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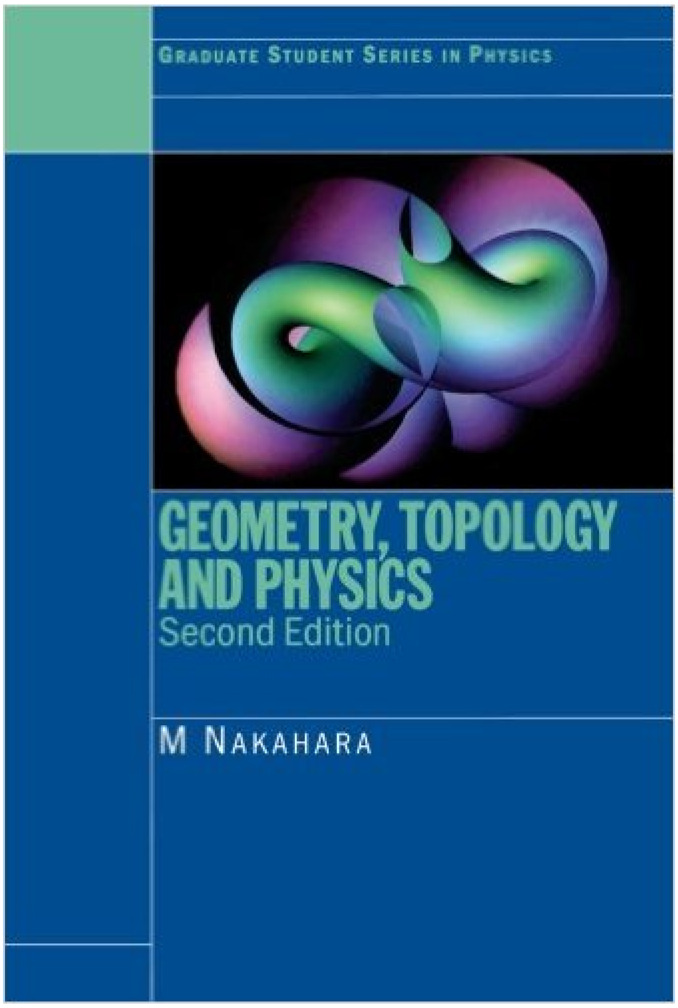
Geometry, Topology And Physics, Second Edition (Graduate Student Series In Physics)



Synopsis

Differential geometry and topology have become essential tools for many theoretical physicists. In particular, they are indispensable in theoretical studies of condensed matter physics, gravity, and particle physics. Geometry, Topology and Physics, Second Edition introduces the ideas and techniques of differential geometry and topology at a level suitable for postgraduate students and researchers in these fields.The second edition of this popular and established text incorporates a number of changes designed to meet the needs of the reader and reflect the development of the subject. The book features a considerably expanded first chapter, reviewing aspects of path integral quantization and gauge theories. Chapter 2 introduces the mathematical concepts of maps, vector spaces, and topology. The following chapters focus on more elaborate concepts in geometry and topology and discuss the application of these concepts to liquid crystals, superfluid helium, general relativity, and bosonic string theory. Later chapters unify geometry and topology, exploring fiber bundles, characteristic classes, and index theorems. New to this second edition is the proof of the index theorem in terms of supersymmetric quantum mechanics. The final two chapters are devoted to the most fascinating applications of geometry and topology in contemporary physics, namely the study of anomalies in gauge field theories and the analysis of Polakov’s bosonic string theory from the geometrical point of view.Geometry, Topology and Physics, Second Edition is an ideal introduction to differential geometry and topology for postgraduate students and researchers in theoretical and mathematical physics.

Book Information

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Customer Reviews

Nakahara is one of my favorite books. It gives the reader the necessary knowledge in differential geometry and topology to understand theoretical physics from a modern viewpoint. Each chapter in Nakahara would normally take a full semester mathematics course to teach, but the necesseties for a physicist are distilled with just the right amount of rigor so that the reader is neither bored from excessive proof nor skeptical from simple plausibility arguments.The first few chapters (homotopy, homology) are rather dry, but the text picks up after that. The manifold chapter is really good, particularly the Lie groups section which gives a geometric viewpoint of the objects which get very little attention in a typical particle physics course. Unfortunately, nothing is said on representation theory, but that can be found in Georgi's book. The cohomology chapter is wonderfully quick and to the point. I found myself having to tell myself to slow down because of the excitement I had in reading it. The Riemannian geometry chapter reads wonderfully and serves as a great reference for all those general relativity formulae you always forget. The end of that chapter has an exquisite little bit on spinors in curved spacetime. The complex geometry chapter is also wonderful. I find myself going back to it all the time when reading Polchinski's string text. The chapters on fiber bundles seem a bit on the overly mathy side, but then again, all the pain is in the definitions which becomes well worth it in the end. I haven't read the last few chapters (spending all of my time in Polchinski!) but I definitely will when I have some spare time. The notation in Nakahara is also really self explanatory and standard.

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