



An Introduction to Galaxies and Cosmology, Edited by Mark H. Jones and Robert J.A. Lambourne, Cambridge University Press, 2004, pp: 442, ISBN 0521546230 (pbk); Price: US\$65

My first impression upon receiving this book is how visually beautiful it is! From the montage of colour photographs of galaxies on the front cover, to the dense, glossy paper that the book is printed on, to the full-colour figures and photos found on almost every page, down to the spacious margins and the use of colour-coded questions, review boxes and highlighted important results, the reader's eye just feasts on the visual presentation that this book presents.

But the beauty is not just skin-deep. The authors give an appealing introduction to the subject of galaxies and cosmology at a level that is comprehensible to anyone with first-year university physics and astronomy courses. Indeed, a motivated high-school student or amateur astronomer would find most of this book understandable. It is assumed that the reader is familiar with the basics of stellar astronomy, as might be obtained by reading the companion volume, *An Introduction to the Sun and Stars*. Among such basics would be the meaning of the Hertzsprung-Russell (H-R) diagram and the rudiments of stellar evolution, but even these are briefly explained in the supplementary material highlighted in purple.

A perusal of the chapter titles gives a good idea of the scope of this book: (1) "The Milky Way – Our Galaxy", (2) "Normal Galaxies", (3) "Active Galaxies", (4) "The Spatial Distribution of Galaxies", (5) "Introducing Cosmology – The Science of the Universe", (6) "Big Bang Cosmology – The Evolving Universe", (7) "Observational Cosmology – Measuring the Universe", (8) "Questioning Cosmology – Outstanding Problems About the Universe".

A very helpful aid to learning the material are the numerous questions provided. These are of three types:

(1) Short-answer questions that the reader should be able to answer immediately, such as, "Why would you expect HII regions to be associated with the spiral arms?" The answer is given immediately below this type of question.

(2) Longer questions which require some calculation, such as "Calculate the dust sublimation radius for an AGN (active galactic nucleus) of luminosity 10^{18} W," have answers given at the back of the book.

(3) Additional supplementary questions at the end of each chapter for further review, again with answers at the back of the book.

The reader should regard the first and second types of questions as integral parts of the text, and do them before proceeding further. The questions make the reader reflect, repeat and review, which makes for an excellent learning environment. It's almost like having a tutor sitting beside you as you read.

There are remarkably few errors and ambiguities that I could find; among those are the following: The caption for Figure 2.4(c) identifies the galaxy as Messier object M5. This is incorrect, since M5 is a globular cluster, not a galaxy. Figure 1.24 is confusing, because the reader cannot see the nested ellipses that are said to be there. Figure 1.25 is also confusing, because the shaded part in the mid-plane is supposed to be circular, but looks elliptical because of the projection used. It would help in this case to label both axes with dimension “a” to make it clear that they are the same. The explanation of “forbidden lines” in the margin of page 128 says that these lines are forbidden according to a certain set of rules in quantum mechanics; this gives no physical insight. It would be more intuitive to say that “permitted lines” correspond to radiation emitted when the electric charge in an atom oscillates like an electric dipole, i.e., a partial positive charge at one end and a partial negative charge at the opposite end. Spectral lines due to more complicated oscillations of electric charge are far less likely and hence are termed “forbidden lines”.

The mathematical demands of this book are not high. The reader needs proficiency only in high-school algebra. On page 35, a review box even explains what the exponential function is. The first four chapters are more descriptive and less mathematical than the last four which require extensive quantitative reasoning. No calculus is used anywhere in the book.

In summary, this book can be highly recommended as a lucid and highly readable introduction to the subjects of galaxies and cosmology.

Stanley Yen
TRIUMF
Vancouver, British Columbia, Canada