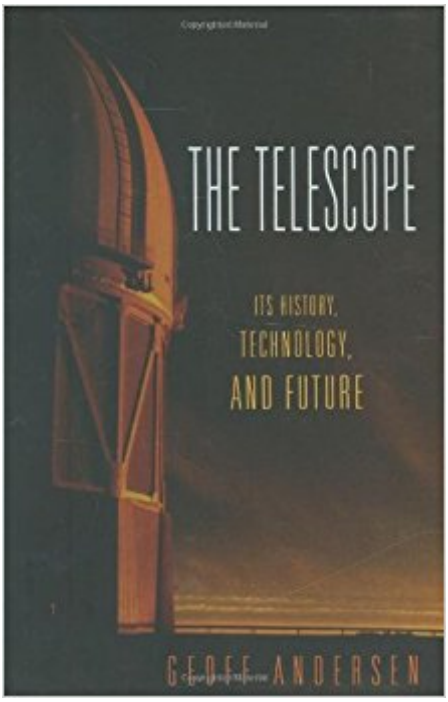
The Telescope: Its History, Technology, And Future



Synopsis

In the four centuries since its invention, the telescope has transformed how humans view the universe and their place in it. But what do most of us know about telescopes themselves--their history, how they work, what they are being used for today, or what the next generation of billion-dollar telescopes will look like? In The Telescope, Geoff Andersen fills in all the details for us in an accessible, nontechnical way that will appeal to the amateur astronomer and anyone else who has been more than a little curious about this amazing instrument. The book covers every aspect of optical telescopes--from the humblest backyard setup, to state-of-the-art observatories, to the Hubble Space Telescope and spy satellites. Chapters describe the development, design, and operation of telescopes; how observatories are sited, engineered, and built; variations such as solar and liquid-mirror telescopes; and some of the key astronomical discoveries telescopes have made possible. And there are plenty of surprises along the way. We learn, for example, that most of today's professional astronomers never even look through their own telescopes, relying instead on digital imaging, measurement, and analysis--or even remote computer control of a night-shrouded observatory on the other side of the Earth. But, as The Telescope explains, these magnificent instruments do more than simply peer into space. They project and receive laser beams--for communicating, mapping, and making detailed observations of the Earth. They also look down at us from spy satellites, providing secret images to intelligence agencies--and, increasingly, giving a curious public access to more pedestrian images. The Telescope is the ideal introduction to a fascinating instrument that has taught us so much--but that most of us know so little about.

Book Information

Hardcover: 256 pages
Publisher: Princeton University Press; First Edition edition (May 27, 2007)
Language: English
ISBN-10: 0691129797
ISBN-13: 978-0691129792
Product Dimensions: 6.5 x 1 x 9.5 inches
Shipping Weight: 1.2 pounds (View shipping rates and policies)
Average Customer Review: 4.3 out of 5 stars 9 customer reviews
Best Sellers Rank: #1,023,805 in Books (See Top 100 in Books) #23 inÃ Â Books > Science & Math > Astronomy & Space Science > Telescopes #110 inÃ Â Books > Science & Math > Experiments, Instruments & Measurement > Scientific Instruments #1078 inÃ Â Books >

Customer Reviews

"Sets a high standard....The book is at its best when discussing modern telescopes."--Martin Ince, The Times Higher Education Supplement"As we approach the 400th anniversary of Hans Lippershay's 1608 patent for a refractor telescope, Andersen offers an accessible, nontechnical account of instruments that show us distant objects...There are short but informative discussions of interferometry and advanced telescope techniques."--Science"A great guide to astronomy's indispensable tool."--Ian Glass, BBC Sky at Night"A pleasant, lightweight, non-technical, and readable account...Although the book concentrates on the astronomical uses of telescopes, there is an interesting section on their use for surveillance (i.e. as spy cameras)."--C.R. Kitchin, Astronomy Now"A thorough, up-to-date and largely non- technical account spanning four centuries and including information for amateurs who want to establish their own observatory or even make their own telescope."--Gerry Rising, Buffalo News"Geoff Andersen does what at first glance seems impossible: justice to the subject...He escorts you through time, from the first telescope to proposed giants like the Overwhelmingly Large Telescope...The book's real gem is Andersen's voice. His knack of writing personal and historical tidbits in a humorous, natural dialog highlights his passion for telescopes...The Telescope provides endless food for thought--even for us professional astronomers."--Monica Bobra, Sky & Telescope"Andersen's title suggests that this is one of many how-to books about telescopes--not so! His focus is the history of the telescope--the invention that helped spark the Renaissance...Andersen spins an engaging story that can be easily read in one afternoon by any layperson. It is well worth a space on any science buff's shelf."--T.D. Oswalt, Choice"This popular science book is of interest to anyone who wishes to learn more about astronomy and telescopes. It is well written, fascinating and delightful to read. The principles of telescope design are clearly explained with just enough detail to allow the interested reader to understand the basic concepts."--OPN Optics & Photonics News"This book not only covers the history of the telescope but, more important, it describes the most recent breakthroughs in optical technology and engineering. It also describes the nature of light in detail, without having the disadvantages of a textbook on physics."--Charles Hughes, Twenty-first Century Science and Technology"The book covers everything from the history and workings of the very earliest telescopes to the science behind modern techniques such as interferometry. If you have ever wondered why telescopes need to be sited on remote mountain tops, or why they have to be so big, Anderson--who is an expert in telescope design with the US Air Force Academy--will tell you. The

