and transition probabilities in ions of high nuclear charge. The use of modern accelerators combined with electron and laser cooling can be applied to the study of fundamental properties of heavy ions with high precision. Applicability of the relativistic many-body techniques and high orders of QED theory is discussed as a tool for calculating Lamb shifts, hyperfine structure, transition probabilities and other fundamental properties of heavy ions.

Part C, *Collisional and Radiative Processes*, is devoted to radiative and collisional elementary processes involving heavy ions – excitation, ionization, and electron capture. These processes are mainly responsible for charge-changing reactions occurring in high-temperature astrophysical and laboratory plasmas which define beam lifetimes of the stored ions, their heating, energy losses, the charge-state balance, and finally, characteristic electromagnetic radiation.

We hope the reader will find this book as instructive and exciting as we have found it while assembling the material. We appreciate the constructive and fruitful cooperation of all contributors, to whom we express our gratitude. We are also grateful to many other colleagues who helped us to systematize the material. Our special thanks are addressed to Dr. C. Ascheron of Springer-Verlag for his continuous interest in this book.

Darmstadt *H.F. Beyer*
Moscow *V.P. Shevelko*
May 1998

Table of Contents

List of Contributors

B. Ban-d'Etat
Centre Interdisciplinaire de Recherches avec les Ions Lourds, UMR 11
rue Claude Bloch, BP 5133
F-14 070 Caen
France
ban@ganaben.in2p3.fr

H.F. Beyer
Gesellschaft für Schwerionenforschung GSI
Planckstraße 1
D-64 291 Darmstadt
Germany
h.beyer@gsi.de

D. Böhne
Gesellschaft für Schwerionenforschung GSI
Planckstraße 1
D-64 291 Darmstadt
Germany

F. Bosch
Gesellschaft für Schwerionenforschung GSI
Planckstraße 1
D-64 291 Darmstadt
Germany
f.bosch@gsi.de

J.P. Briand
Laboratoire de Physique Atomique et Nucléaire
Université Pierre et Marie Curie
4 place Jussieu
F-75 252 Paris, Cedex 05
France
briand@lpnax1.in2p3.fr

J.R. Crespo López-Urrutia
Fakultät für Physik
Albert Ludwigs-Universität
Hermann Herder-Straße 3
D-79 104 Freiburg
Germany
crespojr@uni-freiburg.de

L.J. Curtis
Physics Department
University of Toledo
Toledo, OH 43606
USA
ljc@physics.utoledo.edu

J. Eichler
Bereich Theoretische Physik
Hahn-Meitner-Institut
D-14 109 Berlin
Germany
eichler@hmi.de