

## The Handbook Of Astronomical Image Processing

Fully updated and including data from space-based observations, this Third Edition is a comprehensive compilation of the facts and figures relevant to astronomy and astrophysics. As well as a vast number of tables, graphs, diagrams and formulae it also includes a comprehensive index and bibliography, allowing readers to easily find the information they require. The book contains information covering a diverse range of topics in addition to astronomy and astrophysics, including atomic physics, nuclear physics, relativity, plasma physics, electromagnetism, mathematics, probability and statistics, and geophysics. This handbook contains the most frequently used information in modern astrophysics, and will be an essential reference for graduate students, researchers and professionals working in astronomy and the space sciences. A website with links to extensive supplementary information and databases can be found at [www.cambridge.org/9780521782425](http://www.cambridge.org/9780521782425).

This book details an approach to the problem of getting high-quality astronomical images under light-polluted conditions. The book is for amateur astronomers interested in CCD imaging, especially those who have to work under suburban conditions. It outlines the materials and equipment used for high-quality imaging. The many wonderful images produced allow the reader to see the product of – initially – a fellow beginner's efforts. Respectable images are attainable with modest equipment. This book outlines a complete and thoroughly tested working program for every beginner to achieve high-quality digital imaging.

Dwarf planets (which were formerly called asteroids except for the planet Pluto), and the smaller Solar System bodies still called asteroids today, are making front page news, particularly those that are newly discovered and those that might present a hazard to life on Earth by impacting our planet. In this age of giant telescopes and space probes, these small Solar System bodies have advanced from being tiny points of light to bodies worthy of widespread study. This book describes the dwarf planets and asteroids themselves, their origins, orbits, and composition, and at how amateur astronomers can play a part in their detection, tracking, and imaging. The book is divided into two parts. Part I describes physical properties (including taxonomic types) of dwarf planets and asteroids, how they formed in the early life of the Solar System, and how they evolved to their present positions, groups, and families. It also covers the properties used to define these small Solar System bodies: magnitude, rotation rates (described by their light-curves), and orbital characteristics. Part II opens with a description of the hardware and software an amateur or practical astronomer needs to observe and also to image asteroids. Then numerous observing techniques are covered in depth. Finally, there are lists of relevant amateur and professional organizations and how to submit your own observations to them.

Tools for amateur astronomers who wish to go beyond CCD imaging and step into 'serious' science. The text offers techniques for gathering, analyzing, and publishing data, and describes joint projects in which amateurs and students can take part. Readers learn to recognize and avoid common errors in gathering photometry data, with detailed examples for analysis. Includes reviews of available software, with screen shots and useful tips.

In this new edition of the Handbook of Signal Processing Systems, many of the chapters from the previous editions have been

updated, and several new chapters have been added. The new contributions include chapters on signal processing methods for light field displays, throughput analysis of dataflow graphs, modeling for reconfigurable signal processing systems, fast Fourier transform architectures, deep neural networks, programmable architectures for histogram of oriented gradients processing, high dynamic range video coding, system-on-chip architectures for data analytics, analysis of finite word-length effects in fixed-point systems, and models of architecture. There are more than 700 tables and illustrations; in this edition over 300 are in color. This new edition of the handbook is organized in three parts. Part I motivates representative applications that drive and apply state-of-the-art methods for design and implementation of signal processing systems; Part II discusses architectures for implementing these applications; and Part III focuses on compilers, as well as models of computation and their associated design tools and methodologies.

The Compendium of Practical Astronomy is unique. The practical astronomer, whether student, novice or accomplished amateur, will find this handbook the most comprehensive, up-to-date and detailed single guide to the subject available. It is based on Roth's celebrated German language handbook for amateur astronomers, which first appeared over 40 years ago.

These proceedings celebrate the achievements of the great astronomer Zdenek Kopal, and reflect the state of the art of the dynamically evolving field of binary research, which owes so much to Kopal's pioneering work.

