between normalizable and non-normalizable states. Finally, in the calculation of the Stark and Zeeman effects by perturbation theory this book (along with all other texts) fails to observe that the bound states are not just shifted but in fact acquire a finite lifetime and thus disappear as bound states.

I like this book very much. In spite of the large number of competing texts it is a welcome addition by an author with good taste. I strongly recommend it as a text.

Rem Khokhlov

V. I. Grigoryev
109 pp. Mir, Moscow, 1985. $2.95

Kapitza: Life and Discoveries

F. B. Kedrov
198 pp. Mir, Moscow, 1984. $6.95

The Soviet publisher Mir has been putting out a series of small biographies of prominent physicists. The books are addressed to a general audience, perhaps in part to provide inspirational models. The two books reviewed here illustrate the opportunities and the pitfalls, respectively, presented by such an approach. *Rem Khokhlov*, a small pocket-size book in modest softcover, is a real gem. Khokhlov, who lived from 1926 to 1977, was a leading Soviet physicist who in the last years of his life became president of the "Soviet Harvard"—the Moscow State University. Written by V. I. Grigoryev, a colleague and close friend, the biography has all the advantages of a first-hand account without the usual accompanying impediments: attempts to blow the hero out of proportion at the expense of hard facts. Grigoryev's background in science contributes to his objectivity, and that makes his account really impressive. As the publishers put it, "The book is intended for readers whose affinity to physics is either professional or rests upon a keen interest in the subject."

The subject of Khokhlov's research has indeed been of interest. A leading specialist in quantum optics in the USSR, Khokhlov put the first laser at Moscow University into operation at the beginning of the 1960s. His last major scientific project, in the 1970s, dealt with the possibility of the creation of a gamma-ray laser.

While a professor at Moscow State University, and later as its president, Khokhlov showed admirable human qualities and maintained high moral standards—no easy feat in Brezhnev's time. Khokhlov died unexpectedly, the victim of a bizarre accident during an ascent of Communism Peak in the Pamir range, the highest mountain in the USSR (Khokhlov was an accomplished mountain climber). His death was a severe blow to the Soviet scientific community, whose most visible, liberal-minded and influential leaders, like Igor Kurchatov and Lev Artsimovich, have tended to wear themselves out at a comparatively early age. Khokhlov's death appears especially untimely now, in the "Star Wars" era, when his background and personal acquaintance with such American scientists as Charles H. Townes and Nicolaas Bloembergen would have offered at least some hope of success in an arms-control agreement.

Orthodox Marxists (or Hegelians) like to say that there is a universal law of unity of form and substance. Universal or not, the law is certainly true with regard to the second book under review. There is a perfect match between the book's crooked cover and blind photos and its shoddy contents. The book in question is F. B. Kedrov's attempt to write a brief biography of an eminent Soviet physicist and Nobel Prize winner, Peter Kapitza (1894–84), who attracted a lot of public attention both in the USSR and abroad during his long life. The reason for that attention was not only his fine research in magnetism and low-temperature physics, but also his unusual life and public image. Between the ages of 26 and 40 he lived and worked in Cambridge, England. In 1934, after his forcible transplantation to the USSR, Kapitza successfully resumed his Soviet career (see PHYSICS TODAY, September 1984, page 95) and firmly established himself in the USSR as a "visible scientist." He became there a representative of the Anglo-Saxon tradition, which the Russian culture of science, having been influenced for centuries by the Germans and the French, badly lacked.

Kapitza also played a significant role in contemporary East–West ties. For example, several prominent American proponents of arms control were Kapitza's personal friends, and during their visits to Moscow they sometimes stayed in his home with the consent of the Soviet government. Unfortunately, I did not get this information from the book under review. The main reason for its omission seems to be Kedrov's lack of scientific or technical background, as well as his lack of spiritual independence. He fails to give a critical outline of Kaptiza's scientific achievements.

Still worse, because of his moral indifference, Kedrov tries to gloss over the most dramatic moments in Kapitza's Soviet career. He describes Kapitza's detention in the USSR in 1934 in the following way: "Kapitza returned from England late in 1934. The Institute [Kapitza's Institute of Physical Problems] was founded by a government decree dated 28 December 1934." Kapitza's dismissal from the Institute of Physical Problems between 1946 and 1954 and his house arrest during that period are ascribed to the workings of some mysterious commission. There is not the slightest hint in the book that Kapitza's demotion was connected with Stalin's anger at Kapitza, who, I have been told by Soviet physicists, in 1943 opposed the idea of developing a Russian atomic bomb. On the contrary, the author claims that Stalin's relations with Kapitza continued to be good. In supporting this remarkable statement, Kedrov inadvertently reveals significant information confirming long-circulating rumors about the existence of a Stalin–Kapitza correspondence.

