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Autore	Bernevig B. Andrei <1978->
Titolo	Topological insulators and topological superconductors // B. Andrei Bernevig with Taylor L. Hughes
Pubbl/distr/stampa	Princeton, New Jersey ; ; Oxford, [England] : , : Princeton University Press, , 2013 ©2013
ISBN	1-4008-4673-0
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Soggetti	Energy-band theory of solids Superconductivity Solid state physics - Mathematics Superconductors - Mathematics
Lingua di pubblicazione	Inglese
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Front matter -- Contents -- 1. Introduction -- 2. Berry Phase -- 3. Hall Conductance and Chern Numbers -- 4. Time-Reversal Symmetry -- 5. Magnetic Field on the Square Lattice -- 6. Hall Conductance and Edge Modes: The Bulk-Edge Correspondence -- 7. Graphene -- 8. Simple Models for the Chern Insulator -- 9. Time-Reversal-Invariant Topological Insulators -- 10. Z <sub>2</sub> Invariants -- 11. Crossings in Different Dimensions -- 12. Time-Reversal Topological Insulators with Inversion Symmetry -- 13. Quantum Hall Effect and Chern Insulators in Higher Dimensions -- 14. Dimensional Reduction of 4-D Chern Insulators to 3-D Time-Reversal Insulators -- 15. Experimental Consequences of the Z <sub>2</sub> Topological Invariant -- 16. Topological Superconductors in One and Two Dimensions / Hughes, Taylor L. -- 17. Time-Reversal-Invariant Topological Superconductors / Hughes, Taylor L. -- 18. Superconductivity and Magnetism in Proximity to Topological Insulator Surfaces / Hughes, Taylor L. -- APPENDIX -- 3-D Topological Insulator in a Magnetic Field -- References -- Index
Sommario/riassunto	This graduate-level textbook is the first pedagogical synthesis of the field of topological insulators and superconductors, one of the most

exciting areas of research in condensed matter physics. Presenting the latest developments, while providing all the calculations necessary for a self-contained and complete description of the discipline, it is ideal for graduate students and researchers preparing to work in this area, and it will be an essential reference both within and outside the classroom. The book begins with simple concepts such as Berry phases, Dirac fermions, Hall conductance and its link to topology, and the Hofstadter problem of lattice electrons in a magnetic field. It moves on to explain topological phases of matter such as Chern insulators, two- and three-dimensional topological insulators, and Majorana p-wave wires. Additionally, the book covers zero modes on vortices in topological superconductors, time-reversal topological superconductors, and topological responses/field theory and topological indices. The book also analyzes recent topics in condensed matter theory and concludes by surveying active subfields of research such as insulators with point-group symmetries and the stability of topological semimetals. Problems at the end of each chapter offer opportunities to test knowledge and engage with frontier research issues. Topological Insulators and Topological Superconductors will provide graduate students and researchers with the physical understanding and mathematical tools needed to embark on research in this rapidly evolving field.

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