

Annual Review of Astronomy and Astrophysics, 2007. Blandford *et al.* (eds). Annual Reviews, 4139 El Camino Way, Palo Alto, CA 94306, USA. Vol. 45. 701 pp. Price not mentioned.

In this age of specialization, there are very few who would approach this compilation to read it from cover to cover. Although the overall quality of the presented material is quite good, not all the reviews are sufficiently pedagogic to be of interest to a younger audience. What most of the articles do accomplish is to bring the reader up to date on the state of the field at the present time. The Preface mentions the curious circumstance of long delays having led to several complimentary articles appearing in this volume. So instead of the usual case of a single prefatory, historical article we find two. It turns out to be a boon though, since one of them is written by a theorist and another by observers, providing a contrasting study of social aspects of doing astronomy and astrophysics in the sixties.

Burbidge narrates several interesting stories about astronomical politics in the sixties in England and America. Being one of the proponents of the steady state theory of cosmology, it is not surprising that he argues against some of the standard interpretations of the big bang model. In my view this makes for an interesting reading, even for those who believe that the big bang model is the correct model of the universe. The practitioners of a paradigm seldom make the effort to critically analyse their evidence, so sometimes it takes a person with an opposite point of view to drive home the point that the data also lends itself to alternative explanations. Although it is perhaps well known to the experts, the younger audience would find it interesting to read that the evidence for accelerating expansion of the universe can also be analysed from the point of the steady state cosmology, which also predicts an accelerating expansion, without invoking the ill-understood cosmological constant. The second historical review by Low, Riecke and Gehrz, on the beginning of modern infrared astronomy, provides a contrasting study of life of an observer. Theorists often do not realize the amount of toil that goes into collecting astronomical data. The history of astronomy is generally prefaced by pioneers at-

tempting the detection of astronomical sources with newer techniques in ever new wavebands. This almost always leads to fresh surprises and epoch-making discoveries. The invention of the bolometer has revolutionized the near and far infrared astronomy, providing glimpses into such diverse phenomena as dust in the universe and star formation in the galaxies. This article provides a history of this exciting branch of astronomy, leading up to the launch of the IRAS satellite.

Adding to the unusual nature of this volume, we have three complimentary articles on the broad subject of star formation. The first article by Bergin and Tafalla, provides a review of what is presently known about the initial conditions for star formation in galaxies. It is worth pointing out to the reader that although we understand the evolution of stars after they are born fairly well, the circumstances under which they are born are not as well understood. This article ties in nicely with the prefatory article on infrared astronomy by Low *et al.*, since most of our understanding of the sites of star formation comes from infrared and radio astronomy. For gravity to take over the thermal pressure, the primordial gas clouds have to be sufficiently cold. This condition implies the presence of dust, since dust protects the interiors of these clouds from heating by ambient radiation. The star forming regions have been known and studied for a relatively long time. Recent advances in astronomical technique have provided fresh glimpses into the starless cores of collapsing matter, revealing a combination of simple physical properties together with a complex chemical structure, providing ammunition to theorists to base their theories on. The second article by Zinnecker and Yorke reviews theoretical issues important for a complete understanding of massive star formation. As they point out, due to lack of observational guidance, theoretical models have remained controversial. They discuss in detail some of the competing models of massive star formation, such as monolithic collapse in isolated cores, competitive accretion in a protocluster core and stellar collisions and mergers in very dense system. Their conclusion that high-mass star formation is not merely a scaled-up version of low-mass star formation, will no doubt get further clarified by observations of the kind discussed in the review by Bergin and Tafalla. The

last article on the theory of star formation by McKee and Ostriker, is the longest in the volume. This also happens to be the most pedagogically written article. Hopefully the editors of *Annual Review* would solicit more such articles in the future. This in-depth review discusses the role of turbulence, magnetic fields and self-gravity in star formation. Formation of both low as well as high-mass stars is discussed; leading to an overlap with the review on massive star formation, which in my view is a good thing. These three articles make the main core of this volume and those who are interested in learning about this problem will find these three reviews extremely useful.

Another excellent and timely review by Miller discusses the relativistic X-ray lines from the inner accretion disks around black holes. Very little direct evidence exists in support of black holes. Till recently, there were no direct probes to measure the rotation of black holes. Due to the presence of extreme gravitational fields near the event horizon, several interesting effects such as bending of light and gravitational time delay modulate the relativistic emission lines, such as Fe K-shell line, emerging out of the inner accretion disks of stellar mass black holes. This article discusses the recent observations by Chandra, XMM-Newton and Suzaku telescopes and shows that finally a measurement of the spin of a black hole has become possible. These observations also provide an ideal test bed for general relativistic effects, providing the much needed corroborating evidence for general relativity.

There are several other interesting and useful reviews which I do not discuss in detail. Zurbuchen discusses at length the results of the Ulysses mission that has, for the first time, offered us a glimpse into the polar regions of the heliosphere. The observational surprises are discussed cogently along with the theory they motivate. McNamara and Nulsen discuss the problem of excess entropy in the clusters of galaxies and how it may link to the presence of active galactic nuclei in their centres. This feedback effect is not entirely well understood and the review provides a comprehensive overview of the currently popular ideas in this rapidly evolving field.

