

Advanced Series on
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ADVANCES OF ACCELERATOR PHYSICS AND TECHNOLOGIES

Editor

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PREFACE

This book reviews the state of the art of accelerator physics and technologies as well as the use of accelerators in research, industry and medicine. The principles of operating the different types of accelerators (linear, circular and storage rings) are described and the phenomena limiting their performance according to our present understanding are explained. The main aim is to guide the user or expert to the most relevant issues and recent achievements of modern accelerator technology and to review the most interesting applications.

The book should be of interest not only to researchers and engineers in the field but also to users of accelerators who want to have a better understanding of their tool. Moreover, teachers interested in accelerators and their applications will profit from the book and be brought up to date.

An introductory article explains the progress achieved in elementary particle physics with the help of accelerators.

The articles in the second part cover general problems of operation as well as particular issues, for example collective phenomena and instabilities. Recent achievements, such as RF quadrupole accelerators and accelerators for special purposes (heavy ion facilities or heavy quark factories), and the road to future developments are described. This should give, both to users of accelerators and to experts, a view on present and future possibilities of accelerator performance and use.

In the fourth part, new technologies which have been developed for accelerators are presented, covering a variety of subjects, such as superconducting magnets, RF cavities and beam cooling. Special topics like high performance ion sources and geodesy, which have been developed for accelerators but are important to other fields, are also discussed. Some ideas which seemed to be very promising at the time but failed are treated, too.

The last part is devoted to the most important applications of accelerators in industry and medicine. But also covered are sources for synchrotron radiation, pulsed neutrons and heavy ions for nuclear fusion.

The articles have been written by experts of great international reputation and long experience, which guarantees the quality of the contributions, and I should like to thank those people for their efforts.

Herwig Schopper, Editor

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