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James B. Kaler

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JIM KALER is Professor Emeritus of Astronomy at the University of Illinois. He has published over 100 papers on the later stages of stellar evolution and has written more than a dozen books on stars, ranging from textbooks to popular books for general readers. His book *The Cambridge Encyclopedia of Stars* is a standard reference on stellar astronomy.

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STARS AND THEIR SPECTRA

An Introduction to the Spectral Sequence

Second Edition

JAMES B. KALER

Professor Emeritus of Astronomy

University of Illinois



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*To the memories of our parents,
Hazel (Susie) and Earl Kaler,
Belle and Tibor Grossman,
with eternal thanks*

Contents

| | |
|---|-----------------|
| <i>List of illustrations</i> | <i>page</i> xii |
| <i>List of tables and displays</i> | xvii |
| <i>Preface and acknowledgements</i> | xviii |
| 1 Stars | 1 |
| 1.1 The natures of stars | 3 |
| 1.2 Common names | 5 |
| 1.3 Location | 8 |
| 1.4 General catalogues | 10 |
| 1.5 Distances | 11 |
| 1.6 Starlight: the electromagnetic spectrum | 13 |
| 1.7 Brightnesses: apparent magnitudes | 16 |
| 1.8 Absolute magnitudes | 17 |
| 1.9 Color | 18 |
| 1.10 Bolometric magnitudes | 19 |
| 1.11 Variable stars | 19 |
| 1.12 Organization: the Galaxy | 20 |
| 1.13 Stellar motions | 22 |
| 1.14 Binary and multiple stars | 25 |
| 1.15 Clusters | 26 |
| 1.16 Physical properties: temperature | 27 |
| 1.17 Stellar masses | 30 |
| 1.18 Chemical compositions | 32 |
| 1.19 Structure | 33 |
| 1.20 Evolution | 34 |
| 2 Atoms and spectra | 36 |
| 2.1 Atoms | 36 |
| 2.2 Electronic structure and ions | 41 |
| 2.3 Isotopes | 42 |
| 2.4 Radioactivity | 42 |
| 2.5 Molecules | 43 |
| 2.6 Electron orbits and energy levels | 44 |
| 2.7 Emission spectra | 46 |
| 2.8 Absorption spectra | 48 |
| 2.9 The formation of spectra | 48 |
| 2.10 Continua | 50 |

viii Contents

| | | |
|----------|---|------------|
| 2.11 | Line structure and Kirchhoff's laws | 51 |
| 2.12 | Other atoms and ions | 53 |
| 2.13 | Molecular spectra | 56 |
| 2.14 | Astronomical spectra and chemical composition | 58 |
| 2.15 | The Doppler effect | 60 |
| 2.16 | The dispersion of light | 61 |
| 2.17 | The visual spectrograph | 64 |
| 2.18 | Variations on the theme | 67 |
| 3 | The spectral sequence | 70 |
| 3.1 | The Fraunhofer spectrum | 70 |
| 3.2 | Beginnings: Father Secchi | 72 |
| 3.3 | The Harvard system | 73 |
| 3.4 | Completion of the classic sequence | 82 |
| 3.5 | The HR diagram | 85 |
| 3.6 | Two-dimensional classification: Morgan and Keenan | 85 |
| 3.7 | Numbers | 92 |
| 3.8 | A new ending: L and T | 93 |
| 3.9 | The third dimension | 96 |
| 3.10 | Physical basis of the sequence | 96 |
| 3.11 | Expressions of the HR diagram | 100 |
| 4 | The M stars: red supergiants to dwarfs | 104 |
| 4.1 | Spectra | 105 |
| 4.2 | Carbon stars | 108 |
| 4.3 | Dimension | 113 |
| 4.4 | Temperature | 115 |
| 4.5 | Luminosity, color, and mass | 117 |
| 4.6 | Supergiant variables | 118 |
| 4.7 | Miras | 118 |
| 4.8 | Mass loss | 121 |
| 4.9 | OH/IR and carbon stars | 122 |
| 4.10 | Chemical alterations | 125 |
| 4.11 | The M dwarfs | 126 |
| 4.12 | Activity and flares | 127 |
| 4.13 | Subdwarfs | 129 |
| 4.14 | Companions | 130 |
| 5 | Descending the staircase: class L | 132 |
| 5.1 | Magnitudes, surveys, and names | 132 |
| 5.2 | Spectra and classification | 133 |
| 5.3 | Temperature and luminosity | 135 |
| 5.4 | Chemistry | 135 |
| 5.5 | More numbers | 136 |
| 5.6 | Brown dwarfs | 136 |
| 5.7 | Brown-dwarf classes | 138 |
| 5.8 | The strange case of V838 Monocerotis | 141 |
| 5.9 | Rotation and variation | 143 |
| 5.10 | Binaries | 144 |

