



Preface

Welcome to *Scientific Astrophotography: How Amateurs Can Generate and Use Professional Imaging Data*. I started developing this book in the summer of 2011 to meet the needs of the Rappahannock Astronomy Club (raclub.org) membership for a practical, how-to guide for learning and using the charge-coupled device (CCD) cameras available today for astrophotography. One of the primary missions of our club is to be an enabler, providing access to tools and educational materials that enhance the members' ability to experience all that is offered today in this "golden age" of amateur astronomy. This book was developed to provide the tools and information to enable the RAClub membership to move into the exciting world of scientific astrophotography. I hope this book fulfills those needs for astronomy clubs and amateur astronomers everywhere.

Intended for the beginner and the experienced astrophotographer alike, this book provides the basic material necessary to understand the factors that contribute to taking excellent astrophotographs for use in collecting scientific data. The book also provides step-by-step procedures and exercises to gain the skills needed to perform at the level necessary to obtain professional level scientific data. For the experienced astrophotographer, this book provides the distilled knowledge and procedures needed to quickly get you up and running with new configurations and instruments in the field with your telescope. I took it upon myself to document the highlights of the myriad books, magazines, articles, Internet sites, and owner's manuals available to the beginning astrophotographer. I also chose to take an engineering approach to the issue of learning how to design, build, and operate an Astronomical Imaging System (AIS) to perform scientific astrophotography. I thought that this approach would provide the necessary discipline and structure to minimize an all-too-frequent result—the frustrated beginning astrophotographer who puts his equipment in the back of the closet after not being able to progress past the initial disappointing levels of quality. It is also important to recognize that

the material and techniques in this book are as applicable to obtaining “pretty picture” astrophotographs as they are to obtaining scientific imaging data.

As I did further research for this book, and adjusted the contents accordingly, I recognized that writing it gave me the opportunity to document my approach to building my own personal observatory and AIS. I had always considered my initial purchases of equipment and tools as a necessity for me to learn the diverse sets of ideas, techniques, skills, and knowledge available to the amateur astronomer today. In this respect, my initial AIS *is* a prototype learning environment for scientific imaging. This book documents my journey over the past few years in learning how to perform astrophotography for scientific purposes. It allows me to focus on what is necessary going forward, the engineering issues associated with designing my observing program, and the AIS needed to cost-effectively implement and pursue that program. I am confident that it will also fill that need for the reader.

My observing experience since my early teens has been mainly in the visual realm. When I first started, I did some very rudimentary astrophotography using eyepiece projection and a Polaroid camera. Because of the very modest instruments that I had acquired, my observing focused on the bright objects in our solar system, such as the Moon, Jupiter, and Saturn. I still fondly remember setting up my 60-mm Tasco on its very impressive manual German equatorial mount (GEM). I graduated to a larger telescope during the late 1980s (a Meade 10-in. 2120 LX5 Schmidt-Cassegrain Telescope (SCT)) acquired through Company 7 (a dealer located in Laurel, Maryland), still only using this telescope visually.

Through all the years since then, I have always wanted to learn how to image minor planets (asteroids), determine their position, and calculate their orbits. That to me was the ultimate in practicing science for the amateur astronomer. It was not until the fall of 2008 that I was able to find the time to get into the latest astronomical technology and start down the path of learning what it takes to track down those wily asteroids and, in the process, learn how to create excellent astrophotographs. So just 4 years ago, I was a beginner as many of you are now. You may have followed the same path as I did or may have started out wanting to do astrophotography as your primary goal. Either way, this book is intended to help you reach your astrophotography goals.

Some aspects of scientific imaging can be unforgiving when trying to reach and maintain a high level of quality. However, although the route to high-quality imaging can be a difficult one, if the road taken is well traveled and a disciplined approach is maintained, then all it takes is a little patience, stick-to-itiveness, and practice. Spectacular success is possible for those who go down that well-traveled road.

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