Book Review

Spectroscopic Instrumentation: Fundamentals and Guidelines for Astronomers by Thomas Eversberg and Klaus Vollmann (Springer Praxis Books, Heidelberg, 2015)

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Many textbooks on specialized areas of Physics and Astronomy have their origins in courses taught to advanced students and consequently are often concise and limited in scope. This book, on the other hand, is essentially a journal of the adventures of two serious amateur astronomers who have collected in a relatively large tome (653 pages) both the basic principles of geometric and physical optics (usually a prerequisite for an advanced course in spectroscopy) and applications to both designing and building spectroscopic instruments. Each chapter begins with “A Short Story” journaling the events that led to the focus on the topic of that chapter.

The first two chapters following the prologue review basic physical and geometric optics. They get off to a rocky start confusing diffraction and refraction and inventing a term “index of diffraction” in Snell’s Law which they call the “Law of Diffraction”. Otherwise, they present a thorough background of equations to describe the functioning of a grating spectrograph using refractive optics. Chapter 3 includes a useful discussion of commercially available ray-tracing software and the evaluation and correction of optical aberrations.

The basic spectrograph designs are given in Chapter 4 and the two following chapters are devoted exclusively to echelle spectrographs (although the title of Chapter 6 uses the word “spectrometer” instead of “spectrograph”). The emphasis here is on refracting optical systems as these can be made

relatively compact and thus suitable for small telescopes. Reflecting spectrographs are introduced in Chapter 7 along with a lengthy discussion of the aberrations associated with reflecting surfaces that could have easily been included in Chapter 3. Examples of existing spectrographs on major ground-based telescopes and in space observatories are given in Chapter 8. This chapter is marred by the title of Sec. 8.5, “Spectrographs with Spherical Convex Gratings”, although spherical “concave” gratings are properly discussed in Sec. 7.7. Section 8.5 also calls the Rowland circle mount (Sec. 7.7) a “Rowland cycle”. These are disturbing errors for a book intending to serve as reference work. This section is one of the few instances where instruments working outside the visible spectral range are mentioned in the book. The table of instrument parameters for COS (Sec. 8.5.2) inadvertently reproduces all but one of the parameters for FUSE (Sec. 8.5.1).

The remaining chapters discuss diverse topics including image slicers, CCD detectors (though no other photoelectric detector), fiber optics, data reduction, statistical analysis, and polarimetry. A chapter on the spectroscopy of hot stars, a scientific interest of the authors that is used as an example of the contributions to astronomy that can be made by amateurs, is out of place here. There are several appendices, the longest of which is a description of the MIDAS software package, which is popular with some European astronomers.

The audience for this book is not the professional astronomer, the likely reader of this review, but serious amateur astronomers for whom it collects a myriad amount of useful information. In the Preface, the authors state that “our text is really nothing more than a collection and organized combination of

already existing publications,” and despite some flaws, that is exactly what it is.

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