| | |
|--|-----|
| 6 The wet basement: class T | 146 |
| 6.1 Spectra | 146 |
| 6.2 Temperature, color, luminosity, and the HR diagram | 148 |
| 6.3 Binaries and masses | 153 |
| 6.4 Brown dwarfs and planets | 157 |
| 6.5 From cool to cold: class Y | 160 |
| 7 The K stars: orange giants and brighter dwarfs | 162 |
| 7.1 Classification | 164 |
| 7.2 Parallaxes and stellar distances | 169 |
| 7.3 Main sequence dwarfs and the calibration of the HR diagram | 171 |
| 7.4 Spectroscopic distances | 172 |
| 7.5 K lines and chromospheres | 174 |
| 7.6 Eclipsing giants and supergiants | 175 |
| 7.7 Intrinsic variation | 178 |
| 7.8 Composition differences | 178 |
| 7.9 Toward lower luminosity | 181 |
| 8 Our Sun and its cousins: the G stars | 184 |
| 8.1 Spectra and class | 185 |
| 8.2 The solar spectrum | 187 |
| 8.3 Solar chemical composition | 192 |
| 8.4 The standard Sun | 193 |
| 8.5 G dwarfs and the Sun | 194 |
| 8.6 The chromosphere and corona | 197 |
| 8.7 Solar activity | 201 |
| 8.8 Dwarf-star activity | 205 |
| 8.9 Aging dwarfs | 206 |
| 8.10 The solar interior | 208 |
| 8.11 Subgiants, giants, and supergiants | 210 |
| 8.12 Planets | 212 |
| 9 Class F: stars in transition | 215 |
| 9.1 Spectra | 216 |
| 9.2 Dwarfs in transition: nuclear reactions | 220 |
| 9.3 Convection and rotation | 221 |
| 9.4 The Hertzsprung gap and passages to the A stars | 223 |
| 9.5 Instability: Cepheid variables | 224 |
| 9.6 Calibration | 227 |
| 9.7 The W Virginis stars of Population II | 229 |
| 9.8 The horizontal branch and RR Lyrae stars | 229 |
| 9.9 Fainter pulsators | 235 |
| 9.10 The origin of the instability strip | 237 |
| 9.11 Brightest to dimmest | 238 |
| 10 The white stars of class A | 241 |
| 10.1 The spectrum at class A | 243 |
| 10.2 Classification | 246 |
| 10.3 Line behavior and abundances | 247 |
| 10.4 Strange dwarfs: the metallic-line stars | 249 |

x Contents

| | | |
|-----------|---|------------|
| 10.5 | The magnetic peculiar A stars | 251 |
| 10.6 | Lambda Boötis stars | 254 |
| 10.7 | New stars and planetary disks | 254 |
| 10.8 | White dwarfs | 258 |
| 10.9 | Degeneracy | 262 |
| 11 | The B stars: beacons of the skies | 264 |
| 11.1 | Supergiants to white dwarfs | 264 |
| 11.2 | Organization | 266 |
| 11.3 | Classification | 268 |
| 11.4 | More chemical variations | 273 |
| 11.5 | Be and shell stars | 274 |
| 11.6 | More variables | 275 |
| 11.7 | Hypergiants, LBVs, and P Cygni lines | 276 |
| 11.8 | Dust and nebulae | 278 |
| 11.9 | Interstellar extinction and reddening | 281 |
| 11.10 | Polarization of starlight | 283 |
| 11.11 | White dwarfs | 284 |
| 11.12 | Magnetic fields | 288 |
| 11.13 | White-dwarf variables | 289 |
| 12 | Class O: the head of the spectral sequence | 290 |
| 12.1 | Spectra and classification | 293 |
| 12.2 | Wolf–Rayet spectra | 296 |
| 12.3 | Mass loss | 298 |
| 12.4 | Luminosities and subdwarf O stars | 302 |
| 12.5 | OB associations | 302 |
| 12.6 | Diffuse nebulae | 304 |
| 12.7 | The nebular continuum | 310 |
| 12.8 | Forbidden lines | 311 |
| 12.9 | Analysis of nebular spectra | 312 |
| 12.10 | Interstellar lines | 313 |
| 12.11 | Neutral hydrogen and molecules | 314 |
| 13 | Extraordinary classes | 317 |
| 13.1 | Planetary nebulae | 318 |
| 13.2 | Spectra of planetary nebulae | 320 |
| 13.3 | Planetary nebula nuclei | 321 |
| 13.4 | Central-star classification | 326 |
| 13.5 | Novae | 329 |
| 13.6 | Origins | 332 |
| 13.7 | Nova remnants | 334 |
| 13.8 | Recurrent novae | 335 |
| 13.9 | Dwarf novae | 335 |
| 13.10 | Combination spectra and symbiotic stars | 337 |
| 13.11 | Beyond the HR diagram | 339 |
| 14 | Journeys on the HR diagram | 341 |
| 14.1 | Concepts | 341 |
| 14.2 | Star birth | 344 |

