pictures on glossy paper, it was a surprise to open the book and find that, except for an 8-page insert of color plates, all illustrations are in gray scale. Surprisingly few figures suffer from lack of color, and for some of those, the color plates suffice to fill in the missing information. No doubt the use of gray-scale figures helped to reduce the cost of the book, and that seems a good tradeoff now that a plethora of beautiful solar illustrations is readily available on the Internet.

It seems to me that this book has two audiences. The great lucidity of explanation and lack of mathematics commend it to the educated lay audience, to undergraduates, and to beginning graduate students. Zirker presents concisely and clearly such basic concepts as thermodynamic equilibrium and the Maxwell–Boltzmann distribution. A daunting challenge to the beginning student (or to anyone seriously interested in solar phenomena) is to master the wealth of significant observational detail and the jargon used by the solar community to describe it. I know of no other source that makes learning this language so pleasant.

The book's second natural audience is senior astronomers, like me, who have been so occupied with their own niche as to lose track of the great sweep of scientific advance. For them, the book is a pleasant and delightful way to catch up on the field. Zirker names names and comments on personalities (all positively) who have contributed seminally to the science he describes. It is fun to meet old friends as well as new science here. Historical background provides a perspective of how one discovery leads to the next question.

The book is not without its first-edition warts. A few figure references are in error, Ne becomes He in figure 12.3, and some typos creep in. Unfortunately, Zirker tends to use acronyms without spelling them out. This no doubt accounts for the inexcusable use of ISIS for Japan's Institute of Space and Astronautical Science, the institution that brought us the very successful Yohkoh mission for the study of high-energy solar physics.

At such a reasonable price, *Journey from the Center of the Sun* should be purchased and read by anyone with an interest in solar astrophysics. One might give it as a gift, as I have done here at Montana State, to every entering graduate student in solar astronomy. I can think of no better toehold in this fascinating but challenging field.

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Stellar Physics

G. S. Bisnovatyi-Kogan
(translated from Russian
by A. Y. Blinov and M. Romanova)
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Sometimes just the right combination of events allows a scientific field to advance particularly rapidly. People are most familiar with how quantum mechanics arose in the first part of the 20th century, but models of stellar structure and evolution arose similarly at midcentury. In about 1955, only fairly elementary, semianalytic stellar models existed. By about 1970, stellar models offered a relatively detailed knowledge of the structure and evolution of stars, from the beginning of the slow-time-scale nuclear fusion of hydrogen into helium, through the processing of other elements, until (often) something dramatic happens in stellar evolution.

Major catalysts for this knowledge jump were the development of computers for widespread academic use and the corresponding development of numerical methods. The Henyey technique (as it is known in stellar astrophysics) was a noteworthy numerical method for solving implicit finite-difference equations. This technique allows the full equations of stellar structure to be solved with reasonable physical models for the equation of state and nuclear processing.

Of course, such a dramatic pace of advancement could not continue indefinitely. By the early 1970s, much of the broad scope of stellar evolution was reasonably well known. Attention then turned to more detailed issues, many of which remain only partially solved. By the 1980s, the focus of astronomy and astrophysics had moved to other new and exciting areas. Stellar-evolution research did not cease, but many problems of stellar structure (such as the solar neutrino problem) steadfastly refused to be solved. In the late 1980s and into the 1990s, stellar structure experienced something of a renaissance, prompted in part by three factors. First, astronomers observed the supernova SN1987A, and were helped by knowledge about that star before it exploded. Second, measurements of many oscillation periods of the Sun provided a finely tuned diagnostic of the solar structure. Third, astrophysicists realized that stellar composition undergoes considerably more slow-time-scale movement within the star than had been thought. Such efforts to understand stellar structure and evolution continue.

The advances of the past decade present a problem for this volume of *Stellar Physics*, which was published in Russian in 1989. In the current English version, Gennadii S. Bisnovatyi-Kogan has included a fair amount of material from the past decade but seems to have focused on updating the areas already covered rather than on adding new topics. As the preface states, the author has tailored his presentation to his own many and varied professional interests, including supernovae, the formation of accretion disks, and stellar stability. Although that practice is acceptable, it means a number of topics that should have been included in a general-purpose text have been left out. For example, there is little discussion of solar-oscillation theory, virtually nothing on how the solar-oscillation results have changed the astrophysical picture of the Sun, and not much on the mechanisms for transport of the chemical composition inside stars or on the motivation for such transport.

Although the omissions may make the book unsuitable for a graduate-level text on stellar evolution, the work has many strong points. For one, the author includes detailed discussions of the final stages of stellar evolution, which take up approximately half the book. He also offers in-depth results from Soviet and Russian research. Bisnovatyi-Kogan's discussion of astrophysicists' inability to produce supernova models that account for basic observations nicely summarizes the state of the art. The book's tables present many detailed results that can help validate current research models for situations in which the basic input physics—such as radiative opacities and nuclear energy generation—has not changed very much.

Although the translation is not always grammatically precise, it is clear. However, I found the system of references disruptive to my reading: The text cites references only by number, so I had to turn to the citation index in the back to find the authors and papers. Also, although the numbered reference list is putatively alphabetical, the actual order is only partially so. Such minor reservations aside, I heartily recommend the book for researchers in the field.

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