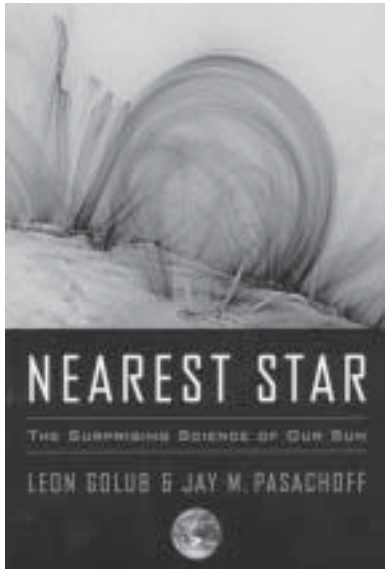
Nearest star: the surprising science of our Sun

by Leon Golub & Jay M. Pasachoff

Harvard University Press, 2002. ISBN 0-674-01006-X, pp. xii + 267. £11.50 (pbk).



Nearest Star is one of several descriptive works on the Sun to have appeared during the recent solar maximum. Its authors are both well-known US solar astronomers. Leon Golub is an astrophysicist working with the Transition Region and Coronal Explorer (TRACE) solar spacecraft, while Jay Pasachoff is familiar to many amateur astronomers as an authority on solar eclipses. *Nearest Star* is written for the non-scientist and avoids mathematics altogether. It aims to present a general description of our current understanding of the Sun and its effects on our planet.

The book is made up of 8 fairly lengthy chapters. I was particularly impressed with the lucid description in the introductory chapter of the various instruments used by astronomers to observe the Sun. Chapter 2 describes how the Sun evolved and how it is predicted to evolve in the future. Present-day solar activity and the sunspot cycle are also covered in this chapter, but some of this latter material might have been better included in chapter 3, which is titled 'What We See' and includes features such as granulation and limb darkening. Chapter 4 discusses the corona and solar flares, as well as phenomena such as solar oscillations. Chapter 5, on solar eclipses, explains not only what happens during a total eclipse but also how eclipse observations of the corona fill in gaps left by space-based observations.

Chapter 6 is concerned with space missions to study the Sun. It gives a good explanation of why it is necessary to go into space to study many aspects of the Sun and reviews current and future solar observing probes. I would like to have seen more coverage in this chapter of how previous solar missions, such as the solar observatory aboard *Skylab* and the Solar Maximum Mission, enhanced our understanding of the Sun.

The final two chapters concern themselves with the Sun's effects on the Earth. Chapter 7 is about the Sun's influence on the Earth's climate. It includes an excellent description of the many possible reasons for climate change and discusses how much the global warming during the last century has been due to the Sun and how much man-made pollution has been to blame. Chapter 8, on 'Space Weather', could have included more detail on the effects of solar outbursts on satellite communications and other human activities.

I enjoyed reading *Nearest Star* and found the text easy to follow. There are occasional unnecessary repetitions – for example, the discovery of helium in the Sun's spectrum is described twice, in chapters 3 and 5. Also, the authors sometimes use non-SI units such as Angstroms and miles without giving their SI equivalents. The book is not printed on image-friendly paper (apart from a 16-page colour section), but most of the illustrations have reproduced well and have been well-chosen to suit the text. I would recommend *Nearest Star*, for the most part, to anyone with a serious interest in the Sun and its effects on Earth.

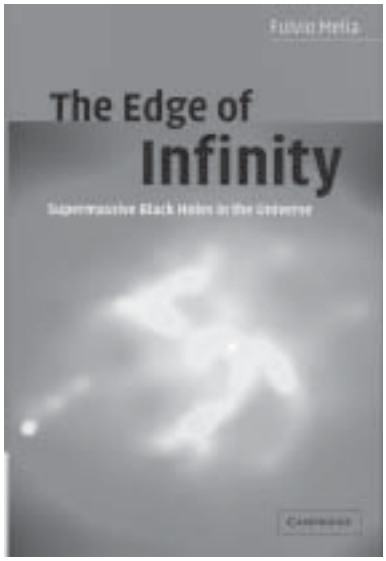
Lee Macdonald

Lee Macdonald has been an active member of the BAA Solar Section since 1989 and also observes the planets and deep sky. He is the author of How to Observe the Sun Safely, *published by Springer-Verlag in 2002.*

The edge of infinity – supermassive black holes in the Universe

by Fulvio Melia

Cambridge University Press, 2003. ISBN 0-521-81405-7, pp. ix + 148. £18.95 (hbk).