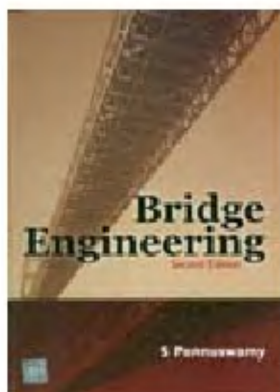
Another notable review by Bregman discusses the important problem of missing baryons at low redshift. Recently, it

was shown that the amount of baryons detected at low redshift only makes up one-tenth of the total number of baryons at high redshift. It has been posited that these missing baryons might lie in the filamentary structures connecting virialized groups and clusters. Some of these have already been detected in the damped Lyman- α systems; however, there has been no convincing detection of hotter gas till date. The possibility that this hotter gas may be detected in the very near future makes this review timely.

In summary, I feel that this volume contains several interesting and competent articles that will be of interest to experts as well as those who are looking for material to learn about a field. For the latter audience, I might add that they will need to supplement these articles with other material, since most of these reviews are fairly concise and technical, and have been written mainly for an informed audience.

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Bridge Engineering. S. Ponnuswamy. Tata McGraw Hill Publishing Co Ltd, 7 West Patel Nagar, New Delhi 110 008. 2008. 747 pp. Price: Rs 750.

This book has come at the right time, when infrastructure development is the need of the hour presently, particularly because most of the urban centres have become hubs for industrial development. Infrastructure planning with emphasis on design of traffic network, although appar-

ently seems to be in the realm of common sense, has certainly a lot of physics. It may not be out of place to cite an article 'Physics is dead, long live physics' by Mark Buchanan (*Nature-Phys.*, 2008, 4, 159), wherein the author cites the work of two other physicists, James Lighthill and Gerald Whitham, who developed the first fluid model for traffic in 1955 in a paper entitled 'On kinematic waves: II. A theory of traffic flow on long crowded roads' (*Proc. R. Soc., Math. Phys. Sci.*). The intention of quoting the above is to emphasize the fact that transportation engineering, of which bridge engineering is a part, is not dead, although quite traditional in approach. The present book has brought out the scientific flavour inherent in all the aspects of bridge engineering, which is apparent in most of the chapters, and particularly in those dealing with superstructure – design aspects, construction, inspection and maintenance.

The book contains 23 chapters, which is rather too large a number. The introduction highlights the importance, appropriateness and relevance of the different types of bridges. Various types of bridges in India and abroad are illustrated. A brief history of the bridges is thought-provoking. Further, the author goes on to explain the various steps involved in bridge construction starting with pile selection, hydrological survey and design, soil investigation and choice of foundation. The author nicely takes the reader to an important aspect of bridge design, viz. choice of the type and loading standards. In the Preface to the first edition, the author has presented a table containing failures of bridges in the US due to various reasons. It is a useful piece of information.

The chapters on choice of foundation for piers and abutments, as well as on types of bridges and loading standards are useful to practising engineers. The information although well known, is explained lucidly with good commentary supported by sketches. Superstructure design which requires the knowledge of architecture and structural engineering, is always not easy. In my view, the book has really come in time to educate an engineer about both. Some of the case studies of bridges elsewhere, like the one on Mississippi River at Washington Avenue, are not available in other books.

The book looks quite complete in all aspects and I do not think that I can sug-

gest any other addition, except that the number of chapters could have been lesser by merging a few of them. For example, all foundations, viz. open, pile and well could have been in one chapter and similarly superstructure, construction, maintenance and inspection could have been in another chapter. Loading standards should have been a part of the superstructure, design and not part of types of bridges. A few inconsistencies in titles are observed. For example, in Chapter 9, the title is 'Open foundation', while in Chapter 10, it is 'Pile foundations' and again in Chapter 11, it reads 'Well foundations'. It could have been uniformly in plural tense. Some of the titles are too long like that of Chapter 8; the title looks like a complete sentence. Similarly, the title of Chapter 6 could have been better were it just 'Foundation for piers and abutment', because the theme of the chapter is simply not the 'choice', but more than that.

Notwithstanding the above few minor observations, the book is certainly useful when many new bridges, flyovers and grade separators are being added in all the urban centres. Infrastructure needs to be properly taken care of and many consultants in the business are involved. The book certainly can be recommended to be read by all these practitioners and will be a useful addition to the library in a university, research institution or R&D laboratory.

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Mild Stress and Healthy Ageing: Applying Hormesis in Ageing Research and Interventions. Eric Le Bourg and Suresh I. S. Rattan (eds). Springer Science. 2008. 187 pp. Price not mentioned.

As there is a rapid rise in the elderly population and incidence of related old-age diseases, the challenge is to maintain a healthy lifespan. In this context, the present book is timely, written by experts in the subject and presents state-of-the-art research on hormesis and ageing. Although the book is multi-authored, the