INVITATION TO PHYSICS

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To my Mother and my Father

Preface

Invitation to Physics is intended for a one-semester or one-quarter course in elementary physics for humanities students, or for the physics segment of a general introduction to physical science. It is the final product of a series of lecture notes that I developed and class tested for several years at the University of California at Davis.

I had two objectives in writing this book: (1) to expose the reader to the changing nature of science in general through a study of the evolution of physics in particular and (2) to recreate the changing ideas of physics as real revolutions in man's perception of the universe—revolutions that were (and still are) being made by real men.

Although it has been my experience in teaching this course that some degree of problem solving is beneficial, I have avoided any temptation to emphasize mathematical manipulations. A blend of mathematical problems and/or questions requiring nonmathematical answers appears at the end of each chapter for use at the instructor's discretion. The few mathematical exercises that have been included are designed to enhance the student's understanding of the subject and allow the reader to recreate a degree of the emotional satisfaction that a physicist feels when he successfully brings theory to bear on solving a practical problem. If I have succeeded in communicating any of the excitement, the creativity, and the fun of stretching one's mind with

new ideas, the humanities student may come to appreciate physics as a science that is both comprehensible and enlightening.

In addition to mathematical and verbal problems, the end-of-chapter material includes a few questions requiring outside reading. The instructor can use these questions as he wishes for term-paper subjects or as topics for small-group discussions.

I have tried to free the main body of the book from lengthy mathematical derivations that would detract from its readability. Several appendixes contain these derivations for the mathematically curious student.

I have included a number of references to and diagrams of lecture demonstrations that are common in any beginning physics course. Most of these are available commercially or are easy to build, and I strongly recommend their use as supplementary visual aids. The first appearance of new units, technical definitions, and terms is rendered in color merely to emphasize the fact that they are likely to be new to the reader. Brief biographical portraits of 25 key physicists are included.

In developing this book, I was indebted to the work of many hands and the inspiration of many minds. I would especially like to express my appreciation and gratitude to: Dave Faulkner for his suggestions and for the countless, tedious hours he spent helping to prepare questions and problems. Frank Serduke for his assistance on earlier versions of the manuscript. Virginia Rosato and Rory Tafoya, who typed the notes and the manuscript, for their patience in decoding my scribbling. My reviewers who read the manuscript in its earlier stages—William J. Bruff, Foothill College, Los Altos Hills, California; John D. McCullen, The University of Arizona; and Paul W. Wagner, Los Angeles City College—for contributing helpful comments and suggestions that have improved the book immensely. Hans Weidenmüller for the kind hospitality of the Max Planck Institut für Kernphysik in Heidelberg, West Germany, where the last stages of the book were completed. Roger Dunn for his prodding and patience. Marian Flanders for her warm support and understanding throughout all my writing agonies. And, last, my many, many friends who, over the years as my students, contributed immeasurably to the development of this book.

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