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Frontmatter

[More information](#)

| | Contents | xi |
|-------|------------------------|-----|
| 14.3 | On the main sequence | 350 |
| 14.4 | Giants and supergiants | 353 |
| 14.5 | Helium burning | 358 |
| 14.6 | The death of a giant | 359 |
| 14.7 | Planetary nebulae | 360 |
| 14.8 | White dwarfs | 363 |
| 14.9 | Supernovae | 366 |
| 14.10 | Origins | 370 |
| 14.11 | The remains | 372 |
| | <i>Star index</i> | 377 |
| | <i>Subject index</i> | 383 |

Illustrations

| | |
|---|---------------|
| 1.1 Orion | <i>page</i> 2 |
| 1.2 Our Sun | 4 |
| 1.3 Cygnus from the Flamsteed atlas | 12 |
| 1.4 The electromagnetic spectrum | 14 |
| 1.5 Diagram of our Galaxy | 21 |
| 1.6 The Milky Way | 22 |
| 1.7 The interstellar medium and an open cluster | 23 |
| 1.8 Spiral structure in Messier 101 | 24 |
| 1.9 The Andromeda Nebula, Messier 31 | 25 |
| 1.10 Krüger 60 orbit | 26 |
| 1.11 The globular cluster Messier 80 | 28 |
| 1.12 Blackbodies | 29 |
| 1.13 The ellipse | 31 |
| 2.1 The construction of atoms | 37 |
| 2.2 Electron orbits and energy levels | 45 |
| 2.3 An emission-line spectrum | 47 |
| 2.4 Absorption-line spectra | 49 |
| 2.5 Formation of spectra | 50 |
| 2.6 Profile of H α in absorption | 52 |
| 2.7 Energy levels of neutral helium | 54 |
| 2.8 Energy levels of singly ionized oxygen | 55 |
| 2.9 Molecular energy levels | 57 |
| 2.10 Prismatic dispersion | 62 |
| 2.11 Diffraction | 63 |
| 2.12 Slit spectrograph | 65 |
| 2.13 Digital emission spectrum | 66 |
| 2.14 The classical spectrograph | 67 |
| 2.15 Objective prism spectrogram | 68 |
| 3.1 Some Fraunhofer lines | 72 |
| 3.2 Original classification spectra | 74 |
| 3.3 A carbon star | 75 |
| 3.4 A page from the <i>Henry Draper Catalogue</i> | 79 |
| 3.5 The spectral sequence | 80 |
| 3.6 A digital dwarf sequence extended to the red | 83 |
| 3.7 The HR diagram | 86 |
| 3.8 An example of luminosity classification | 87 |

