

Schrödinger wavefunctions for a variety of parameters so that they can develop a feel for wavefunctions and the information they contain. Although other software exists for doing this, I know of no other package that is as comprehensive, organized and consolidated as this one. The material in it is appropriate for undergraduate students taking introductory quantum mechanics at the junior or senior level.

The text is an outgrowth of a book by the same authors with the charming title *The Picture Book of Quantum Mechanics* (Wiley, New York, 1985), which contained a collection of graphs of wavefunctions for common potentials, along with commentary and background. While the original book is out of print, *Quantum Mechanics on the Macintosh* lets students reproduce those graphs, with many variations. The two program disks supplied with the book contain software for Macintosh computers with or without math coprocessors. However, I found that graphing was painfully slow on the non-coprocessor Macintosh Plus, taking from one minute to three hours per plot. Speeds were 25–50 times faster on a Macintosh II/cx, which has a math coprocessor, with 60% of the graphs taking less than 20 seconds.

The topics of introductory quantum mechanics are nicely divided into seven chapters, with an eighth chapter on special functions. The summaries of quantum mechanics that begin each chapter are among the clearest I have ever seen and have their own pedagogic value. Each chapter continues with examples of wavefunctions for various standard potentials and concludes with a large number of exercises that extend and elucidate those examples.

No programming knowledge is required, but the exercises involve changing parameters by a fairly arcane system that is not easy to figure out. Presumably it becomes easier to use with experience, but a less cumbersome system would permit concentrating on quantum mechanics rather than learning techniques specific to this text. The exercises themselves are very well done and expose important features of the wavefunctions. Indeed, it would be a rare instructor who would not learn something from them.

The program was originally written by Brandt and Dahmen for the IBM PC (*Quantum Mechanics on the Personal Computer*, Springer-Verlag, 1989), so it is not surprising that Macintosh features are not implemented. The software has some annoying operational quirks; for exam-

ple, there seems to be no way to switch from text to graphics to view a previous plot or to interrupt a plot after it is started. It would be convenient to be able to create a graph, view it and then print it without recalculating the function. Surprisingly, one cannot save a graph for later display. On the plus side, although the manual only mentions printing on an Apple printer, the program worked fine on my Hewlett-Packard DeskWriter.

The exercises in *Quantum Mechanics on the Macintosh* are not equivalent to a normal laboratory experience, but they are certainly qualitatively different from and orthogonal to traditional classroom activities. There is no question in my mind that they will go a long way toward putting flesh on the quantum mechanical skeleton for undergraduates. I would use the text for a computer laboratory in an appropriate course. However, for this program to gain wide acceptance the authors should develop a less forbidding user interface.

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Strings, Conformal Fields and Topology: An Introduction

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Springer-Verlag, New York,
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Michio Kaku's new book, *Strings, Conformal Fields, and Topology* is a comprehensive survey of essentially all recent research undertaken in string theory and related fields. In 14 chapters and two appendixes the author discusses a vast array of subjects, including superstring theory, minimal models, WZW models and coset constructions, the Feigin-Fuchs construction, Landau-Ginzburg potentials, Zamolodchikov's c theorem, modular invariance, the GSO projection, Calabi-Yau manifolds and $N=2$ supersymmetry, Yang-Baxter equations, knot theory, quantum groups, string field theory, $D=2$ gravity and matrix models, topological field theory and Batalin-Vilkovisky quantization (including applications to the Green-Schwarz superstring). The book is well organized: Each chapter is subdivided into numerous subsections and includes a brief summary of its main points and references. The book also contains a detailed table of contents and an index.

In its broad survey, the book cannot pay attention to all details. In some places, it gives a nice concise review,

but more frequently it is too sketchy to be understood by anyone other than an expert seeking to refresh his or her memory. Kaku often neglects to mention pitfalls (as in his appendix on the covariant quantization of the Green-Schwarz string). And the discussion of string field theory, to which three entire chapters are devoted, is decidedly idiosyncratic. Despite the book's shortcomings, the author's ability to absorb rapidly and present such an enormous variety of material is astonishing, resulting in a book that is both up-to-date and thorough.

In short, the book is valuable as a survey and bibliography but is unsuitable as a textbook. In the preface, the author says "*Strings, Conformal Fields, and Topology* will be a success if it conveys some of the vitality and vigor of current activity in string theory to the reader and prepares him or her for research." The book succeeds admirably in the first objective but falls short in the second.

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Quantum Semiconductor Structures

Claude Weisbuch and
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Academic, San Diego, Calif.,
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The advent of exacting crystal-growth technologies such as molecular-beam epitaxy, chemical-beam epitaxy and metal-organic chemical vapor deposition has made possible the realization of new quantum-sized devices that manifest many interesting quantum phenomena. Much interest and a major research effort are currently focused on furthering the understanding of quantum phenomena in semiconductor nanostructures and on developing new, useful devices that harness these phenomena.

Claude Weisbuch and Borge Vinter, two very distinguished research scientists in this new, expanding field, have compiled a useful survey book on this subject. *Quantum Semiconductor Structures* can be viewed as a concise introduction to the many underlying physical concepts and new device structures that have evolved in this area over the past 20 years. The book is written at a level easily accessible to graduate students and researchers in the field. It spans a wide range of topics, although the depth of coverage is often necessarily not as deep as one may desire. Nevertheless, this volume will certainly be