As with so many astronomical books, the eye-catching main title has a fairly distant relationship to the subject. Melia is at some pains to deal with the scale of the Universe from the 3 kilometre radius of a one solar mass black hole to the over 13 billion light years of the visible Universe. My first impression was that the book is much more about the Universe than black holes. However, a quick review of the titles of sections and subsections shows he stuck to his last.

He looks at black holes, where they lurk in the centres of galaxies. He explains how they dominate their surroundings and how infalling gas becomes so heated that it shines brightly and produces quasars and other active galactic nuclei. There is a good deal about the cosmic microwave background radiation and the various types of galaxy, even about starburst galaxies which contain more than one black hole of merely high not super-mass.

There is a most interesting section discussing the idea that the Universe itself might be in a black hole (read it for yourself – I'm not going to tell you).

The publishers say that this is an 'elegant non-technical account'. It is non-mathematical and there are lots of references to enable the interested reader to get to the original or seminal papers, but I did not find it non-technical in any other way. There is an intriguing explanation beginning on page 46 of rotation and why two full turns are needed. I cannot yet state

that I understand it. I even tried the Philippine Wine dance, but couldn't do that either, even though I used an empty plastic cup, not a full wine glass.

There is some odd English amongst the striking ideas.

Plenty of attractive illustrations are included, but the numbering is odd and makes no distinction between pictures in the text and those in the two special sections. I was pleased to see images from the VLT, VLA and Chandra as well as artists' impressions and computer simulations.

Melia is Professor of Astronomy at the University of Arizona and there is no doubt that he knows what he is talking about.

Roger O'Brien

Roger teaches astronomy and cosmology for the Open University and the Workers' Educational Association. He has just revived his interest in science fiction.

A practical guide to lightcurve photometry and analysis

by Brian D. Warner

BDW Publishing, 2003. ISBN 0-9743849-0-9. Pp xiv + 266, $40.00 incl. air mail postage (pbk). [Available through www.MinorPlanetObserver.com]

Written by a keen amateur astronomer, this book aims to explain and facilitate how one goes about the photometric study of asteroids and (to a lesser extent) variable stars, and in particular how to combine observational data so as to derive the period and form of the lightcurve.

Although some very good books have been written on the topic of photometry, none of these in the past have dealt adequately with this particular subject. So with its appearance, Brian Warner has provided a useful service to all those would-be amateurs, who, equipped with a small telescope and CCD camera, wish to make worthwhile observations to determine the rotation rate, size and shape of asteroids. Though this may sound a rather complex subject, the author has avoided being too technical thereby ensuring a wide readership amongst the amateur community.

Brian Warner is a very active observer himself, and has done much to further the development of asteroid studies. For instance, he writes a regular article in the *Minor Planet Bulletin* and has written a good deal of software including MPO Connections, Canopus and PhotoRed, all of which are available commercially, and which can be used to measure images and carry out photometric analyses. Indeed, although not strictly necessary, the latter two software routines are a useful adjunct to the book itself so if you are interested in acquiring this book you should also look at the software, details of which can also be found on the author's Website, www.MinorPlanetObserver.com.

Being somewhat of a first, the author addresses a wide variety of topics including photometry with filters, transforming to standard magnitudes, air mass, extinction, telescopes, CCD cameras, image acquisition and photometric software. He does not plunge into any one topic in great detail but rather gives a broader perspective, often giving his own view and tips from his first-hand experience with illustrative examples taken from his own observing successes. The author writes in a style which speaks directly to the reader with many anecdotes and raising many issues and questions, to which he gives his own opinions, advice and answers. As such it is a good book for anyone who has a telescope and CCD camera and who has been looking to contribute to the scientific understanding of asteroids or eclipsing variables but who has not yet summoned up sufficient energy to take the plunge: this book should keep you from drowning!

