PREFACE

In this work we report upon what we believe to be the solution of one of the classic problems of nuclear physics: the description of the gross properties of nuclear matter and finite nuclei starting from the knowledge of the nucleon-nucleon interaction in free space. The solution, however, takes us outside the realm of Schroedinger theory (which is quite well understood) and into a much less developed area, that of the relativistic many-body theory of extended objects (nucleons). Therefore, what we will discuss here is a *phenomenological* theory which, however, is constructed so that there are no free parameters once a model of the nucleon-nucleon force is specified. It has taken about twenty-five years to solve this problem, however, as with many problems in physics, the solution raises many extremely interesting questions for future research. We hope the reader will understand that while we are able to calculate many nuclear properties in some detail, the description of nuclear dynamics on a more fundamental level is now clearly seen as a fascinating problem of quantum field theory. Attempts to understand nuclear dynamics on the basis of the modern theory of strong interactions, quantum chromodynamics, are being made by many researchers and we hope that the relativistic model discussed here will aid in the development of more fundamental theories of nuclear structure. We believe, however, that any new and more fundamental theory will have to be consistent with the phenomenological theory discussed here.

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