List of illustrations xiii

| | | |
|------|--|-----|
| 3.9 | A modern HR diagram with MK luminosity classes | 91 |
| 3.10 | Class M to L | 94 |
| 3.11 | Class L to T | 95 |
| 3.12 | Spectral class, temperature, and color | 97 |
| 3.13 | Line strengths and spectral classes | 98 |
| 3.14 | Color–magnitude diagram | 101 |
| 3.15 | Color–color diagram | 102 |
| 4.1 | Scorpius | 105 |
| 4.2 | Spectrum of Betelgeuse | 106 |
| 4.3 | High-dispersion spectrum of Mira | 107 |
| 4.4 | Spectra of three Miras | 108 |
| 4.5 | Spectral sequence for red dwarfs | 109 |
| 4.6 | Differences among cool stars | 110 |
| 4.7 | Spectra of two carbon stars | 111 |
| 4.8 | Transition of spectra from M through S to C | 112 |
| 4.9 | Betelgeuse resolved | 114 |
| 4.10 | Light curve of μ Cephei | 118 |
| 4.11 | Mira's variation | 119 |
| 4.12 | The Calabash Nebula | 123 |
| 4.13 | A variable OH maser | 124 |
| 4.14 | Technetium stars | 126 |
| 4.15 | Flaring on Krüger 60 B | 128 |
| 4.16 | Barnard's Star | 130 |
| 5.1 | Class L spectra | 134 |
| 5.2 | A star-forming region | 137 |
| 5.3 | The first brown dwarf | 139 |
| 5.4 | Red and brown dwarfs in time | 140 |
| 5.5 | V838 Monocerotis | 142 |
| 5.6 | The infrared spectrum of V838 Monocerotis | 143 |
| 5.7 | An L-star binary | 144 |
| 6.1 | The extended spectrum of a mid-T brown dwarf | 147 |
| 6.2 | Development of class T | 149 |
| 6.3 | The color–class relation for class T | 150 |
| 6.4 | Temperature and spectral class | 151 |
| 6.5 | An infrared HR diagram for classes L and T | 152 |
| 6.6 | An infrared color–magnitude diagram | 152 |
| 6.7 | Luminosity, mass, and age for brown dwarfs | 153 |
| 6.8 | A brown-dwarf companion for ϵ Indi | 155 |
| 6.9 | Epsilon Indi B resolved | 156 |
| 6.10 | A protoplanetary disk | 159 |
| 6.11 | An ultracool brown dwarf | 160 |
| 6.12 | The spectrum of an ultracool brown dwarf | 161 |
| 7.1 | Arcturus | 162 |
| 7.2 | High-resolution spectrum of Arcturus | 163 |
| 7.3 | Close look at Arcturus's spectrum | 164 |
| 7.4 | The Hyades | 165 |
| 7.5 | The spectrum of δ^1 Tauri | 165 |
| 7.6 | The Beehive Cluster | 166 |
| 7.7 | The binary K dwarf (K5 V and K7 V) 61 Cygni | 167 |

xiv List of illustrations

| | |
|---|-----|
| 7.8 Dwarf spectra from M2 to K0 | 168 |
| 7.9 Luminosity effects in early K | 168 |
| 7.10 Annual parallax | 170 |
| 7.11 Hipparcos color–magnitude diagram including clusters | 173 |
| 7.12 The Wilson–Bappu effect | 174 |
| 7.13 Light curve of Algol | 176 |
| 7.14 Mizar and its spectrum | 177 |
| 7.15 Metal-deficient stars | 180 |
| 7.16 Building new elements | 181 |
| 8.1 The Sun | 184 |
| 8.2 Capella and Kids | 186 |
| 8.3 Capella resolved | 187 |
| 8.4 Spectra of K and G dwarfs | 188 |
| 8.5 Luminosity changes in late-G stars | 189 |
| 8.6 The solar spectrum | 189 |
| 8.7 A high-dispersion solar spectrogram | 190 |
| 8.8 An extremely high-dispersion ultraviolet solar spectrogram | 190 |
| 8.9 A periodic table of solar elements | 191 |
| 8.10 Relative abundances of elements in the Sun | 192 |
| 8.11 Granulation and sunspots | 196 |
| 8.12 The chromosphere | 198 |
| 8.13 The flash spectrum | 199 |
| 8.14 The solar corona during an eclipse | 199 |
| 8.15 The face of the corona and a solar flare | 201 |
| 8.16 The Zeeman effect | 202 |
| 8.17 Solar prominences | 203 |
| 8.18 A coronal mass ejection | 204 |
| 8.19 Stellar activity cycles | 206 |
| 8.20 Lithium in stellar spectra | 207 |
| 8.21 The solar interior | 210 |
| 8.22 The velocity curve of 51 Pegasi | 213 |
| 9.1 A gallery of F stars | 216 |
| 9.2 The F7 supergiant/bright giant Polaris | 217 |
| 9.3 The spectrum of Procyon | 218 |
| 9.4 A selection of main sequence and supergiant spectra | 218 |
| 9.5 High-dispersion spectra of Procyon and α Persei | 219 |
| 9.6 The spectroscopic effect of stellar rotation | 222 |
| 9.7 The light, color, and velocity curves of β Doradus and η Aquilae | 225 |
| 9.8 The Small Magellanic Cloud | 226 |
| 9.9 Cepheid period–luminosity relations | 227 |
| 9.10 Cepheids and a Hubble–Sandage variable in M 33 | 228 |
| 9.11 The globular cluster M 15 | 230 |
| 9.12 The color–magnitude diagram of M 5 | 231 |
| 9.13 RR Lyrae | 233 |
| 9.14 The light curve of RR Lyrae | 233 |
| 9.15 M 104 and its globular clusters | 235 |
| 9.16 The light curve of Altair | 236 |
| 9.17 The light curve of R Coronae Borealis | 238 |
| 9.18 A historic spectrum of R Coronae Borealis | 239 |

