astronomer whose prime concern is to understand the ordinary objects in the Universe rather than the exotic. This is reflected in the balance of the chapters. Four of them describe the ordinary stuff out of which our Universe is made — "Forms and Structures", "Normal Galaxies", "Galaxies and their Environments", "Measuring the Universe". One is entitled "Active Galaxies" and the two remaining main chapters, "Cosmology" and "Gravitational Instability and Galaxy Formation", discuss cosmological questions.

The advantages and disadvantages of the programme are obvious. First of all, as a lecture course, it has the advantage that the statements made have to be rather definitive or the course would never finish on time. Professor Sérsic's approach is to outline the main features of each topic and then quote without comment additional facts, alternative interpretations or problems. It works well, provided one is aware that every definitive statement should be subject to a fairly large number of provisos.

I find the sections on normal galaxies very useful and they can be entrusted to beginners in the subject, with the recommendation that this *is* an introduction and should not be taken as gospel or the last word. The chapter on active galaxies is perhaps the least satisfactory because this is now an enormous field. To consider a subject close to my own heart, the few pages devoted to strong radio galaxies barely begin to address the astrophysical problems one would hope students would be exposed to. The astrophysics of massive black holes in active galactic nuclei is only hinted at, yet it is surely one of the most significant pieces of "new" astrophysics in extragalactic astronomy. The chapters on cosmology and gravitational collapse are straightforward and cover many basic topics in a short space.

I like this book, although the translation is what I will generously call idiosyncratic. I will recommend it to my students as an example of the way in which a classical optical astronomer approaches the problem of expounding what he considers it essential that students should know about extragalactic astronomy. Ideally, it should be read in parallel with similar books by astronomers whose home territories are in the radio, millimetre, infrared, X- and γ-ray wavebands, as well as one by a pure theorist. Professor Sérsic, however, has the advantage of being the one who has most to say about the ordinary components which make up our Universe. □

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Paper comets

New in paperback from Cambridge University Press is John Brandt and Robert Chapman's *Introduction to Comets*. The book, which was reviewed in *Nature* **296**, 783 (1982), costs £6.95, $11.95.

Up with the times

Michael Rowan-Robinson

Introduction to Special Relativity, 2nd Edn.
By Wolfgang Rindler.
Oxford University Press: 1982. Pp.184. Hbk £15, $39; pbk £6.95, $13.95.

An Introduction to Tensor Calculus, Relativity and Cosmology, 3rd Edn.
By D.F. Lawden.
Wiley: 1982. Pp.205. Hbk £14.75, $33.50; pbk £6.75, $14.95.

Seventeen Simple Lectures on General Relativity Theory.
By H.A. Buchdahl.
Wiley: 1982. Pp.174. £21.25, $31.85.

Physics of Stellar Evolution and Cosmology.
By Howard S. Goldberg and Michael D. Scandron.
Gordon & Breach: 1982. Pp.390. $59.50.

FIFTEEN years or so ago when I began to give an undergraduate course on relativity and cosmology, there were two books which my students and I found very useful — Wolfgang Rindler's *Introduction to Special Relativity* and D.F. Lawden's *Introduction to Tensor Calculus and Relativity*. It is quite a pleasure therefore to welcome completely new editions of these books, each of which has done such a lot to make relativity theory accessible to the student of general physics or applied maths.

The subject of relativity has changed greatly over the two decades since the first versions of these books appeared. Rindler brings us up to date with these new developments, for example the many experimental tests of relativity, the resolutions of the so-called paradoxes such as the twins paradox, and the appearance of an object moving close to the speed of light. Above all Rindler gives us the deeper physical understanding of special relativity which has grown out of the past 20 years of intensive work on relativity theory. This will be a really useful book for students for years, perhaps decades, to come.

Lawden has written a completely new chapter on the mathematical aspects of cosmology and this certainly extends the scope and usefulness of his book. However he has made remarkably few changes to the chapters on special and general relativity, and as a result the book now has a rather old-fashioned feel. The use of an imaginary time coordinate, for example, will certainly be frowned on by pukka relativists. I think that many lecturers on relativity will be disappointed that this new edition is not more radically revised. I would not be surprised, though, if the less high-flying student continued to find the book useful.

H.A. Buchdahl's *Seventeen Simple Lectures on General Relativity Theory* are actually quite heavy going. They will probably be more useful to the lecturer on relativity who wants to meditate on the more esoteric points of the theory than to the student; this is definitely not a book from which one could learn relativity and the lectures read more like a commentary than an exposition. They may appeal to the student for whom the philosophy of science is a major interest and for whom physics and the real world are of secondary importance. The lecture format, with no division into sub-headings, is extremely opaque and it takes some time to get into the book.

Nevertheless by the time I reached the end Buchdahl had convinced me that there was a good deal here that I ought to know and understand. You would have to be one of general relativity's Mighty Handful not to learn something from these lectures. I disagree with Buchdahl, incidentally, that general relativity's failure to specify the large-scale topology of the Universe is unimportant. To me this seems a serious incompleteness of the theory and in the past such incompletenesses in physical theory have, in the long run, usually required major new ideas to deal with them.

Elementary particle physicists tend not to regard astronomy as a branch of science at all. It is not surprising, however, that two such physicists, Howard Goldberg and Michael Scandron, should want to write a book on *The Physics of Stellar Evolution and Cosmology* — astronomy has become a tremendous laboratory for all aspects of physics and this book ought to have been a good idea. I think, however, that it suffers from trying to aim at too many audiences at once. In their preface, the authors say the book is written for "the liberal arts and engineering student who has been bitten by the physics bug . . . the graduate science student who wants to obtain a solid foundation: the amateur astronomer who would like to understand more about what he sees". Such a wide constituency is, of course, impossible to please. The number of equations and the level of physical knowledge assumed mean that the book is completely unsuitable for the non-science major or amateur astronomer, and might even pose problems for final-year science students. At the same time nothing seems to be explained or derived thoroughly and the order-of-magnitude argument is decidedly overworked.

Still, modern accounts of stellar evolution with a strong physical bias are thin on the ground. This book will find its supporters, although the fairly cavalier treatment of astronomical facts and arguments will lose it a few too. A nice feature is several quite amusing cartoons, including the well-known one with two bearded and robed figures sitting on a cloud with one saying "The Big Bang? Believe me, it was very, very, very, very Big". □

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