level of technical detail should be satisfying enough for even the professional astronomer, but the book is also arranged so that non-experts can happily skip any sections that get too technical without losing track of the narrative."--Physics World"Although not apparently aimed at the academic market, it would be a worthwhile read for undergraduate students wanting to gain an overview of modern techniques in optical astronomy."--Fred Watson, Observatory Magazine"Written in a clear and accessible style, most of Andersen’s story will be familiar to historians and amateur astronomers, but perhaps it will prove useful for a general reader who is looking for a gentle introduction to more detailed and comprehensive treatments."--W. Patrick McCray, Technology and Culture"I really enjoyed the great detail put into the book and the sure knowledge of the author--a research physicist who works for the United States Air Force Academy. The book is aimed at those who already know some astronomy, but who yearn to know more about this fascinating field. I . . . recommend it strongly."--David Mannion, Popular Astronomy

"As we approach the International Year of Astronomy, the four-hundredth anniversary of Galileo’s turning a telescope on the heavens, Geoff Andersen has produced an interesting book on the centuries’ progress in optical observations. Chapters on telescopes used for surveillance and on a series of astronomical discoveries add interest beyond discussions of the telescopes themselves."--Jay M. Pasachoff, Field Memorial Professor of Astronomy, Williams College"This book covers both the science of astronomy and the telescope technology that underlies astronomical discoveries. This balance enhances our appreciation of telescopes as engineering marvels, and it increases our understanding of what the operators of these instruments are trying to accomplish."--Richard Kron, University of Chicago"The Telescope is an extensive and thorough look at the telescope in all its modern variants, and the only book like it that I know of. I enjoyed reading it, and I’m sure that many others will too."--Robert J. Vanderbei, Princeton University

This is an odd book. It was written by an Aussie who now works at the US Air Force Academy. It was originally published in Australia and New Zealand, then republished by Princeton University Press. And I can’t figure out who the target reader is.It is a short book, a bit over 200 pages, broken up into short chapters with magazine article level treatments of various subjects. Despite its brevity, there are many times the author claims he could write so much more if he only had the space. He often alludes to being much more knowledgeable than the reader, yet some of the chapters don’t quite get it right, and others give the impression he is simply digesting what he has read in other popular treatments.He spends a few pages on astronomy before telescopes, then a few pages on

the early history of the telescope. Both subjects are covered in more detail in many texts and popular astronomy books. These are followed by a brief sketch of how different types of telescopes work from a geometrical optics standpoint, and then a chapter called "The perfect telescope", which is really a very short, very introductory discussion of diffraction. A chapter with the cute but misleading title "When good telescopes go bad" then discusses why real telescopes can't be built to perform as well as reading a few page article on telescopes would suggest. (Aberrations and all that.)Andersen then moves into the sensors that record what the telescope is looking at. One chapter skims over cameras, spectrometers, photometers, and polarimeters. He then has a chapter on interferometry. While written at roughly the high school physics level, it starts with the warning "While interferometry is the next big thing for telescopes, it is a complex subject, so some readers may want to skip over the material." I doubt many people would make it this far into the book without being able to understand the very basic treatment that follows.The cute title "So you want to build an observatory?" briefly covers the difficulty of building a large mirror, choosing a site, and the mechanical engineering of a large device. These appear to be topics he wanted in the book but didn't know where to put them. Next we are in space with the Hubble Space Telescope. If you don't know the history of how they screwed up the primary mirror this includes a relatively good brief history. But the overall history of Hubble here is thin, and there are better treatments.He's then off on "Advanced telescope techniques", which covers lightweighting, active optics, segmented primaries, adaptive optics, and laser guide stars. But what is on offer is a series of vignettes thrown together rather than integrated into the areas where they enable telescope advancement.Next come a couple of chapters on applications other than astronomy for telescopes. Laser communication and remote sensing are tossed together in the first. The very first sentence claims "Telescopes are instruments for gathering and intensifying light." Telescopes concentrate light; "intensify" means something else. The next page claims "This increased waveform complexity (called bandwidth) ...". Complexity and bandwidth are different things. You can transmit a very simple signal at very high bandwidth (for example, a sine wave), or a very complex signal at very low bandwidth (for example, Beethoven's Ninth Symphony). (In the latter case you won't be enjoying the music in real time, but you can transmit it at low bandwidth with suitable patience. And for those old enough to remember, an LP is a pretty low bandwidth medium.)The surveillance section is truly odd. Andersen has apparently surfed the internet and applied flights of fancy to imagine what US spy satellites can do. While it is possible that his speculation about satellite capability is correct (although it seems far fetched), his assertion that such a satellite's altitude has "a reasonable value of 200 km" is hard to swallow. At that altitude there is enough residual atmospheric drag that nothing stays up very long.

