



## CONTENTS

PREFACE . . . . .	1
<b>Part One</b>	
<b>THE SUN</b>	
<b>Chapter I. V. P. Vyazanitsyn. INTRODUCTION</b> . . . . .	3
§ 1. General data . . . . .	3
§ 2. The total solar radiation . . . . .	5
§ 3. Fluctuations in solar radiation . . . . .	6
§ 4. The energy distribution in the solar spectrum . . . . .	9
§ 5. Limb darkening . . . . .	13
§ 6. Solar rotation . . . . .	16
<b>Chapter II. V. P. Vyazanitsyn. THE SOLAR LINE SPECTRUM</b> . . . . .	19
§ 7. The normal solar spectrum. Spectrum atlases and line catalogs . . . . .	19
§ 8. The identification of Fraunhofer lines . . . . .	22
§ 9. Equivalent Fraunhofer-line widths. Growth curves . . . . .	25
§ 10. The quantitative composition of the solar atmosphere . . . . .	32
<b>Chapter III. V. A. Krat. THE STRUCTURE OF THE PHOTOSPHERE: GRANULATION, SUNSPOTS AND FACULAE</b> . . . . .	37
§ 11. The general appearance of the solar surface. Granulation . . . . .	37
§ 12. Sunspots . . . . .	43
§ 13. Solar rotation, as determined from spots and faculae . . . . .	46
§ 14. Special features of the line spectra of spots and faculae . . . . .	49
§ 15. Magnetic fields of spots. The general magnetic field of the sun . . . . .	53
§ 16. Gas motion in sunspots. The Evershed effect . . . . .	57
§ 17. The nature of sunspots . . . . .	59
§ 18. The cyclic variation of photospheric phenomena . . . . .	61
§ 19. The cyclic nature of sunspot formation . . . . .	66
<b>Chapter IV. V. P. Vyazanitsyn and V. M. Sobolev. THE CHROMOSPHERE</b> . . . . .	68
§ 20. The flash spectrum. General properties of the chromosphere . . . . .	68
§ 21. Spectrophotometric measurements and chromospheric-line profiles . . . . .	72
§ 22. The chemical composition of the chromosphere . . . . .	77
§ 23. The density distribution with height in the chromosphere . . . . .	79
§ 24. Self-absorption in the chromosphere . . . . .	84
§ 25. The temperature and the electron concentration. Chromospheric models . . . . .	89
§ 26. Chromospheric spicules . . . . .	98
§ 27. The ultraviolet radiation of the chromosphere . . . . .	101
§ 28. The theory of chromospheric heating . . . . .	103
§ 29. Bright flocculi . . . . .	107
<b>Chapter V. V. P. Vyazanitsyn and V. M. Sobolev. PROMINENCES</b> . . . . .	111
§ 30. Historical remarks . . . . .	111
§ 31. Statistical data . . . . .	112
§ 32. Filaments . . . . .	114
§ 33. The classification of prominences . . . . .	116
§ 34. The dynamics of prominences . . . . .	123
§ 35. Prominence spectra. Spectrophotometric measurements . . . . .	125
§ 36. Excitation and ionization . . . . .	130

Chapter VI. V. A. Krat. CHROMOSPHERIC FLARES . . . . .	134
§ 37. Classification. Frequency of flares . . . . .	134
§ 38. The formation of surges . . . . .	136
§ 39. The spectra of chromospheric flares and their interpretation . . . . .	137
§ 40. Emission cores . . . . .	141
§ 41. Geoactivity and the nature of flares . . . . .	144
Chapter VII. V. A. Krat. THE SOLAR CORONA . . . . .	148
§ 42. The continuous spectrum of the corona . . . . .	148
§ 43. The line spectrum of the corona . . . . .	151
§ 44. The brightness and polarization of the corona . . . . .	153
§ 45. Structural features of the corona in "white" light . . . . .	155
§ 46. The ionization and excitation of atoms in the corona . . . . .	156
§ 47. Profiles of coronal lines. The structure of the corona in monochromatic emission of spectral lines . . . . .	158
§ 48. Coronal motions. The development of coronal condensations . . . . .	162
§ 49. The corona and the chromosphere . . . . .	163
Chapter VIII. M. N. Gnevyshev. THE SOLAR SURVEY . . . . .	169
§ 50. A definition of the term "Solar Survey" . . . . .	169
§ 51. Photospheric solar-activity indexes . . . . .	171
§ 52. Chromospheric solar-activity indexes . . . . .	175
§ 53. Coronal solar-activity indexes . . . . .	178
§ 54. Solar radio-emission indexes . . . . .	179
Chapter IX. A. P. Molchanov. SOLAR RADIO EMISSION . . . . .	182
§ 55. Methods of observation . . . . .	182
§ 56. A general description of solar radio emission . . . . .	185
§ 57. The undisturbed component of the solar radio emission . . . . .	186
§ 58. The slowly varying disturbed component of the solar radio emission . . . . .	208
§ 59. The rapidly varying disturbed component (radio bursts) . . . . .	228

**Part Two**  
**THE PLANETARY SYSTEM**

Chapter X. A. V. Markov. THE MOON . . . . .	238
§ 60. The moon as a celestial body . . . . .	238
§ 61. Photometric and polarization properties of the lunar surface . . . . .	241
§ 62. Studies of the temperature of the lunar crust using heat receivers and radio methods . .	246
§ 63. Endogenous and exogenous hypotheses of lunar-relief formation. . . . .	255
§ 64. Maps of the other side of the moon . . . . .	259
Chapter XI. V. V. Sharonov. PHYSICS OF THE PLANETS . . . . .	264
§ 65. Introduction . . . . .	264
§ 66. The planetary disk . . . . .	265
§ 67. Methods of observing planetary features . . . . .	266
§ 68. Methods of disk measurement . . . . .	267
§ 69. Phases . . . . .	269
§ 70. Planetographic coordinates of surface points . . . . .	270
§ 71. The rotation elements and their observational determination . . . . .	272
§ 72. Spectroscopic studies of rotation . . . . .	274
§ 73. The disk of a considerably flattened planet . . . . .	277
§ 74. Planetary characteristics related to the mass . . . . .	279
§ 75. The brightness, magnitude, and color of a planet . . . . .	281
§ 76. Reflectivity . . . . .	283
§ 77. Albedo . . . . .	285
§ 78. The application of surface photometry to disks of planets and satellites . . . . .	288
§ 79. Structures of planetary atmospheres . . . . .	289
§ 80. Optical phenomena in planetary atmospheres . . . . .	292
§ 81. Temperature conditions . . . . .	294
§ 82. Planetary radio astronomy . . . . .	296

Chapter XII. V. V. Sharonov. A DESCRIPTION OF INDIVIDUAL PLANETS . . . . .	299
§ 83. Mercury . . . . .	299
§ 84. Venus . . . . .	300
§ 85. The earth . . . . .	306
§ 86. Mars . . . . .	308
§ 87. Jupiter . . . . .	314
§ 88. Saturn and its rings . . . . .	318
§ 89. Uranus, Neptune, and Pluto . . . . .	321
§ 90. Planetary satellites . . . . .	324
Chapter XIII. A. V. Markov. PHYSICAL PROPERTIES OF THE MINOR PLANETS . . . . .	328
§ 91. Orbits of the minor planets . . . . .	328
§ 92. Physical properties of the minor planets . . . . .	329
§ 93. The origin of the minor planets . . . . .	333
Chapter XIV. O. V. Dobrovol'skii. COMETS, METEORS, AND THE ZODIACAL LIGHT . . . . .	336
§ 94. General data on comets . . . . .	336
§ 95. Cometary nuclei . . . . .	342
§ 96. Cometary spectra . . . . .	347
§ 97. The apparent brightness of a comet. Masses and densities of cometary atmospheres . . . . .	358
§ 98. Differentiation of matter in a cometary atmosphere under the influence of solar heat . . . . .	361
§ 99. Type-I tails . . . . .	363
§ 100. The origin of comets . . . . .	369
§ 101. Some unsolved problems in the physics of comets . . . . .	369
§ 102. General data on meteors . . . . .	370
§ 103. Elements of the physical theory of meteors . . . . .	373
§ 104. The results of photographic observations of meteors . . . . .	375
§ 105. Spectra of meteors . . . . .	379
§ 106. Radar observations of meteors . . . . .	381
§ 107. The latest research techniques . . . . .	386
§ 108. General data on the zodiacal light . . . . .	387
§ 109. The nature of the zodiacal light . . . . .	389
INDEX . . . . .	393