characteristically clear and insightful, but all too brief, concluding discussion of the philosophy and psychology of time perception. The reader is left hoping that Davies will find or make the time to develop his ideas on these topics at greater length.

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Principles of Condensed Matter Physics

Paul M. Chaikin and Thomas C. Lubensky
Cambridge U. P., New York, 1995. 665 pp. $49.95 hc ISBN 0-521-43224-3

What is the material world around us made of? The answer depends on whom and when you ask. A century ago the strongest answer would have come from the chemists. For them the world was made of atoms, those 98 elementary entities newly organized into the periodic table. Through the first half of this century the physicists were developing a competing view based on quantum mechanics. For them matter was made of Schrödinger waves coursing through space and confined by one another. The ascendancy of the quantum view was marked by the 1953 publication of Charles Kittel's famous *Introduction to Solid State Physics* (Wiley).

Kittel's textbook expanded the notion of what it meant to understand matter. But its scope was limited; it aspired to describe matter only insofar as matter could be viewed as a periodic lattice. Thus it necessarily left out phenomena as basic as the freezing, boiling and flowing of a drop of water. Curing this deficiency has been a major preoccupation for condensed matter physics ever since. This effort, like the quantum paradigm before it, has now reached a level of comprehensive understanding.

Paul Chaikin and Tom Lubensky's *Principles of Condensed Matter Physics* marks this development. Chaikin is a distinguished condensed matter experimenter; Lubensky is a distinguished theorist. Their 700-hundred-page work, in progress since 1986, is an important achievement. It brings into focus a new approach to the question, What is matter made of? For Chaikin and Lubensky, matter is *phases*—organizations of indefinitely large amounts of matter with a well-defined broken symmetry.

Phases are solids, liquids, liquid crystals or quasicrystals. Phases also define electronic organizations of matter such as the ferrimagnetic or the superconducting states. By extension, fractal aggregates, surfactant membranes and flexible polymers are also viewed as phases. To understand matter in this approach is to explain the structure, thermodynamics and types of motion distinctive to a particular phase or to a transition between phases.

Among the book's pedagogical features are a wealth of daunting problems, a pithy glossary of intimidating terms and concrete descriptions of experiments and technological applications. At some points the charm of a gifted teacher shines through, as in this playful aside: "[Polymerized membranes] have a negative Poisson ratio . . . , *i.e.*, when stretched in one direction, they expand rather than contract in the other. This effect can be seen with a crumpled piece of paper—try it." Still, for all but the most dedicated and sophisticated doctoral students, learning from this book will be tough going. There are long stretches of unmotivated manipulation and occasional confusing misstatements.

Like any unified discussion of a broad field, this one has its limitations. As announced in the preface, the book is not about the behavior of individual electrons or ions in matter. It leaves out important cooperative phenomena like the origin of metallic and insulating behavior and the consequences of quenched disorder. Thus the book complements traditional solid-state textbooks; it doesn't supersede them. It also leaves out conformal invariance, the powerful symmetry that fixes the values of many critical exponents in two dimensions. Likewise, collective phenomonena far from equilibrium, such as turbulent flow or material fracture, go unmentioned. Given the real scope of the book, it might be better titled "Principles of Phase Behavior in Condensed Matter." In this important domain the book represents a great advance in unification. It will strengthen the understanding by students and researchers for a long time to come.

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Diagrammatica: The Path to Feynman Diagrams

M. Veltman
Cambridge U. P., New York, 1994. 284 pp. $29.95 pb ISBN 0-521-45692-4

On the whole, *Diagrammatica* is a masterful introduction to quantum