

discussion of the work of Levin and his collaborators in the presentation of thundercloud electrification, the rather sketchy treatment of the ionosphere and the decision to leave reconnection out of the discussion of magnetospheric substorms. Yet on deeper perusal these defects become marginal in the light of the success of the author in building an intellectual bridge between different disciplines. His insightful treatment of basic problems based on simplified analytical treatments is indeed the correct prescription for illustrating matters for which the specialists have developed complicated numerical schemes. His book is the right place for the atmospheric electricist and the magnetospheric plasmacist to learn about each others fields, but not necessarily about their own. In terms of the goal of broadening of horizons, the book fills a definite need for active workers and advanced graduate students in both fields. I would, however, hesitate to recommend it for undergraduates or beginning graduate students unless it is made clear to them that the book cannot replace specialized textbooks in either area. This style of writing is clear and concise and the graphic material is both well presented and enlightening. The author and publisher are to be commended for making this book available to the community.

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A. EVIATAR

B. Guillaud-Saumur and O. Réthoré, *Les Objets de Messier, Repérage, Observation, Photographie*, 248 pp., Masson, Paris, 1985, 110 Francs.

A description, with finding charts, positions, magnitudes, colours of all Messier objects; approximately 2 pages per object, with a 36 pages introduction.

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Richard N. Thomas, *Stellar Atmospheric Structural Patterns*, CNRS–NASA Monograph Series on Nonthermal Phenomena in Stellar Atmospheres, NASA Special Publication SP–471, 1983, xxxiv + 369 pp., including summary in French, reference list and index, CNRS Paris, NASA Washington, Price FF.100.

This is an unusual book written by an unusual astrophysicist. It calls for unusual advice from the reviewer: do it yourself – if you are interested in stellar astrophysics, then read this book and formulate your own review! Some readers will highly appreciate the book while others will strongly disagree with it; many readers will like some sections and dislike others; most readers will be bewildered if not baffled by various viewpoints and the way they are formulated; but all readers should find inspiration in this book for future research, from like and dislike alike.

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The book is a vintage Thomasian mix of pure wisdoms and deep physical insights, provocative ideas and wide vistas, penetrative evaluations and clever interpretations; but also of overly selective quotations, tendentious misinterpretations, hobbies ridden to exhaustion, grudges elaborated into polemics, and minor points hammered into coffin nails; and all of these are provided in ThomasSpeak, 'Nebraskan Franglais', which is a terrible language with an opaque grammar and a dictionary hard to grasp. It would be easy to deride the whole book by quoting some of the more convoluted sentences and section headings, and many readers will be put off by the stylistic monstrosities and obtusities. Such negation should be rebutted, however; this book does not pose a question of take it or leave it, but it is required reading for anybody studying stellar atmospheres. It should not be discarded too easily; in fact, to quote an Australian expert, you will need to read it a dozen times before you will understand it – but do so, it will be worth the effort!

The book is intended as a background volume in the NASA–CNRS Monograph Series on nonthermal phenomena in stellar atmospheres, of which it is the fourth volume to appear, after 'The Sun as a Star', 'B-Stars With and Without Emission Lines' and 'The A-type Stars: Problems and Perspectives', and which will contain various further volumes. Thomas is the founding father and a major organiser in the realization of the series, which passing along the spectral types stresses the many phenomena by which actual stars show themselves not to be the simple spheres they were supposed to be, with just Milne–Eddington or Schuster–Schwarzschild photospheres in well-balanced equilibrium. With this volume Thomas has provided a highly personal guiding gospel to the whole series, with his own philosophies, findings, viewpoints, expectations, and much of his own research history. Walking across the HR-diagram, he surveys all the exceptions to the classical picture, convincingly demonstrating that exceptions are the rule, and that truly no star isn't an exception; that observational peculiarities requiring non-thermal modeling are not a second-order refinement necessary only for a few pathological stars, but that they are ubiquitous and require non-thermal physics right from the start, not as an add-on afterthought. This extensive and highly interesting observational review is given in Chapter 3; this chapter is best read first of all.

Thomas has split the book in three parts, of which Chapter 3 concludes Part I. Part II doesn't exist yet, but is promised as a separate volume discussing thermodynamics and gasdynamics. Part III is Thomas' recipe for future work. His basic thesis is that the radial structure of outer stellar atmospheres, described by radially-varying radiation fields, occupation densities and matter and energy fluxes is what we are after, and must be derived through self-consistent physics; but that details of lateral inhomogeneities and their processes are not required. For example, while solar fluxtubes may be channeling waves upwards to heat the corona, in Thomas' view the wave flux is important, taking energy here and dumping it there, but not the details of how fluxtubes do their wave guiding. Indeed, the book mentions magnetism only in passing, and all of magnetohydrodynamics, plasmaphysics and electrostatics are woefully absent, in utter contrast to "The Sun as a Star" which is magnetically flavored throughout. I regard this absence as the major flaw of the book – as a solar physicist I cannot accept the

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belief the lateral inhomogeneity is unimportant; rather, I expect that the physics of magnetism-induced structuring is so interesting that nature will have elaborated its rich possibilities and be reaping its fruits elsewhere too.

On the other hand, there is a major flaw of "The Sun as a Star" remedied by Thomas here, by including in Chapter 2 a detailed discussion of the intricacies of radiative transfer within the constraints of standard laterally-averaged 'one-dimensional' modeling. This is of interest to stellar workers in their current transition from LTE radiative-equilibrium to empirical NLTE model-building. However, this is not a chapter to be read without prior knowledge! A proper course for a fresh student would be first to study Mihalas' 'Stellar Atmospheres', then to read Athay's 'Radiation Transport in Spectral Lines' and the Vernazza, Avrett and Loeser papers for a flavour of real-life labour, and only then to appreciate Chapter 2 of this book. It reviews NLTE theory and standard modeling while evading numerical solutions through analytical arguments which often provide insight but sometimes confuse, imbedded in a historical sauce clearly intended as corrections to the above books. The chapter serves Thomas to set up today's standard modeling as a testing ground disproven observationally in Chapter 3, and therefore discarded in Part III. This seems too hard a verdict since undoubtedly the known complexities of radiative transfer have to be combined with yet unknown complexities from other domains of physics to describe a star properly. Standard modeling is surely not all in vain, even if Thomas makes it abundantly clear that it is very much incomplete, and undoubtedly often wildly off the mark.

Personal copies of this book and of the other volumes in this series can be requested by researchers who are active in the field from the Series Organizers: Dr. S. D. Jordan, Organizer NASA, code 682, NASA Goddard Space Flight Center, Greenbelt MD 20771, U.S.A., for astrophysicists in North and South America, and Dr. R. N. Thomas, Organizer CNRS, Institut d'Astrophysique, 98bis Boulevard Arago, F-75014 Paris, France, for astrophysicists in the rest of the world.

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Sidney C. Wolff, *The A-stars: Problems and Perspectives*, CNRS–NASA Monograph Series on Nonthermal Phenomena in Stellar Atmospheres, NASA Special Publication SP-463, 1983, xlv + 211 pp., including summary in English, summary in French, reference list, subject index and star index, CNRS – Paris, NASA – Washington.

This book was the third volume to appear in the CNRS–NASA Monograph Series on nonthermal phenomena in stellar atmospheres. In the dividing scheme adopted in this series which by and large follows spectral type, it fits between its sister volume 'B-stars With and Without Emission Lines' on the one hand and 'The Sun as a Star' and the yet-to-appear volume on F-, G-, and K-stars on the other hand. As with these other

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