List of illustrations xv

| | | |
|-------|--|-----|
| 10.1 | Canis Major and Sirius | 242 |
| 10.2 | Ursa Major's Big Dipper | 243 |
| 10.3 | The spectrum of the class A0 star Vega | 244 |
| 10.4 | Class A detail in the spectrum of Sirius | 244 |
| 10.5 | Dwarf spectra from F0 to A0 | 245 |
| 10.6 | Luminosity and temperature effects at class A | 246 |
| 10.7 | Modelling the spectrum of Przybylski's Star | 249 |
| 10.8 | The spectrum of a metallic-line star | 251 |
| 10.9 | High-dispersion spectra of the Ap star HD 125248 | 252 |
| 10.10 | The reconstructed surface of the A1pSi star γ^2 Arietis | 253 |
| 10.11 | Vega's disk | 256 |
| 10.12 | The edge-on disk of Beta Pictoris | 257 |
| 10.13 | Fomalhaut's disk and planet | 258 |
| 10.14 | 40 Eridani | 259 |
| 10.15 | Sirius and its companion | 260 |
| 10.16 | The orbit of Sirius B about Sirius A | 261 |
| 11.1 | The Milky Way filled with O and B stars | 265 |
| 11.2 | Scorpius with and without its B stars | 266 |
| 11.3 | Hot-star distribution | 267 |
| 11.4 | The Pleiades | 268 |
| 11.5 | The spectral sequence for class B dwarfs | 269 |
| 11.6 | An archival selection of B-type spectra from MKK | 271 |
| 11.7 | Ultraviolet spectra of three stars | 272 |
| 11.8 | The spectrum of a mercury–manganese star | 273 |
| 11.9 | Hydrogen emission from two Be stars | 275 |
| 11.10 | The Carina Nebula | 277 |
| 11.11 | Eta Carinae and a portion of its spectrum | 278 |
| 11.12 | Time-sequenced spectra of η Carinae | 279 |
| 11.13 | P Cygni lines | 279 |
| 11.14 | The origin of P Cygni lines | 280 |
| 11.15 | The interstellar extinction curve | 282 |
| 11.16 | White-dwarf spectra | 285 |
| 11.17 | The spectrum of a magnetic white dwarf | 288 |
| 12.1 | The Orion Nebula and its central Trapezium | 291 |
| 12.2 | The Whirlpool Galaxy, M 51 | 292 |
| 12.3 | Photographic spectra across the O stars | 294 |
| 12.4 | The O-dwarf sequence | 295 |
| 12.5 | O stars in the ultraviolet | 297 |
| 12.6 | Two Wolf–Rayet spectra | 298 |
| 12.7 | The ultraviolet spectrum of the O3 Iabf star HD 93129A | 299 |
| 12.8 | NGC 6888, a “ring nebula” | 300 |
| 12.9 | The Large Magellanic Cloud | 301 |
| 12.10 | OB associations in Monoceros | 303 |
| 12.11 | R 136 in the Tarantula Nebula | 305 |
| 12.12 | H II regions in central Cygnus | 306 |
| 12.13 | The emission-line spectrum of the Orion Nebula | 307 |
| 12.14 | The formation of the nebular spectrum | 308 |
| 12.15 | Interstellar lines in the spectrum of λ Orionis | 313 |
| 12.16 | The radio spectrum of the Orion Molecular Cloud | 315 |

