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THE DYNAMICAL THEORY
OF GASES

THE DYNAMICAL THEORY OF GASES

BY
J. H. JEANS, D.Sc., LL.D., F.R.S.

FOURTH EDITION

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PREFACE TO THE SECOND EDITION

MY primary aim in the first edition of this book was to develop the Theory of Gases upon as exact a mathematical basis as possible. This aim has not been forgotten in the preparation of a second edition, but has been combined with an attempt to make as much of the book as possible intelligible to the non-mathematical reader. I have adopted the plan, partially followed in the first edition, of dividing the book to a large extent into mathematical and physical chapters. The reader whose interest is mainly on the physical side will, it is hoped, get an intelligible account of the present state of the subject by reading the physical chapters I, VI, VII and XI to XVIII, and regarding the more mathematical chapters simply as material for reference. Apart from this, something is, I think, gained by clearing the ground by a full mathematical treatment before any physical discussion is attempted.

Since the first edition of this book appeared the position of the Kinetic Theory has been to some extent revolutionised by the growth and developments of the Quantum Theory, and it has been by no means easy to decide what exact amount of prominence ought to be given to the Quantum Theory in the arrangement of the book. The plan finally adopted has been to confine the Quantum Theory to the last chapter; the difficulties arising out of the classical treatment have been allowed to emerge in the earlier chapters, but have been left unsolved. The last chapter merely indicates how these difficulties disappear in the light of the new conceptions of the Quantum Theory: no attempt is made to give a full or balanced view of the whole theory. In the present status of the Quantum Theory this seemed to me the best procedure, but I anticipate that if the book is fortunate enough to run to a further edition, the Quantum Theory is likely to figure much more prominently there than in the present edition.

It will be found that the book has been very extensively rewritten since the first edition. A large amount of new matter has been inserted, and a good deal of labour has been expended in bringing the subject up to date, both on the theoretical and experimental sides. I hope the book in its new form will be of value to the large and increasing number of physicists who find a knowledge of the methods and results of the Kinetic Theory essential to their work, as well as to those who study the subject for its own sake.

J. H. JEANS.

LONDON,
January 1916.

PREFACE TO THE THIRD EDITION

IT will be found that this edition varies from its predecessor mainly in the greater prominence given to the Quantum Theory. The chapter on Radiation and the Quantum Theory which previously terminated the book has been added to and partially rewritten. To this I have further added an entirely new chapter on Quantum Dynamics, dealing mainly with the quite recent work of Ehrenfest, Sommerfeld, Epstein and others. This chapter can of necessity provide only a very brief introduction into the mysteries of Quantum Dynamics, but I hope it will be of value in stimulating the interest of English-speaking readers in a branch of science of which the development has so far been left mainly to other nations.

J. H. JEANS.

DORKING,
October 1920.

PREFACE TO THE FOURTH EDITION

IN preparing a fourth edition I have made only those few changes which were necessary to bring the book up to date.

J. H. JEANS.

DORKING,
June 1925.

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