Galaxies - the Milky Way's siblings - offer a surprising variety of forms and colours. Displaying symmetrical spiral arms, glowing red nebulae or diffuse halos, even the image of a galaxy can reveal much about its construction. All galaxies consist of gas, dust and stars, but the effects of gravity, dark matter and the interaction of star formation and stellar explosions all influence their appearances. This volume showcases more than 250 of the most beautiful galaxies within an amateur's reach and uses them to explain current astrophysical research. It features fantastic photographs, unique insights into our knowledge, tips on astrophotography and essential facts and figures based on the latest science. From the Andromeda Galaxy to galaxy clusters and gravitational lenses, the nature of galaxies is revealed through these stunning amateur photographs. This well illustrated reference atlas deserves a place on the bookshelves of astronomical imagers, observers and armchair enthusiasts.

This entertaining text details the methods and techniques employed by non-professional astronomers from all over the world, providing a wonderful resource for anyone wishing to build a small observatory of almost any kind. It's a fun read, too. Almost every amateur astronomer dreams of having a fixed observatory - this provides ideas and constructional details. Ideas from around the world. Written for a broad audience, including non-astronomers.

Scientific Astrophotography is intended for those amateur astronomers who are looking for new challenges, once they have mastered visual observing and the basic imaging of various astronomical objects. It will also be a useful reference for scientifically inclined observers who want to learn the fundamentals of astrophotography with a firm emphasis on the discipline of scientific imaging. This book is not about making beautiful astronomical images; it is about recording astronomical images that are scientifically rigorous and from which accurate data can be extracted. This book is unique in that it gives readers the skills necessary for obtaining excellent images for scientific purposes in a concise and procedurally oriented manner. This not only gets the reader used to a disciplined approach to imaging to maximize quality, but

also to maximize the success (and minimize the frustration!) inherent in the pursuit of astrophotography. The knowledge and skills imparted to the reader of this handbook also provide an excellent basis for "beautiful picture" astrophotography! There is a wealth of information in this book – a distillation of ideas and data presented by a diverse set of sources and based on the most recent techniques, equipment, and data available to the amateur astronomer. There are also numerous practical exercises. Scientific Astrophotography is perfect for any amateur astronomer who wants to go beyond just astrophotography and actually contribute to the science of astronomy.

This volume contains leading edge research and authoritative reviews in meteor science. It provides a comprehensive view of meteoroid research including the dynamics, sources and distribution of these bodies. Techniques for investigation of meteor phenomena in the book include conventional and large aperture radar systems, spacecraft detection, optical systems, spectral measurements, and laboratory based interplanetary dust particle studies.

Our goal is to produce a comprehensive handbook of the current state of the art of astronomical instrumentation with a forward view encompassing the next decade. The target audience is graduate students with an interest in astronomical instrumentation, as well as practitioners interested in learning about the state of the art in another wavelength band or field closely related to the one in which they currently work. We assume a working knowledge of the fundamental theory: optics, semiconductor physics, etc. The purpose of this handbook is to bring together some of the leading experts in the world to discuss the frontier of astronomical instrumentation across the electromagnetic spectrum and extending into multimessenger astronomy.

