

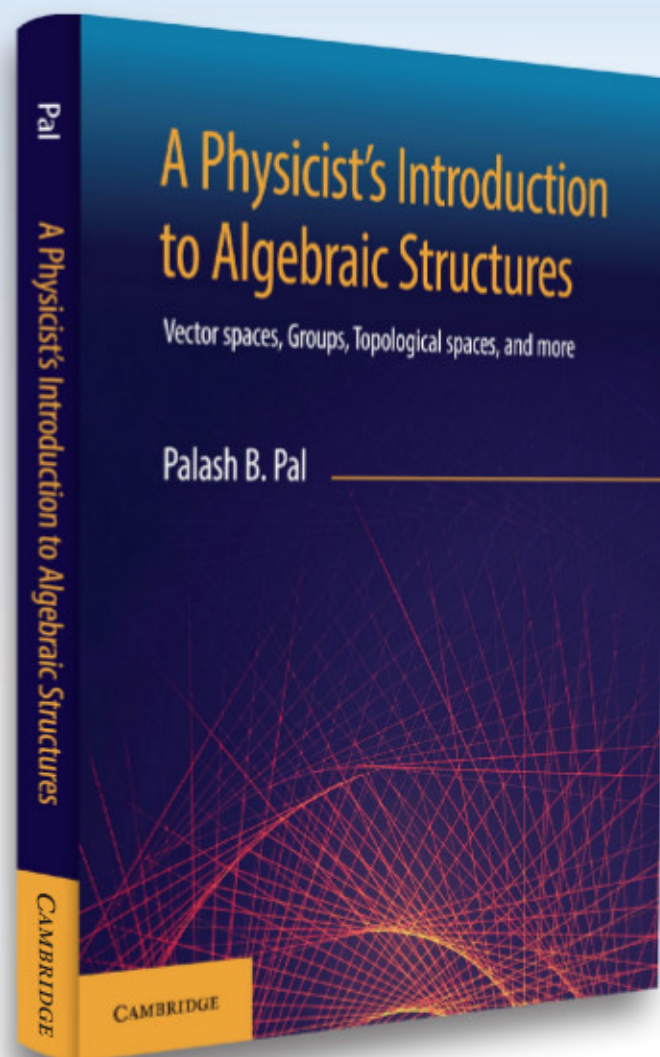
# A Physicist's Introduction to Algebraic Structures

Vector spaces, Groups, Topological spaces and more

Palash B. Pal

Catering to the needs of graduate students and researchers in the field of mathematical physics and theoretical physics, this comprehensive and valuable text discusses the essential concepts of algebraic structures such as metric space, group, modular numbers, algebraic integers, field, vector space, Boolean algebra, measure space and Lebesgue integral. Important topics including finite and infinite dimensional vector spaces, finite groups and their representations, unitary groups and their representations and representations of the Lorentz group, homotopy and homology of topological spaces are covered extensively. Rich pedagogy includes various problems interspersed throughout the book for better understanding of concepts.

- Includes detailed proofs of important theorems
- More than 400 problems to test the understanding of concepts, including answers to many of them
- In-depth coverage of topics includes vector space, group, and topological space
- Topology is introduced after group theory, helping students understand the topological properties of group parameter spaces



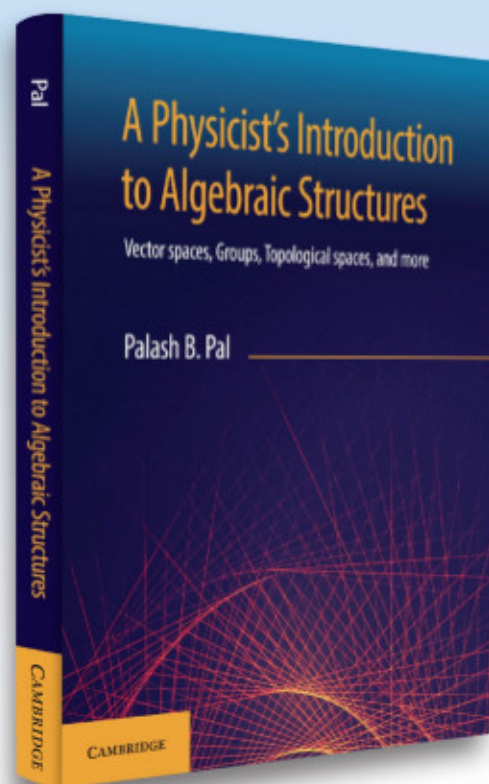
**Palash B. Pal** retired from the theory division at Saha Institute of Nuclear Physics, Kolkata, and presently holds an emeritus position at the University of Calcutta. His research includes elementary particle physics, with specializations in neutrinos, grand unified theories, and particles in electromagnetic fields. He has published more than 100 papers in journals of international repute. He has taught courses on mathematical methods, particle physics, quantum field theory, theoretical physics and classical field theory at graduate level. He is also a prolific popular-science writer in his native language Bengali, and some of his works have been translated into English.

Paperback | 978-1-108-72911-6 | ₹ 995.00

# A Physicist's Introduction to Algebraic Structures

Vector spaces, Groups, Topological spaces and more

Palash B. Pal



## CONTENTS

*Preface*

### **Part A : General Introduction**

- Chapter 1. Rules of Logic
- Chapter 2. Sets and Functions
- Chapter 3. Algebraic Structures

### **Part B : Vector Spaces**

- Chapter 4. Basics
- Chapter 5. Operators on vector spaces
- Chapter 6. Infinite dimensional vector spaces

### **Part C : Group Theory**

- Chapter 7. General properties of groups
- Chapter 8. Finite groups
- Chapter 9. Representation of finite groups
- Chapter 10. Symmetries of regular geometrical objects
- Chapter 11. Countably infinite groups
- Chapter 12. General properties of Lie groups

- Chapter 13. Rotations and translations
- Chapter 14. Unitary groups and their representations
- Chapter 15. Orthogonal groups and their representations
- Chapter 16. Parameter space of Lie groups
- Chapter 17. Representations of the Lorentz group
- Chapter 18. Roots and weights
- Chapter 19. Some other groups and algebras

### **Part D : Topology**

- Chapter 20. Continuity of functions
- Chapter 21. Topological spaces
- Chapter 22. Homotopy theory
- Chapter 23. Homology

*Appendices*

*References*

*Index*

Available on 



**CAMBRIDGE**  
UNIVERSITY PRESS

[www.cambridgeindia.org](http://www.cambridgeindia.org)

Cambridge University Press India Pvt Ltd  
314 to 321, 3rd Floor, Plot No.3, Splendor Forum, Jasola District Centre, Jasola, New Delhi – 110025  
Tel: 011-43543500 Email: [academic.marketing.india@cambridge.org](mailto:academic.marketing.india@cambridge.org)

Join us:  /CambridgeIndiaAcademic

New Delhi • Bengaluru • Chennai • Kolkata • Hyderabad • Mumbai • Thiruvananthapuram

Cambridge University Press is a part of the University of Cambridge. It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.