presentation accessible to a wider audience, the authors restrict attention to a relatively simple tight-binding Anderson model on a cubic lattice Zd. This book includes the following cutting-edge features: an introduction to the state-of-the-art single-particle localization theory an extensive discussion of relevant technical aspects of the localization theorya thorough comparison of the multi-particle model with its single-particle counterpart a self-contained rigorous derivation of both spectral and dynamical localization in the multi-particle tight-binding Anderson model. Required mathematical background for the book includes a knowledge of functional calculus, spectral theory (essentially reduced to the case of finite matrices) and basic probability theory. This is an excellent text for a year-long graduate course or seminar in mathematical physics. It also can serve as a standard reference for specialists.

Book Information

Series: Progress in Mathematical Physics (Book 65)

Hardcover: 238 pages

Publisher: Birkhãƒâ¤user; 2014 edition (September 20, 2013)

Language: English

ISBN-10: 1461482259

ISBN-13: 978-1461482253

Product Dimensions: 6.1 x 0.6 x 9.2 inches

Shipping Weight: 1.2 pounds (View shipping rates and policies)

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