Amateur astronomy has changed beyond recognition in less than two decades. The reason is, of course, technology. Affordable high-quality telescopes, computer-controlled 'go to' mountings, autoguiders, CCD cameras, video, and (as always) computers and the Internet, are just a few of the advances that have revolutionized astronomy for the twenty-first century. Martin Mobberley first looks at the basics before going into an in-depth study of what's available commercially. He then moves on to the revolutionary possibilities that are open to amateurs, from imaging, through spectroscopy and photometry, to patrolling for near-earth objects - the search for comets and asteroids that may come close to, or even hit, the earth. The New Amateur Astronomer is a road map of the new astronomy, equally suitable for newcomers who want an introduction, or old hands who need to keep abreast of innovations. From the reviews: "This is one of several dozen books in Patrick Moore's "Practical Astronomy" series. Amid this large family, Mobberley finds his niche: the beginning high-tech amateur. The book's first half discusses equipment: computer-driven telescopes, CCD cameras, imaging processing software, etc. This market is changing every bit as rapidly as the computer world, so these details will be current for only a year or two. The rest of the book offers an overview of scientific projects that serious amateurs are carrying out these days. Throughout, basic formulas and technical terms are provided as needed, without formal derivations. An appendix with useful references and Web sites is also included. Readers will need more than this book if they are considering a plunge into high-tech amateur astronomy, but it certainly will whet their appetites. Mobberley's most valuable advice will save the book's owner many times its cover price: buy a quality telescope from a reputable dealer and install it in a simple shelter so it can be used with as little set-up time as possible. A poor purchase choice and the hassle of setting up are why most fancy telescopes gather dust in their owners' dens. Summing Up: Highly recommended. General readers; lower- and upper-division undergraduates."( T. D. Oswalt, CHOICE, March 2005)

Digital electronic imaging devices allow the wonders of the universe to be seen in detail never before possible from an amateur astronomer's backyard. This book clearly examines how to create the best astronomical images possible with a digital camera. It reveals the astonishing

images that can be obtained with simple equipment, the right software, and knowledge of how to use it. Completely jargon-free, the book describes how to extract results from the raw-and-dirty original imagery and then transform them into high-quality pictures suitable for framing, posting online, or sharing with friends and colleagues.

As new communications applications are developed and brought to market, it is vital for communications professionals to keep abreast of these issues. Since the technologies and applications also affect our daily lives, it is important to understand how they will shape the country and, by extension, the world at large. International censorship, the impact of the Internet and wireless tools, and the legislation following the World Trade Center bombing all fall into this category. The New Communications Technologies, Fifth Edition, provides vital information on the new and emerging technologies that will shape the way communicators do business. The book explores the new communications technologies and covers topics ranging from multimedia and production to satellites to digital communication. Just as important, the book examines the social, economic, and political impact brought about by the adoption of such technologies and applications; this fallout includes privacy concerns, First Amendment issues, and the implications raised by biometric systems.

Here are clear explanations of how to make superb astronomical deep-sky images using only a DSLR or webcam and an astronomical telescope – no expensive dedicated CCD cameras needed! The book is written for amateur astronomers interested in budget astrophotography – the deep sky, not just the Moon and planets – and for those who want to improve their imaging skills using DSLR and webcams. It is even possible to use existing (non-specialist astronomical) equipment for scientific applications such as high resolution planetary and lunar photography, astrometry, photometry, and spectroscopy. The introduction of the CCD revolutionized astrophotography. The availability of this technology to the amateur astronomy community has allowed advanced science and imaging techniques to become available to almost anyone willing to take the time to learn a few, simple techniques. Specialized cooled-chip CCD imagers are capable of superb results in the right hands – but they are all very expensive. If budget is important, the reader is advised on using a standard camera instead. Jensen provides techniques useful in acquiring beautiful high-quality images and high level scientific data in one accessible and easy-to-read book. It introduces techniques that will allow the reader to use more economical DSLR cameras – that are of course also used for day-to-day photography – to produce images and data of high quality, without a large cash investment.

Now in an updated edition that adds new and revised material, this book offers a comprehensive introduction to quantitative evaluation of satellite and aircraft derived remotely retrieved data. Each chapter includes practice problems.

Written by an experienced and well-known lunar observer, this is a hands-on primer for the aspiring observer of the Moon. Whether you are a novice or are already experienced in practical astronomy, you will find plenty in this book to help you raise your game to the next level and beyond. In this thoroughly updated second edition, the author provides extensive practical advice and sophisticated background knowledge of the Moon and of lunar observation. It incorporates the latest developments in lunar imaging techniques, including digital photography, CCD imaging and webcam observing, and essential advice on collimating all common types of telescope. Learn what scientists have discovered about our Moon, and what mysteries remain still to be solved. Find out how you can take part in the efforts to solve these mysteries, as well as enjoying the Moon's spectacular magnificence for yourself!

