
Zbl 1208.81172**Rosenberg, Jonathan****Topology, C^* -algebras, and string duality.** (English)

CBMS Regional Conference Series in Mathematics 111. Providence, RI: American Mathematical Society (AMS). viii, 110 p. \$ 33.00 (2009). ISBN 978-0-8218-4922-4/pbk

This little book is based on a series of lectures given by its author at an NSF/CBMS Regional Conference in the Mathematical Sciences, 2009.

Its goal is to give a concise introduction to K -theory and the use of K -theory in the context of modern physics, in particular in string theories and their dualities. A central role in the book is played by T -duality which is presented in detail. After some introductory remarks on string theory the following topics are discussed (a collection from the table of content): A quick review of topological K -theory. K -theory and D-brane charges. K -homology and D -brane charges. A few basics of C^* algebras and crossed products. Continuous trace algebras and twisted K -theory. The theory of gerbes. Connes' Thom isomorphism. The Pimsner-Voiculescu sequence. The topology of T -duality and the Bunke-Schick construction. T -duality via crossed products. Higher-dimensional T -duality via topological methods. Higher-dimensional T -duality via C^* -algebraic methods. As more advanced topics, mirror symmetry and Fourier-Mukai duality are discussed.

The book introduces the necessary concepts in a very lively manner concentrating on essential aspects of the theory. The reviewer considers the book as a highly welcome introduction to a field of ongoing mathematical research. It gives an excellent overview of the methods and results. For the reader who wants to know more, further references are given.

*Martin Schlichenmaier (Luxembourg)**Keywords* : K -theory; string theory; dualities; crossed products; mirror symmetry*Classification* :

- *81T30 String and superstring theories
- 81T75 Noncommutative geometry methods
- 19K99 K -theory and operator algebras
- 46L80 K -theory and operator algebras
- 58B34 Noncommutative geometry (a la Connes)
- 55R10 Fiber bundles
- 55P65 Homotopy functors
- 55R50 Stable classes of vector space bundles, K -theory
- 14J32 Calabi-Yau manifolds
- 53Z05 Appl. of differential geometry to physics