

BOOK REVIEW

A review of *Group Theory for Physicists (Second Edition)*

By Zhong-Qi Ma

World Scientific, 2019, 655 pp., (£115 hardcover, £60 softcover)

ISBN 978-981-3277-96-0

Scope: Textbook

Level: Researcher

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Many problems in physics possess symmetry, either the familiar symmetries of geometrical objects, or more abstract symmetries connected with exchange of variables or the structure of the mathematics. Arguments involving symmetry can then be marshalled to show that certain processes are allowed, or forbidden, that certain sets of energy levels are degenerate, or that certain transitions between energy levels will be allowed by one perturbation but not by another. These powerful and effective arguments are constructed using group theory, and thus it is no surprise that group theory is a particularly useful branch of mathematics for physicists to learn.

The problem is that, though group theory is extremely valuable in very many branches of their subject, group theory can be rather dry to learn. Theorems and proofs follow abstract definitions, and it can be a while until the payoff in physics is visible. Ma's book, now in a revised second edition, presents a clear, step-by-step treatment of the material, but it can hardly be described as lively, containing very few pictures and practical examples. It's a reliable account, particularly good on certain topics such as Young tableau and Clebsch-Gordan coefficients, but the reader should not expect much hand-holding as they are marched through the mathematical formalism. The subject of group theory for physicists is already well served by a large variety of textbooks; I still prefer Zee's highly readable volume, published by Princeton University Press, as my top recommendation, with Burns and Glazer excellent for space groups in condensed matter, and I would make an honourable mention of the somewhat older books by Georgi (on Lie algebras), Heine, Joshi and Tinkham. Nevertheless, Ma's book is a comprehensive treatment of the subject that works through the material with care and clarity and will appeal to those who like their mathematics undiluted.