The Handbook on Radio Astronomy has been developed by experts of Working Party 7D of ITU-R Study Group 7 (Science Services) that is responsible for radio astronomy. This Handbook is not intended as a source book on radio astronomy, but rather deals with such aspects of radio astronomy that are relevant to frequency coordination as the management of radio spectrum usage in order to minimize interference

between radio communication services.

In dit boek worden talloze pictogrammen met tips, bijzonderheden, 'geheimpjes', technische info en andere informatie gegeven. Met verwijzingen naar allerlei websites en te downloaden materiaal. Tevens bevat het boek informatie over zelf sterrenkijken, verenigingen, sterrenwachten etc.

Observing variable stars is one of the major contributions amateur astronomers make to science. There are 36,000 variable stars listed in the General Catalogue of Variable Stars, so it is clearly impossible for the limited number of professional observatories to target even the majority of them. That's where amateur astronomers come in - thousands of them turning their telescopes to the sky every night. Variable star observing is the most popular of "real science" activities for amateurs, and Gerry Good's book provides everything needed. The first part of the book provides a highly detailed account of the various classes of variable star, with examples, illustrations and physical descriptions. The second section covers practical aspects of observing, everything from preparation and planning, through observing techniques, to data management and reduction.

A clear and concise practical handbook on all aspects of infrared astronomy, for graduate students, researchers and keen amateurs. The Moon boasts an unexpected variety of landscapes - including volcanic features, sinuous valleys and ghost craters - which are readily visible from Earth. This practical guide explains and demonstrates how you can capture impressive images of our nearest neighbour in space using a variety of different techniques. As the first guide to be dedicated to modern lunar imaging, this volume offers an in-depth and illustrated approach to common optics, the essentials of digital images, imaging devices, and image processing software. Even in light-polluted areas, the countless features and finest details of the Moon can be captured by following the instructions in this comprehensive and accessible guide. Covering equipment ranging from smartphones and DSLRs to specialist planetary cameras, whether you are a novice without a telescope, an amateur developing your skills in imaging, or an experienced astrophotographer, you will benefit from the hints, insights and expertise within.

Several decades have elapsed since the publication of any similar book in the German language. The lack of such a book has been felt keenly by all friends of astronomy. In our space age, astronomical knowledge arouses public interest more and more. Practical observation at the telescope depends more than anything else on such knowledge. The educational value of such a training is undisputed. On the other hand, the work of the amateur astronomer can also contribute essentially to the work of the professionals. It is from these points of view that this handbook aims to help with versatile advice. At the same time, the book intends to show the wide range of applied astronomy, as it presents itself to the friend of the stars; in mathematical-physical fields, in precision mechanics and optics, and last but not least in the area of social relations. Beyond the circle of amateur astronomers the book is addressed to lecturers, teachers, students and pupils. It wishes to serve them as a guide to "astronomical experiments", which we suggest should be performed in primary and secondary schools, specialist colleges, and extramural courses.

Charge-Coupled Devices (CCDs) are the state-of-the-art detector in many fields of observational science. Updated to include all of the latest developments in CCDs, this second edition of the Handbook of CCD Astronomy is a concise and accessible reference on all practical aspects of using CCDs. Starting with their electronic workings, it discusses their basic characteristics and then gives methods and examples of how to determine these values. While the book focuses on

the use of CCDs in professional observational astronomy, advanced amateur astronomers, and researchers in physics, chemistry, medical imaging, and remote sensing will also find it very valuable. Tables of useful and hard-to-find data, key practical equations, and new exercises round off the book and ensure that it provides an ideal introduction to the practical use of CCDs for graduate students, and a handy reference for more experienced users.

