

Preface

In the atomic processes connected with the absorption of energy that is much larger than binding energies of the involved atoms, there are at least two energy scales. There are correspondingly two scales of momenta. This book is devoted to the theory of such processes. The presented approach based on analysis of the two regions of the recoil momenta does not always enable one to achieve high accuracy. However, it makes it possible to clarify the mechanisms of the processes and also to avoid the mistakes that are sometimes made in purely numerical computations.

The specifics of the experimental physics at such energies is beyond the scope of this book, and we present the results of experiments only as an illustration of the theory.

We assume that our reader knows the quantum mechanics and is familiar at least with fundamental points of quantum electrodynamics. We assume also that the reader has taken a standard course in atomic physics.

We hope that this book will be useful to the atomic physics community. We expect also that this book will help in overcoming the prejudice that “theoretical atomic physics is the science of precise computations.”

This book is to a large extent based on the works of the authors. We thank our colleagues and coauthors for decades of fruitful cooperation. We are especially grateful to Mrs. Galina Stepanova for her assistance in preparation of the manuscript.

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