He finishes the surveillance section with laser weapons. Yes, they use telescopes. But I don’t see how they are tied to surveillance.Next comes another mishmash called "Non-traditional observatories". First he talks about liquid mirror telescopes, which fit the title. But then he goes into solar telescopes which are, to my thinking, quite traditional. He mentions observations back to 1609, and includes a picture of a dedicated solar telescope (the 150 ft tower on Mt Wilson) finished in 1912! After explaining that the "emphasis of this book has been on optical telescopes, as the extension into other parts of the spectrum would constitute an overwhelming amount of subject matter", he then describes observing the Cherenkov radiation caused by high energy gamma rays entering the atmosphere. I suppose it can at least be argued that conventional telescopes are used for this purpose. But this is followed with a discussion of detecting gravity waves! Gravity waves aren’t even light, although the detectors do use laser interferometry to (it is hoped) detect them. There is no room in his short book to discuss radio or x-ray telescopes at all, but he finds room for gravity wave detection? I think he just writes about what interests him, which is his prerogative, just don’t expect a complete or rigorous coverage of "The Telescope".He concludes with brief discussions of some recent discoveries in astronomy and some future telescope projects.While there are some interesting bits to this book, there is no unified story. There are also some things he doesn’t quite get right. On the other hand, I can’t think of another book that gives a better short introduction to the topics he choses to cover. There are certainly better books on astronomical telescopes, but they give little or no coverage to other uses for telescopes. Andersen’s coverage is nether very complete nor always accurate, but it is another viewpoint. I didn’t personally learn much from this book, but some readers might. Just approach with caution.

A nicely done book. Organization is a bit odd, but workable. The only reason i couldn’t give it 5 stars was it omits the two GREAT telescope designs of the 20th century that ultimately solved most of the observer’s problems (both are only briefly mentioned), the Ritchey-Chretien aplanatic Cassegrain and the Schmidt catadioptric camera. I have yet to find a good general audience treatment of these two great designs, or the stories of the eccentric geniuses that created them...Still a very good book and recommended...

This book provided an interesting and informative overview of many topics. Cutting edge modern telescopes are truly engineering marvels, and the author does a good job highlighting this. This book substantially enhanced my understanding of telescope optics including what "diffraction-limited seeing" means and how adaptive optics work. The chapters on the challenges of constructing not

just the optics but the entire observatory structure/system for a large telescope is very interesting. I also think the chapters on uses for telescopes other than astronomy are particularly valuable because those subjects are rarely considered/presented.Because I found all the information presented so interesting, I wish he had included more detail in some places. It seems that the author was so afraid of scaring off the non-technical reader that he didn't put in enough detail to satisfy people who might actually be interested in this book in the first place (I am an engineer but have no background in telescopes or optics whatsoever). This is perhaps related to the one major drawback of this book: the author's condescending tone. Throughout the book, he makes numerous comments about how you would have to be very clever to understand the truth behind what he is saying and so he'll be kind and spare you that awful trouble! If you are reading this book, you are probably interested in learning more technical information. No doubt there must be simplification for those who are getting a first introduction to these topics, but that hardly justifies the patronizing condescension in the author's tone.

financial technology fintech, Fintech Innovation, Fintech Gold, ... technology,equity crowdfunding) (Volume 1) FINTECH: Simple and Easy Guide to Financial Technology(Fin Tech, Fintech Bitcoin, financial technology fintech, Fintech Innovation, Fintech Gold, Financial services technology,equity crowdfunding) Seeing and Believing: A Short History of the Telescope and How we Look at the Universe World History: Ancient History, American History, and the History of Europe, Russia, China, India, World War 1 and 2, Vietnam War, Cold War, Medicine, Science and Technology