Wspc Handbook Of Astronomical Instrumentation, The (In 5 Volumes)World Scientific

Here is a one-volume guide to just about everything computer-related for amateur astronomers! Today's amateur astronomy is inextricably linked to personal computers. Computer-controlled "go-to" telescopes are inexpensive. CCD and webcam imaging make intensive use of the technology for capturing and processing images. Planetarium software provides information and an easy interface for telescopes. The Internet offers links to other astronomers, information, and software. The list goes on and on. Find out here how to choose the best planetarium program: are commercial versions really better than freeware? Learn how to optimise a go-to telescope, or connect it to a lap-top. Discover how to choose the best webcam and use it with your telescope. Create a mosaic of the Moon, or high-resolution images of the planets... Astronomy with a Home Computer is designed for every amateur astronomer who owns a home computer, whether it is running Microsoft Windows, Mac O/S or Linux. It doesn't matter what kind of telescope you own either - a small refractor is just as useful as a big "go-to" SCT for most of the projects in this book.

"How to Observe the Sun Safely, 2nd Edition" gives all the basic information and advice the amateur astronomer needs to get started in observing our own ever-fascinating star. Unlike many other astronomical objects, you do not need a large telescope or expensive equipment to observe the Sun. And it is possible to take excellent pictures of the Sun with today's low-cost digital cameras! This title concentrates on providing practical, on-the-spot advice to the amateur astronomer who is interested in observing the Sun, using commercially available equipment. This book surveys what is visible on the Sun, before describing how to record solar features and measure solar activity levels. There is also an account of how to use H-alpha and Calcium-K filters to observe and record prominences and other features of the solar chromosphere, the Sun's inner atmosphere. Because we are just entering a period of high activity on the Sun, following a long, quiet period, many more amateur astronomers will become interested in observing it. The second edition includes an update of Chapter 2 to reflect advances in solar observing equipment since 2002, and a section on building a solar projection box, originally included in the main body of this chapter has been moved to Appendix A. Also Chapter 6 thru 8 have been completely revised to give amateur astronomers advice on how to use film to photograph the Sun, and how to use digital cameras. This new edition also includes more than twice as many illustrations as the first and almost half of them new images.

Review of astronomical photometry for graduate students, researchers and advanced amateurs in practical and observational astronomy.

55% new material in the latest edition of this “must-have for students and practitioners of image & video processing! This Handbook is intended to serve as the basic reference point on image and video processing, in the field, in the research laboratory, and in the classroom. Each chapter has been written by carefully selected, distinguished experts specializing in that topic and carefully reviewed by the Editor, Al Bovik, ensuring that the greatest depth of understanding be communicated to the reader. Coverage includes introductory, intermediate and advanced topics and as such, this book serves equally well as classroom textbook as reference resource.

- Provides practicing engineers and students with a highly accessible resource for learning and using image/video processing theory and algorithms
- Includes a new chapter on image processing education, which should prove invaluable for those developing or modifying their curricula
- Covers the various image and video processing standards that exist and are emerging, driving today’s explosive industry
- Offers an understanding of what images are, how they are modeled, and gives an introduction to how they are perceived
- Introduces the necessary, practical background to allow engineering students to acquire and process their own digital image or video data
- Culminates with a diverse set of applications chapters, covered in sufficient depth to serve as extensible models to the reader’s own potential applications

About the Editor... Al Bovik is the Cullen Trust for Higher Education Endowed Professor at The University of Texas at Austin, where he is the Director of the Laboratory for Image and Video Engineering (LIVE). He has published over 400 technical articles in the general area of image and video processing and holds two U.S. patents. Dr. Bovik was Distinguished Lecturer of the IEEE Signal Processing Society (2000), received the IEEE Signal Processing Society Meritorious Service Award (1998), the IEEE Third Millennium Medal (2000), and twice was a two-time Honorable Mention winner of the international Pattern Recognition Society Award. He is a Fellow of the IEEE, was Editor-in-Chief, of the IEEE Transactions on Image Processing (1996-2002), has served on and continues to serve on many other professional boards and panels, and was the Founding General Chairman of the IEEE International Conference on Image Processing which was held in Austin, Texas in 1994. \* No other resource for image and video processing contains the same breadth of up-to-date coverage \* Each chapter written by one or several of the top experts working in that area \* Includes all essential mathematics, techniques, and algorithms for every type of image and video processing used by electrical engineers, computer scientists, internet developers, bioengineers, and scientists in various, image-intensive disciplines

