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978-1-107-00744-4 - Fragmentation Processes: Topics in Atomic and Molecular Physics

Edited by Colm T. Whelan

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FRAGMENTATION PROCESSES

Revolutionary advances in experimental techniques and spectacular increases in computer power over recent years have enabled researchers to develop a much more profound understanding of the atomic few-body problem. One area of intense interest has been the study of fragmentation processes.

Covering the latest research in the field, this edited text is the first to provide a focused and systematic treatment of fragmentation processes, bringing together contributions from a range of leading experts. As well as tackling the more established coincident study of electron-impact ionization, the $(e,2e)$ process, this book also guides the reader through topics such as molecular fragmentation, ion–atom collisions and multiphoton processes.

Combining a broad range of topics with an equal mix of theoretical and experimental discussion, this is an invaluable text for graduate students and researchers in atomic collisions, laser physics and chemistry.

COLM T. WHELAN is a Professor of Physics and an Eminent Scholar at Old Dominion University, USA. He received a Ph.D. in Theoretical Atomic Physics from the University of Cambridge in 1985 and an Sc.D. in 2001. He is a Fellow of both the American Physical Society and the Institute of Physics (UK). He has edited five previous books and has written over 150 research papers, mostly on atomic collision physics.

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COLM T. WHELAN

Old Dominion University



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Preface

In the past few years, revolutionary advances in experimental techniques and spectacular increases in computer power have offered unique opportunities to develop a much more profound understanding of the atomic few-body problem. One area of intense effort is the study of fragmentation processes – break-up processes – which are studied experimentally by detecting in coincidence the collisional fragments with their angles and energies resolved. These experiments offer a unique insight into the delicacies of atomic and molecular interactions, being at the limit of what is quantum mechanically knowable; the fine detail that is revealed would be swamped in a less differential measurement. The challenge for the theorist is to develop mathematical and computational techniques which are of sufficient ingenuity and sophistication that they can elucidate the Physics observed in existing measurements and give direction to the next generation of experiments. Fragmentation processes are studied by those interested in electron and photon impact ionization, heavy particle collisions, collisions involving antimatter, as well as molecular collisions.

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