Speaking about Kapitza as a public personality, the author creates, as is his habit, a too-good-to-be-believed image of a snow-white knight of Soviet science, ignoring the opinions of those who knew Kapitza quite well and who gave him the nickname "the Centaur"—a half-human, half-beastly creature. Of course, in summarizing this poor book, I do not mean to pronounce any negative judgments on Kapitza himself—a very complex and remarkable man—nor on the publishing house Mir, nor on Soviet pop-science writing.

Kapitza was published in its original Russian version in 1979, when the corruption and complacency of the Brezhnev era reached its peak. Let us hope that now, under more favorable political circumstances, somebody—perhaps Kapitza's talented son Sergey—will finally write a biography of the late physicist worthy of him and his science.

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Computational Methods for Fluid Flow

Roger Peyret and Thomas D. Taylor
358 pp. Springer-Verlag, New York, 1985. $30.00

This book is the paperback version of a very successful book on computational fluid dynamics by two well-known scientists, one French, the other American. When the hardcover first appeared, in 1983, there were many fewer books in this field. There has been an avalanche of such books since then, but many of them are specialized either in the method they present (for example, finite-element methods) or in the area of application (for example, viscous, incompressible flows). So although there are some places where the book shows its vintage—it would be strange indeed if it did not, given the rapid changes in the field—it is still one of the few and one of the best books on all

of computational fluid mechanics. Thus it discusses finite-difference, finite-element and spectral techniques—the first of these in by far the greatest detail. After an introductory section Peyret and Taylor show how these techniques may be applied to solve problems in incompressible and compressible flows, both inviscid and viscous, slow and fast, and laminar and turbulent. Mathematical details are not emphasized, the concern being the solution of real flows. Whenever possible or useful Peyret and Taylor consider simpler model equations to give insight into the behavior of the numerical methods. They also examine the relationship among the various numerical methods and how they stack up against one another.

For a scientist or engineer interested in applying numerical methods to solve fluid-flow problems it would be hard to think of a better book with which to begin, and to have nearby as a resource.

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Physics of Planetary Interiors

G. H. A. Cole
208 pp. Adam Hilger, Bristol, 1984. $16.00

Planetary physics deals with systems that are so complex that an exposition of the physics requires a full-year course. For a one-semester course it is necessary to concentrate on results that are not dependent on the details of the approximation chosen. G. H. A. Cole's book provides a good text for such a course. In general it tries to give the reader a feeling for the type of physics encountered in a planetary body, using the simplest models feasible. It contains a good review of the observational data and many useful tables and figures, although some of the material for Uranus and Neptune is out of date even for a pre-Voyager book. I liked the general discussion of the physics of bodies of planetary size: It gives an excellent feel for the range of physical parameters one can expect to encounter. The equation of state is presented in a parametric form without much reference to quantum-mechanical and thermodynamic arguments. The result is adequate for appreciating conditions inside the planets, but not sufficient if one wishes to follow current research papers.

The chapters on the shape of a rotating body, heat transfer and magnetic fields follow the same trend. One comes away with a good feeling for the basic physical principles but without having seen the techniques used in current research. The chapters on the planets themselves continue in this vein. The basic structures discussed give a fair representation of the results of current research but are based on very simplified models. In short, if the aim of the course is to give astronomy or geology students a context for appreciating results in planetary physics, this book is a useful text. Preparing students for research in the field, however, requires a more detailed text such as *Planetary Interiors* by V. N. Zharkov and V. P. Trubitsyn, edited by William B. Hubbard (Pachart, Tucson, Ariz., 1978), or *Interiors of the Planets* by Allan F. Cook (Cambridge U. P., New York, 1981).

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Gamma Ray Astronomy

Rodney Hiller
202 pp. Clarendon Press, Oxford, 1985. $29.95

Though x-ray astronomy has blossomed in the two decades since its origin, gamma-ray astronomy has proved