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Record Nr.	UNINA9910686787203321
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Titolo	Self-Adjoint Extension Schemes and Modern Applications to Quantum Hamiltonians / / Matteo Gallone and Alessandro Michelangeli ; foreword by Sergio Albeverio
Pubbl/distr/stampa	Cham, Switzerland : , : Springer Nature Switzerland AG, , [2023] ©2023
ISBN	9783031108853 9783031108846
Edizione	[First edition.]
Descrizione fisica	1 online resource (557 pages)
Collana	Springer Monographs in Mathematics Series
Disciplina	530.15
Soggetti	Mathematical physics Mathematical analysis
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Sommario/riassunto	This book introduces and discusses the self-adjoint extension problem for symmetric operators on Hilbert space. It presents the classical von Neumann and Krein–Vishik–Birman extension schemes both in their modern form and from a historical perspective, and provides a detailed analysis of a range of applications beyond the standard pedagogical examples (the latter are indexed in a final appendix for the reader's convenience). Self-adjointness of operators on Hilbert space representing quantum observables, in particular quantum Hamiltonians, is required to ensure real-valued energy levels, unitary evolution and, more generally, a self-consistent theory. Physical heuristics often produce candidate Hamiltonians that are only symmetric: their extension to suitably larger domains of self-adjointness, when possible, amounts to declaring additional physical states the operator must act on in order to have a consistent physics, and distinct self-adjoint extensions describe different physics. Realising observables self-adjointly is the first fundamental problem of quantum-mechanical modelling. The discussed applications concern models of topical relevance in modern mathematical physics currently

receiving new or renewed interest, in particular from the point of view of classifying self-adjoint realisations of certain Hamiltonians and studying their spectral and scattering properties. The analysis also addresses intermediate technical questions such as characterising the corresponding operator closures and adjoints. Applications include hydrogenoid Hamiltonians, Dirac–Coulomb Hamiltonians, models of geometric quantum confinement and transmission on degenerate Riemannian manifolds of Grushin type, and models of few-body quantum particles with zero-range interaction. Graduate students and non-expert readers will benefit from a preliminary mathematical chapter collecting all the necessary pre-requisites on symmetric and self-adjoint operators on Hilbert space (including the spectral theorem), and from a further appendix presenting the emergence from physical principles of the requirement of self-adjointness for observables in quantum mechanics.