

1. Record Nr.	UNINA9910254620103321
Autore	Prodan Emil
Titolo	Bulk and Boundary Invariants for Complex Topological Insulators : From K-Theory to Physics // by Emil Prodan, Hermann Schulz-Baldes
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2016
ISBN	3-319-29351-6
Edizione	[1st ed. 2016.]
Descrizione fisica	1 online resource (217 p.)
Collana	Mathematical Physics Studies, , 2352-3905
Disciplina	514.23
Soggetti	Mathematical physics K-theory Condensed matter Mathematical Methods in Physics K-Theory Mathematical Physics Condensed Matter Physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Illustration of key concepts in dimension $d = 1$ -- Topological solid state systems: conjectures, experiments and models -- Observables algebras for solid state systems -- K-theory for topological solid state systems -- The topological invariants and their interrelations -- Index theorems for solid state systems -- Invariants as measurable quantities.
Sommario/riassunto	This monograph offers an overview of rigorous results on fermionic topological insulators from the complex classes, namely, those without symmetries or with just a chiral symmetry. Particular focus is on the stability of the topological invariants in the presence of strong disorder, on the interplay between the bulk and boundary invariants and on their dependence on magnetic fields. The first part presents motivating examples and the conjectures put forward by the physics community, together with a brief review of the experimental achievements. The second part develops an operator algebraic approach for the study of disordered topological insulators. This leads naturally to use analysis

tools from K-theory and non-commutative geometry, such as cyclic cohomology, quantized calculus with Fredholm modules and index pairings. New results include a generalized Streda formula and a proof of the delocalized nature of surface states in topological insulators with non-trivial invariants. The concluding chapter connects the invariants to measurable quantities and thus presents a refined physical characterization of the complex topological insulators. This book is intended for advanced students in mathematical physics and researchers alike.
