

Preface

Atomic physics is in every respect one of the greatest achievements of human beings, and is recognized as the one to give human thought a great revolution and a firm foundation. Nevertheless, there has been little work of making clear its logical structure to put the outcome in the property of thought. Natural scientists, who are generally not versed in logical expression and elucidation of high level, have not been able to clarify the significance of the works they did, so that they understand it superficially and their interpretations are quite separated from their works. Philosophers on the other hand have not analyzed the logical structure of physics itself, and have selected fragments of one or another physicist's words, using those irresponsibly for the sake of their own theories.

Therefore, such a work must be done first of all as to trace the correct process of formation of the atomic theory, and thereby to draw its logic. This is however surely a hard task. I hope that my present book will serve as a footing for this aim.

The present book consists of Vol. I, The Formation of Atomic Models, Vol. II, The Formation of Quantum Mechanics, and Vol. III, The Logic of Quantum Mechanics.

Volume I treats the process up to the establishment of Rutherford's model of the atom, in which our Nagaoka made an important work, so great a contribution to world physical society made by Japanese physics in its young days that we can never forget it. Nevertheless, its actual fact is generally unknown.

Also in foreign countries, almost no detailed book on the history of the formation of atomic models before the time of Rutherford has not been seen,

because this subject was regarded as settled already. However, the period mentioned is very important when it is seen from the viewpoint of epistemology. Every epistemological confusion arises from having no appreciation of this period.

In the present book particular attention is paid to reveal clearly on what assumption each paper bases, and what conclusion is deduced by means of what reasoning as well as from what fact, for the purpose of clarifying step by step the process of development in it.

The method of carrying out this purpose has been described in detail in my book "*Problems in Dialectic*". I shall be glad if the reader refers to this book.

I intend that descriptions shall represent the features of each original paper as far as possible, and also that words shall be faithful to the original papers. In this respect the present book may lack plainness and unity such as those found in textbooks. As to this point, I would like to recommend the reader to consult some textbook of quantum mechanics, such as that by S. Tomonaga, for example, for supplementary information. The knowledge which I suppose to be necessary to understand the present book, is that which is treated in textbooks of general physics for undergraduate students, and that of the Maxwell theory of electromagnetics.

As a work on the history of science, the present one makes only the fundamental study as an initial step. It is still necessary to make clear the relation of science to society and the interaction of science with general philosophical thought. I plan for a study on "the experimental foundation of quantum mechanics" as to the former, and a study on "the role played by idealism and materialism in the formation of atomic physics" as to the latter.

The book "The History of Quantum Mechanics", a great work by the late Mr. Kiyoshi Amano who was my respected senior, has recently been published to my delight. I hope that the reader will read through it once, since into it plenty of descriptions of social background and episodes are woven into, and it is plain to be readable by general readers. I would like to thank Mr. Amano in this occasion for his having given me much knowledge.

As the present book is the first step in my study I am afraid that it may have insufficient points. I would like to get suggestions from those who know well about circumstances of those times.

The present book is written in a specialized way with the use of mathematical equations. But they are put in for the sake of contributing to more

understanding. Those who are not familiar with mathematical equations may well skip the mathematical parts to get the outline of reasoning.

I would like to acknowledge Mr. S. Tomonaga, Mr. S. Sakata and other my seniors and co-workers for their good wishes and advice. I am indebted very much to Mr. S. Nakamura for his help in getting the literature. My thanks are due to Mr. G. Tominga, Miss Yuminami and Miss Ghi for their help about the literature.

I would like to thank Mr. Y. Kuyoshi of the Ginza Pub. Co. for his goodwill to the present book of unpopular subject and for his good offices in its publication. I am grateful to Mr. M. Minakami and Mr. M. Watanabe of the same company for their acceptance of my personal circumstances to offer convenience. I intended to write out the present book in August of last year, but I spent almost one year more in finishing my work. I would like to express my sincere thanks to the workers of the printing office for the trouble they have taken for me.

The author
May 8, 1948