communication in the 1.3–1.7 μm wavelength region, a spectral region in which low-loss, low-dispersion optical fibers are available.

In general, the quaternary $In_{1-x}Ga_xAs_yP_{1-y}$ compound is not as well studied as the more readily available GaAs, InP and $In_{0.53}Ga_{0.47}As$, which are used extensively in electronic devices. The book tries to present data on $In_{1-x}Ga_xAs_yP_{1-y}$, lattice-matched to InP, placing special emphasis on $In_{0.53}Ga_{0.47}As$ for y=1 whenever such data are available. When they are not, interpolation of data for binary compounds becomes necessary. The interpolation scheme is conveniently summarized in an appendix. This book covers the properties of III–V compounds quite comprehensively, including structural, mechanical, elastic, thermal, optical, piezoelectric, electromechanical, elasto-optic, electro-optic, band-structure, carrier-transport, phonon and strain properties. A short summary of the importance of the topics begins each section.

Although some properties of all four binary compounds are given, sometimes only InP is discussed. Some noteworthy inclusions and omissions are discussed below: In chapter 2 on structural properties, for example, Adachi provides the usual data on crystal structures and lattice parameters for InP, InGaAs and InGaAsP. He also includes a discussion on an important but seldom-included fact: that the cation–anion distances in InGaAs and InGaAsP deviate from the average interatomic distances in those compounds but are close to the bond lengths in pure parent crystals of GaAs and InP. Chapter 2 also covers ordering but not spinodal decomposition, which is important for laser reliability.

Chapter 6 gives a very good and detailed discussion of electronic energy-band structure, bowing parameters and electron effective masses and hole effective masses. It also discusses the effects of temperature and pressure on the band gap. The chapter shows conduction-band and valence-band offsets of not only the InGaAsP / InP and InGaAs / InP systems but also the InGaAs / InAlAs heterojunction. However, Adachi does not mention the band offsets of the interesting InAlAs / InP, which has a type II, or staggered, band lineup.

Chapter 10 presents data on the transport properties for both majority and minority carriers, but to be more meaningful, the velocity-field curves should indicate the individual doping levels. Chapter 11 deals with strain, and it gives a detailed list of dislocation etchants for InGaAsP. For the critical layer thickness, however, the chapter discusses InGaAs on GaAs, instead of the InGaAsP / InP system, which is the main material system discussed in the book. Chapter 11 could have been expanded, because strain is an increasingly important degree of freedom in device design.

I recommend this book to those who work on long-wavelength optoelectronic devices; the wealth of information is directed especially to them. The book might be more broadly useful if data on all related binary compounds were included.

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What Makes Nature Tick?

Roger G. Newton
Harvard U. P., Cambridge, Mass., 1993. 257 pp.
$27.95 hc ISBN 0-674-95085-2

In the present climate, with many people claiming that science is too hard to understand, it is most important that competent scientists present science to the nonscientist in simple terms. Authors also should try to cover the aspects of their science of special interest to the readers to whom the work is addressed. Now there are many different kinds of nonphysicists, according to their background knowledge, their interests and what they would like to understand. In this volume, Roger Newton, a distinguished theoretician, who has many important contributions to his credit, above all in scattering theory, presents an outline of the laws of inanimate nature, that is, essentially of physics, for the nonphysicist who is philosophically minded.

The book is for readers who are more interested in the methods by which physicists arrive at their conclusions than in the conclusions themselves. This is not stated explicitly, but it is seen by implication from the treatment, in the course of which the author explains carefully and clearly the ways physicists reason. For example, the introduction starts with the question whether the most characteristic thing about physics is its high precision. An alternative title for the book might well be, *What Makes Physicists Tick?*

The author credits his readers with powers of abstraction. He reminds them on one page what logarithms are, and on another he introduces partial differentiation and partial differential

equations. Fortunately, logarithms are used only once and partial differential equations not at all.

Generally, the nature of the reasoning is brought out more clearly than is the content, even where a few additional words could give the reader a simple picture. For example, it would take only a sentence or two to explain how the photoelectric effect support the hypothesis of light quanta. The book says only: "Einstein . . . had invented the concept of light quanta or *photons*, an idea that, among other things, explained the photoelectric effect."

Similarly, in getting across the counter-intuitive idea that the relative timing of a distant event may appear different to different observers, it would surely help in explaining relativity to illustrate the impossibility of comparing times at distant places.

All these points concern presentation; overall the author has given a good account of how the physicist reasons. I do, however, disagree with his description of the "arrow of time," in which he fails to take into account the fact that, in most problems, we specify initial but not terminal conditions.

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Simple Models of Complex Nuclei: The Shell Model and Interacting Boson Model

Igal Talmi
Harwood Academic, Chur, Switzerland, 1993. 1074 pp.
$125.00 hc
ISBN 03-7186-0551-1

The physics community enthusiastically welcomed the publication of *Nuclear Shell Theory* by Amos de-Shalit and Igal Talmi in 1963. Talmi, one of the pioneers of the nuclear shell model, has now expanded upon this original effort in *Simple Models of Complex Nuclei*, which focuses on the nuclear shell model and the interacting boson model.

This volume is part of the Contemporary Concepts in Physics series (Volume 7), whose purpose is to provide technical books on forefront subjects of current research that are rigorous and complete enough to be directly useful to both professional physicists and serious physics graduate students. In this regard the pre-