An introduction to galaxies and cosmology

by Mark H. Jones & R. J. A. Lambourne (Eds.)

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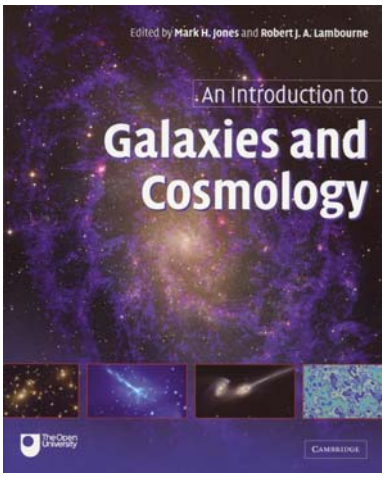

Produced by the Open University, this book aims to provide an introductory textbook of extragalactic astronomy and cosmology at undergraduate level, as a part of their astronomy course S282. It concentrates on physics more than observation, though it aims to require minimal mathematical expertise. The few equations that do crop up are accompanied by textual explanation, or can be skipped over with little loss of flow.

Thumbing through, I was first struck by the lavish use of full colour: the discussion is reinforced throughout by both clear technical diagrams and beautiful images of galaxies. Optical images are typically drawn from the Hubble Space Telescope, often accompanying images at other wavelengths. It should be noted that the scope for amateur observation of these objects is limited, since in most cases they are by necessity rather distant, or those which only exhibit interesting behaviour at non-optical wavelengths.

In the opening chapter, a summary is provided of what is known about our own Galaxy, the Milky Way, describing both our understanding of its composition – stars, gas, dust and dark matter – and the observations leading us to these conclusions. Subsequent chapters deal with other galaxies: first normal galaxies, outlining the Hubble classification into spiral, elliptical and lenticular systems, and then various types of active galaxy. Each includes discussion of the physical principles which might underlie such systems.

The latter half of the book becomes more mathematical, treating the spatial distribution of galaxies into clusters and superclusters, and then leading naturally into cosmological models of the large-scale Universe. After outlining the various *cosmological parameters*, a chapter discusses methods for measuring these, including an up-to-the-minute review of the results of the first year of operation of the WMAP satellite. A final chapter discusses outstanding problems in cosmology and current research directions.

The subject matter is quite technical, but I believe the authors have succeeded in their goal of finding a presentation style which ensures accessibility to curious amateur deep-sky enthusiasts as well as trained astrophysics students. In the early chapters, I feel the authors achieved their aim of avoiding mathematical complexity well. However, this seemed rather in contrast with the cosmology chapters, which require some ability to interpret equations, and preferably a little knowledge of calculus. The exposition is clear and unambiguous throughout, though your reviewer felt in places this led to a somewhat dry and repetitive style. The authors urge active learning, some ideas being raised in question and answer fashion, encouraging the reader to consider the relevant physics before reading the answer. Each chapter also has numerous exercises, with full solutions at the back.

Some background in physics is required, though an A-level would suffice, and box-outs indicate more challenging concepts which might be considered optional at a first reading. A comprehensive index is provided, and I feel this text will be of value also as a foundation reference at first-year postgraduate level, with the caveat that mathematical rigour is outside its scope.

I would recommend this book to any amateur with basic scientific grounding who seeks to learn more about the physics of deep sky objects. It is loaded with factual information, and produced to a high standard of accuracy and clarity throughout.

Dominic Ford

Dominic is a research student in galaxy evolution at the Cavendish Laboratory, Cambridge. He has served the Association in the capacity of Meetings Recorder since 2002.