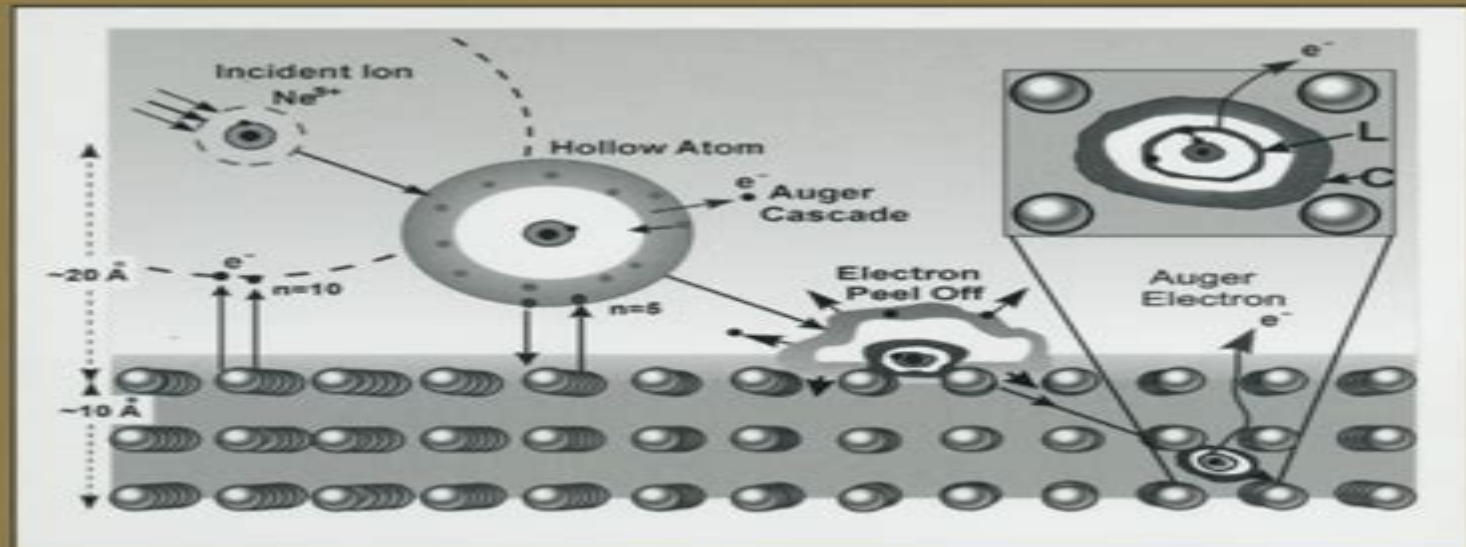


The Physics of Multiply and Highly Charged Ions

Volume 2

Interactions with Matter

Edited by
Fred J. Currell



Physics Of Multiply And Highly Charged Ions

Fred J. Currell



Physics Of Multiply And Highly Charged Ions:

Physics of Multiply and Highly Charged Ions, 2003 The Physics of Multiply and Highly Charged Ions: Sources, applications and fundamental processes Fred J. Currell, 2003 **The Physics of Multiply and Highly Charged Ions** F.J. Currell, 2011-12-12 Highly charged ions are the most chemically reactive species known to mankind This reactivity is due to the extremely large potential energy they possess This textbook deals with the wide range of interactions which occur when such ions interact with other forms of matter especially solid surfaces and gasses Particular emphasis is placed on situations where the kinetic energy associated with the interactions is small so that the effects of the high potential energy are most apparent Experimental and theoretical techniques of investigation are covered in addition to the findings they produce The treatment aims to be instructive to the beginner while leading on to a level where the newest findings are reviewed As such the text is suitable for final year undergraduates postgraduates or experienced researchers **The Physics of Multiply and Highly Charged Ions: Interactions with matter** Fred J. Currell, 2003 **The Physics of Multiply and Highly Charged Ions** F.J. Currell, 2003-09-30 This textbook deals with the wide range of interactions that occur when highly charged ions interact with other forms of matter especially solid surfaces and gasses The book is instructive to beginners leading on to a level where the newest findings are reviewed **Trapping Highly Charged Ions** John Gillaspay, 2001 This book provides an elementary introduction to the field of trapping highly charged ions The first group of chapters is intended to describe the various sorts of highly charged ion traps EBIT EBIS ECR Storage Rings and various speciality traps The authors focus on their own ion trap facilities in order to teach by example The chapters range in scope from comprehensive reviews to brief introductions The second group of chapters is intended to give a flavour of the various sorts of scientific research which are presently being carried out with traps for highly charged ions These chapters not only inform but also stimulate newcomers to think up fresh ideas The articles in this second group generally fall into one of three broad categories atomic structure experiments ion surface interactions and precision mass spectrometry The third group of chapters is intended to deal with theory and spectroscopic analysis It provides some of the background material necessary to make sense of observed phenomenology to allow detailed explanation of experimental data and to sensibly plan further experimentation An appendix provides a complete keyword annotated bibliography of papers Physics of Highly Charged Ions R.K. Janev, L.P. Presnyakov, V.P. Shevelko, 2012-12-06 The physics of highly charged ions has become an essential ingredient of many modern research fields such as x ray astronomy and astrophysics controlled thermonuclear fusion heavy ion nuclear physics charged particle accelerator physics beam foil spectroscopy creation of xuv and x ray lasers etc A broad spectrum of phenomena in high temperature laboratory and astrophysical plasmas as well as many aspects of their global physical state and behaviour are directly influenced and often fully determined by the structure and collision properties of multiply charged ions The growth of interest in the physics of highly charged ions experienced especially in the last ten to fifteen years has