xvi List of illustrations

| | | |
|-------|--|-----|
| 13.1 | Nova Cygni 1975 | 317 |
| 13.2 | The Saturn Nebula | 319 |
| 13.3 | Tiny IC 4997 | 320 |
| 13.4 | The spectrum of NGC 2440 | 322 |
| 13.5 | The radio spectrum of NGC 7027 | 324 |
| 13.6 | The derivation of Zanstra temperatures | 325 |
| 13.7 | Ultraviolet spectra of the nuclei of planetary nebulae | 327 |
| 13.8 | The spectrum of the WC9 star, Henize 2–99 | 328 |
| 13.9 | Two O VI (WO) central stars | 330 |
| 13.10 | A representative nova light curve | 330 |
| 13.11 | Historic nova spectra | 331 |
| 13.12 | Mass transfer in a binary system | 333 |
| 13.13 | The remnant of Nova Cygni 1992 | 334 |
| 13.14 | Twenty-four years in the life of the dwarf nova SS Cygni | 336 |
| 13.15 | Spectra of the symbiotic stars CI Cygni and AG Draconis | 338 |
| 14.1 | Red supergiants in the Milky Way | 343 |
| 14.2 | New stars in the ρ Ophiuchi dark cloud | 345 |
| 14.3 | The Orion Molecular Cloud | 346 |
| 14.4 | Herbig–Haro objects in the Orion complex | 347 |
| 14.5 | R Monocerotis and Hubble’s Variable Nebula | 348 |
| 14.6 | T Tauri and its spectrum | 349 |
| 14.7 | The driving star of HH 30 | 349 |
| 14.8 | The early evolution of the Sun | 351 |
| 14.9 | Bolometric corrections | 352 |
| 14.10 | Evolutionary tracks for stars of Population I | 354 |
| 14.11 | Supergiant evolution | 356 |
| 14.12 | The early evolution of clusters | 357 |
| 14.13 | The Egg Nebula | 362 |
| 14.14 | The Cat’s Eye, NGC 6543 | 363 |
| 14.15 | Evolutionary tracks for planetary nuclei | 364 |
| 14.16 | YM 29 (Abell 21) | 365 |
| 14.17 | Supernova 1987A in the Large Magellanic Cloud | 367 |
| 14.18 | Supernova spectra | 368 |
| 14.19 | Supernova 1979I in the galaxy M 63 (NGC 5055) | 369 |
| 14.20 | The Crab Nebula and its pulsar | 372 |
| 14.21 | The spectrum of the Crab Nebula | 373 |
| 14.22 | The Cygnus Loop | 374 |
| 14.23 | Cygnus X-1 | 376 |

Tables and displays

Tables

| | |
|---|---------------|
| 1.1 The Constellations | <i>page</i> 6 |
| 1.2 The first-magnitude stars | 9 |
| 1.3 The Greek alphabet | 11 |
| 2.1 The chemical elements | 38 |
| 3.1 The Fraunhofer lines | 71 |
| 3.2 The original Draper classes | 76 |
| 3.3 The Harvard classes and their later development | 78 |
| 3.4 Later development of carbon-star classes | 84 |
| 3.5 Fine-structure prefixes and suffixes | 88 |
| 3.6 The MK classes | 89 |
| 8.1 Some solar data | 194 |
| 8.2 Other suns | 195 |
| 8.3 Prominent optical emissions of the corona | 200 |
| 9.1 Six bright Cepheids | 224 |
| 11.1 White-dwarf classifications | 286 |

Displays

| | |
|----------------------|-----|
| 8.1 Solar power | 209 |
| 9.1 The carbon cycle | 220 |

Preface and acknowledgements

After 20 years in print, *Stars and their Spectra*, updated with modern observing techniques, new spectral classes, and two decades of astronomical discoveries, is seeing new light. Yet the glow from the past shines strongly. The project began with a series of a dozen articles on spectral classes and classification that appeared in *Sky and Telescope* between 1986 and 1988. I remain grateful to the editors for accepting it, and in particular to Leif Robinson and Ron Schorn. Special thanks then go to Simon Mitton, who helped bring the articles into expanded book form in the 1989 first edition. A veritable crowd of astronomers provided encouragement, corrections, and feedback, and it is still highly appropriate to thank W. W. Morgan, Helmut Abt, William Bidelman, Anne Cowley, Art Cox, Catherine Garmany, Icko Iben, Hollis Johnson, Philip Keenan, Karen Kwitter, Julie Lutz, Dick Shaw, Harry Shipman, Jim Truran, and Ken Yoss, added to by three general readers, friend and scholar David Bright, my wife Maxine Kaler, and my mother Hazel (Susie) Kaler. For this edition, additional thanks go to Richard O. Gray and Christopher J. Corbally (with chapters by Adam Burgasser, J. Davy Kirkpatrick, and Nolan Walborn), the authors of *Stellar Spectral Classification* (Princeton University Press, 2009), with special thanks to J. Davy. A number of illustrations have been drawn from their definitive book, which interested readers of *Stars and their Spectra* are encouraged to pursue for more advanced discussion. Thank you as well to all the others who patiently answered my many questions.

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Still true from the first edition, I hope you will all find your contributions within and that you will be pleased with what I have made of them.