Observational Astrophysics follows the general outline of an astrophysics undergraduate curriculum targeting practical observing information to what will be covered at the university level. This includes the basics of optics and coordinate

systems to the technical details of CCD imaging, photometry, spectrography and radio astronomy. General enough to be used by students at a variety of institutions and advanced enough to be far more useful than observing guides targeted at amateurs, the author provides a comprehensive and up-to-date treatment of observational astrophysics at undergraduate level to be used with a university's teaching telescope. The practical approach takes the reader from basic first year techniques to those required for a final year project. Using this textbook as a resource, students can easily become conversant in the practical aspects of astrophysics in the field as opposed to the classroom.

"What our teachers don't tell us in school is that we will spend most of our scientific or engineering career in front of computers, trying to beat them into submission." This extract from the Preface sets the style for this highly readable book. It is packed with information covering data representations, the pitfalls of computer arithmetic, and a variety of widely-used representations and standards. Each chapter begins with a detailed contents list and finishes with a brief summary of the topics presented and the whole is rounded off with a glossary and index. Novices will enjoy an occasionally lighthearted read from start to finish, while even the most experienced computer users who use the book as a reference will discover useful nuggets of information. A structured array of data sets are available online via the TELOS Web site, [www.telospub.com](http://www.telospub.com), which will provide users with direct digital access to information they might need in working through the book.

First published in 1992, The Image Processing Handbook not only set the standard for professional references in this field, but also provided the first text truly accessible to undergraduate students and non-specialists. Each subsequent edition has reflected the continuing rapid advances in image processing, and the fourth edition is no exception. Since comet Shoemaker-Levy collided with the planet Jupiter with stupendous force in 1994 there has been an upsurge of amateur interest in comets. Most comets are first discovered by amateur astronomers because there are so many amateurs looking for them, and techniques and instruments have improved dramatically in the past few years. After a short but detailed introduction to the comets themselves Nick James and Gerald North describe comet hunting, photographing and imaging comets, and digital image processing. The use of computers for orbital calculations and even helping to discover new comets is given a full chapter, as are advanced techniques including comet photometry and spectroscopy. This comprehensive book has an accompanying CD-ROM and is at once a "primer" for comet hunters and a reference text for more advanced amateur astronomers.

Deep-Sky Video Astronomy is a concise guide to using modern integrating video cameras for deep-sky viewing and imaging with the kinds of modest telescopes available commercially to amateur astronomers. It includes an introduction and a brief history of the technology, camera types, etc. The authors then examine the pros and cons of this

unrefrigerated yet highly efficient technology, which is already beginning to compete with expensive astronomical cooled-chip CCD cameras in quality and ease of use. There is a thorough examination of accessories used to achieve particular results. Examples are focal reducers, Barlow lenses, and optical filters. However, the focus is mostly on the practical side of creating beautiful and detailed astronomical portraits using image-stacking software, enhancement tools like PhotoShop, and creating color images with a black-and-white camera. Practical step-by-step examples supported by tried and trusted tips show how to achieve the best possible deep-sky video portrait!