stimulated a dramatic increase in research activity in this field and resulted in numerous significant achievements of both fundamental and practical importance This book is devoted to the basic aspects of the physics of highly charged ions Its principal aim is to provide a basis for understanding the structure and spectra of these ions as well as their interactions with other atomic particles electrons ions atoms and molecules Particular attention is paid to the presentation of theoretical methods for the description of different radiative and collision phenomena involving multiply charged ions The experimental material is included only to illustrate the validity of theoretical methods or to demonstrate those physical phenomena for which adequate theoretical descriptions are still absent The general principles of atomic spectroscopy are included to the extent to which they are pertinent to the subject matter

Basic Atomic Interactions of Accelerated Heavy Ions in Matter
Inga Tolstikhina, Makoto Imai, Nicolas Winckler, Viacheslav Shevelko, 2018-02-28 This book provides an overview of the recent experimental and theoretical results on interactions of heavy ions with gaseous solid and plasma targets from the perspective of atomic physics The topics discussed comprise stopping power multiple electron loss and capture processes equilibrium and non equilibrium charge state fractions in penetration of fast ion beams through matter including relativistic domain It also addresses mean charge states and equilibrium target thickness in ion beam penetrations isotope effects in low energy electron capture lifetimes of heavy ion beams semi empirical formulae for effective cross sections The book is intended for researchers and graduate students working in atomic plasma and accelerator physics

Physics with Multiply Charged Ions
Dieter Liesen, 2013-06-29 Multiply charged ions have always been in the focus of atomic physics astrophysics plasma physics and theoretical physics Within the last few years strong progress has been achieved in the development of ion sources ion storage rings ion traps and methods to cool ions As a consequence nowadays experiments with ensembles of multiply charged ions of brilliant quality are performed in many laboratories The broad spectrum of the experiments demonstrates that these ions are an extremely versatile tool for investigations in pure and applied physics It was the aim of this ASI to bring together scientists working in different fields of research with multiply charged ions in order to get an overview of the state of the art to sound out possibilities for fruitful cooperations and to discuss perspectives for the future Accordingly the programme of the ASI reached from established areas like QED calculations weak interactions x ray astronomy x ray lasers multi photon excitation heavy ion induced fusion and ion surface interactions up to the very recently opened areas like bound beta decay laser and x ray spectroscopy and spectrometry of ions in rings and traps and the interaction of highly charged ions with biological cells Impressive progress in nearly all of the fields could be reported during the meeting which is documented by the contributions to this volume The theoretical understanding of QED and correlation effects in few electron heavy ions is rapidly developing

Fundamental Processes And Applications Of Atoms And Ions, Review Of Chii-dong Lin, 1993-10-27 This book reviews the major progress made in the fields of atomic molecular and optical physics in the last decade It contains eleven chapters in which contributors have highlighted the major accomplishments made in a given

subfield Each chapter is not a comprehensive review but rather a succinct survey of the most interesting developments achieved in recent years This book contains information on many AMO subfields and can be used as a textbook for graduate students interested in entering AMO physics It may also serve researchers who wish to familiarize themselves with other AMO subfields

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