There are some very useful appendices (9 in all) including a bibliography, key websites, worked examples for determining atmospheric extinction, CCD calibration, and charts of fields containing Landolt standard stars as well as close-up fields (0.5° square) provided by Arne Henden of the US Naval Observatory, Flagstaff containing B,V and R secondary standards suitable for photometric calibration.

As a first edition, written and published by the author himself, the book has some limitations. Notably, it contains numerous

Cometary science after Hale–Bopp, Vols. I & II

by H. Boehnhardt et al. (eds.)

Kluwer Academic Publishers, 2003. ISBN 1-4020-1288-8, pp. 343 (Vol. I); ISBN 1-4020-0978-X, pp. 524 (Vol. II); £119.00 each.

This two-volume book is a collection of papers presented at an international conference of the same name, held in Tenerife in January 2002. The papers were quickly put together and refereed following the conference and in places it shows. The first volume presents the invited papers, and the second other contributions and research notes. Because it is a collection of papers there is no index, which makes finding specific items somewhat difficult. Overall it is one to dip into in the library, rather than to have on the bookshelf.

As might be expected there is much on the current understanding of the physical properties of the cometary nucleus, chemical processes that go on in the nucleus and coma, and on the orbital dynamics of comets. Some papers look at spacecraft studies, though these suffer from the loss of *Contour* and the delay in launching *Rosetta*.

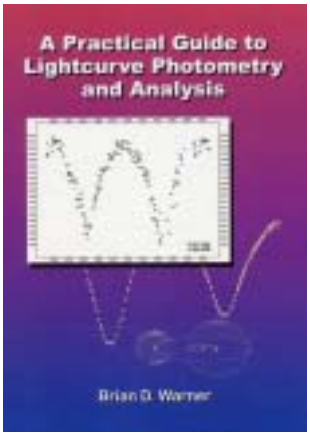
Some professionals either don't seem to know or understand the present system of comet nomenclature and hence a wide variety of styles is used in the two volumes. It would also be beneficial if SI units were used throughout the publication; for example in places nanometres are used, but there are still many instances of Angstroms.

There are some interesting items for amateurs, particularly for those who carry out CCD imaging of comets. Wide field imaging is one key area, and one where amateurs are generally not doing as much as they used to. With the ever-increasing use of CCD imaging at prime focus, the traditional use of photographic wide field imaging is declining, although some observers do produce excellent wide field CCD views. Amateur CCD magnitudes are being increasingly used by professionals, but have suffered from a lack of standardisation – several papers make suggestions for better techniques. Visual magnitude estimates are still important, and several light curves are presented, for example in an interesting paper on comet splitting that also includes a section on the Kreutz group. Split comets are clearly important targets to aid the understanding of cometary physics, and an area where amateurs can help is to survey theoretically faint comets to catch any that outburst.

Jonathan Shanklin

Jonathan Shanklin works as a meteorologist with the British Antarctic Survey and is Director of the BAA Comet Section.

errors, most of which are annoying rather than fatal. Some errors are typographical or grammatical in nature. Others are more serious such as the formula on page 83 for determining extinction by the Hardie method, which is incorrect. This reviewer also found that many of the figures, being computer screen-dumps, were reproduced on too small a scale to be readable: this is where having the MPO software running alongside would have helped. Many graphs are not adequately labelled or are labelled in too small a font size. Also, the observing methodology expounded is very much the personal preference of the author and, as such, is a mirror of the MPO software, although reference to alternative image analysis and photometric software is given in the book.



Overall, the book is certainly a start, a good start, and will be a valuable resource and practical guide for the active observer. The subject of asteroid photometry in the hands of the amateur is a fast-evolving one, with many more advances to be expected in the coming few years. This book should help to facilitate these.

Richard Miles

Dr Richard Miles, as Assistant Director of the Asteroids and Remote Planets Section of the BAA, is an old hand at lightcurve photometry, having obtained his first composite lightcurve of an asteroid in 1983 and gone on to determine the rotation periods of several previously-unobserved asteroids.