Analytical Archaeometry describes this interesting and challenging field of research - on the border between natural sciences (chemistry, spectroscopy, biology, geology) and humanities (archaeology, (art-)history, conservation sciences). It fills the gap between these two areas whilst focussing on the analytical aspects of this research field. The first part of the book studies the main analytical techniques used in this research field. The second part expands from the different types of materials usually encountered, and the final part is organised around a series of typical research questions. The book is not only focussed on archaeological materials, but is also accessible to a broader lay audience. Overall the book is clearly structured and gives insight into different approaches to the study of analytical providing extensive discussion on a wide range of techniques, materials, questions and applications. Due to the advances in analytical instrumentation and applications in this field, it is important to have all this information merged together. Academics as well as professionals in archaeology, art history, museum labs and conservation science will find this an invaluable reference source ensuring the reader is provided with the latest progress in this research field.

At first glance, the challenge of astrophotography may appear daunting. But not only are spectacular results possible, they are easy to learn with the step-by-step instructions provided in Stephan Seip's Digital Astrophotography: A Guide to Capturing the Cosmos. Today, amateurs can produce images that only twenty years ago a large professional observatory would have been proud of; and this book shows you how. Learn how to: Set up your camera for optimum results Focus your camera for razor-sharp images Take beautiful night shots with a simple compact digital camera, a tripod, and a telescope Use a DSLR camera to shoot the Sun, Moon, stars, star clusters, and nebulae through your telescope Get brilliant images of planets with a Webcam Capture remote galaxies with a charge-coupled device (CCD) camera just like a pro Also included are lessons on the processing that is done in the "studio" after your shoot, including how to: Shoot RAW format images and improve them with calibration frames Take short exposures of faint deep-sky objects and combine them into a longer exposure Perform brightness, contrast, and color correction Make corrections to correct for vignetting and uneven field illumination Process your images for stunning results Equipment requirements for astrophotography range from nothing but a simple camera and tripod to a multi-thousand dollar computer controlled

telescope equipped with a CCD auto-guider and separate guide-scope. Researching the best equipment for your needs is a task in itself. Seip helps you to sort out which cameras are best for the various celestial objects, what to look for when buying a camera, and what accessories you really need. The rewards of this fascinating hobby, as the author says, "Grants you unforgettable hours under the night sky; it allows you to produce aesthetically rewarding and lasting results. Astrophotography is a love-match between physics, photography, art, and digital image processing. It is exciting!" You too can follow in the steps of the great astronomers such as Hipparchus, Galileo, Kepler and Hubble, who all contributed so much to our modern understanding of the cosmos. This book gives the student or amateur astronomer the following tools to replicate some of these seminal observations from their own homes: With your own eyes: Use your own observations and measurements to discover and confirm the phenomena of the seasons, the analemma and the equation of time, the logic behind celestial coordinates, and even the precession of the equinoxes. With a consumer-grade digital camera: Record the changing brightness of an eclipsing binary star and show that a pulsating star changes color as it brightens and dims. Add an inexpensive diffraction grating to your camera and see the variety of spectral features in the stars, and demonstrate that the Sun's spectrum is similar to one particular type of stellar spectrum. With a backyard telescope: Add a CCD imager and you can measure the scale of the Solar System and the distance to a nearby star. You could even measure the distance to another galaxy and observe the cosmological redshift of the expanding universe. *Astronomical Discoveries You Can Make, Too!* doesn't just tell you about the development of astronomy; it shows you how to discover for yourself the essential features of the universe.

Digital SLR cameras have made it easier than ever before to photograph the night sky. Whether you're a beginner, nature photographer, or serious astronomer, this is the definitive handbook to capturing the heavens. Starting with simple projects for beginners such as cameras on tripods, it then moves onto more advanced projects including telescope photography and methods of astronomical research. With 80% revised and updated material, this new edition covers nightscapes, eclipses, using cameras with sky trackers and telescopes, and tools for identifying celestial objects and investigating them scientifically. Image processing is discussed in detail, with worked examples from three popular software packages - Nebulosity, MaxIm DL, and PixInsight. Rather than taking a recipe-book approach, Covington explains how your equipment works as well as offering advice on many practical considerations, such as choice of set-up and the testing of lenses, making this a comprehensive guide for anyone involved in astrophotography.

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