

# Bookshelf

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*An Introduction to Gauge Theories and Modern Particle Physics,*  
by Elliot Leader and Enrico Predazzi:  
Cambridge University Press,  
Volume I hardback,  
ISBN 0521464684 £90,  
Volume I paperback  
ISBN 052146840X £32.50,  
Volume II hardback  
ISBN 0521496179 £85,  
Volume II paperback  
ISBN 0521499518 £30

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The first volume of this book (close to 500 pages) covers electroweak interactions, the "new particles" (with the discovery of charm beauty and the tau) and the parton model. The second volume (about 450 pages) deals with CP violations, QCD and hard processes.

Reading it, the first impression is of a saga. The book traces the excitements and discoveries which characterized the fruitful period in particle physics during the seventies and the eighties, when our Standard Model of fundamental particles and their interactions took shape and was verified by experiment to high precision. This precise adherence to the Standard Model has subsequently continued and increased, despite careful searches for any deviations.

The presentation sometimes traces actual developments, with an almost chronological presentation of results which gradually brought a better understanding, but overall the book prefers a more global viewpoint to ensure a good conceptual understanding. The particularly clear presentation also often follows a phenomenological approach, emphasizing analysis of the data as they became available.

Rather than an introduction to gauge theories, it is more the story of

the success of the particular gauge theories which constitute the Standard Model - the Electroweak Theory and Quantum Chromo-dynamics - including most of the necessary technical details.

While, with hindsight, one can cover much ground while remaining at a relatively simple theoretical level, there are many subtle points, associated in particular with renormalizability and vacuum degeneracy, which cannot be avoided.

The presentation of these points tends to be rather brief. However the authors do acknowledge this and make a genuine effort to present clear pictures of such complex topics so that the unfamiliar reader could at least appreciate the importance of these questions, the techniques needed to handle them, and/or their practical consequences.

A good knowledge of relativistic quantum mechanics is needed. Some quantum field theory, only briefly covered in the appendices, would also help.

The book is primarily a presentation of past successes. This could have been achieved more compactly, but it is good to have such an authoritative phenomenological compilation of the dramatic progress during two decades.

The book is however very brief when looking beyond the Standard Model, in particular about supersymmetry, which, while still controversial, has many followers and already extensive putative phenomenology. The book also does not cover in any detail the future expectations when colliding constituents at the TeV level, neither does it present rationale behind the effort to search for the quark-gluon plasma or for neutrino oscillations.

While not speculating very much

about future directions, the book does provide a very good pedagogical survey of the recent and very rewarding past.

*Maurice Jacob*

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## New Cosmology

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Now available is the third edition of Cosmology by Michael Rowan-Robinson of London's Imperial College (Oxford University Press, ISBN 0 19 851885 4 hbk, 0 19 851884 6 pbk).

In the quarter-century since the appearance of the first edition of this book, cosmology has become an increasingly experimental science with the impact of space-borne observatories as well as new ground-based stations. The subject remains as controversial as ever - the book's epilogue lists twenty ongoing controversies.

## Books received

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*Theory of Nuclear Reactions* by  
P. Fröbrich and R. Lippenheide,  
Oxford Science Publications,  
ISBN 0 19 85377783 2 hbk £65

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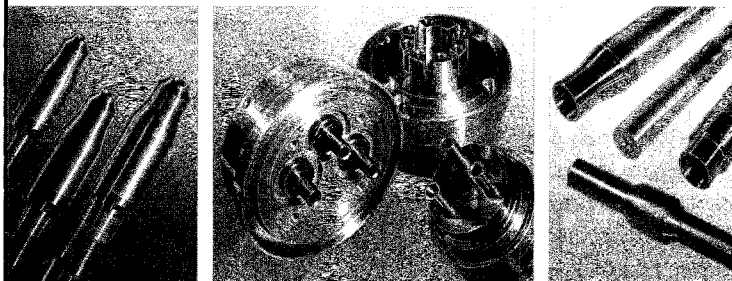
In the Oxford Studies in Nuclear Physics Series, the presents the theoretical formalism of nonrelativistic nuclear reactions, covering potential scattering, formal theory, direct reactions, the compound nucleus, and dissipation and fluctuations.

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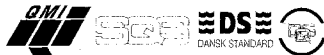
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