

CONTENTS

Introduction	VII
1. J. H. Oort	Survey of spiral structure problems
	1
PART I / SPIRAL STRUCTURE IN GALAXIES	
2. W. W. Morgan	Spiral structure in external galaxies
3. B. A. Vorontsov-Velyaminov	Spiral structure of our Galaxy and of other galaxies
4. G. de Vaucouleurs	Statistics of spiral patterns and comparison of our Galaxy with other galaxies
5. B. T. Lynds	The distribution of dark nebulae in late-type spirals
6. N. Heidmann	Angular momenta of late-type spiral galaxies
7. R. M. Dzigaashvili and T. M. Borchkhadze	Applying the model of a normal logarithmic spiral to galaxies
8. J. