ATOMIC DYNAMICS IN LIQUIDS

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Preface

This book presents the subject of dynamics of atoms in liquids in a form which should be useful for established research workers in the field of the physics and chemistry of the liquid state. It should also be useful to research students entering this field but, of course, quite a bit of background will then be necessary for an understanding of this work. Specifically, we have assumed that the reader will have successfully completed a basic course on statistical mechanics and thermodynamics and, since the book deals with quantal as well as classical fluids, a basic course in quantum mechanics. However, only in the advanced part of Chapter 9 on Critical Phenomena is detailed knowledge of quantum field theory assumed.

Some of the material in this book has formed the basis of advanced level courses given by the authors. One of us in particular (M.P.T.) has drawn upon it for lectures given at the University of Rome and at the Postgraduate School at L'Aquila, organised by the Consiglio Nazionale delle Ricerche for condensed matter physicists. Supplemented by some material from Landau and Lifshitz's *Statistical Physics*, courses of from 10 to 20 lectures to first and second year postgraduate students have been given at different times on portions of this book.

There are several points relating to the presentation which need brief comment. First, though we have called the work *Atomic Dynamics in Liquids*, some attention is also paid to the dynamics of electrons in Chapter 7. Secondly, we have thought it helpful to include, albeit in rather elementary terms, an account of the recent progress in the understanding of liquid helium three, and of critical phenomena. We are conscious that neither of us has contributed to these fields and that great use has been made of the presentation developed by other workers (particularly A. J. Leggett on helium three, who of course is in no way responsible for any of our final presentation here).

Though we felt it important to include a final chapter on the liquid surface, this is now a subject for a book in its own right and we are aware that the choice of material is idiosyncratic. Fortunately, in C. A. Croxton's book *The Liquid State*, there is a useful source for readers who wish to take this field somewhat further.

Many colleagues have influenced our thinking in this area over the past decade. To them, and to all authors and publishers who have given us permis-

sion to include figures and tabular material from the original sources, we are most grateful.

Finally, we shall be grateful if readers who find the book useful would write to tell us where we might make improvements in the future. It is too much to hope that a work on this scale, and of such a degree of complexity, could be completely free from error.

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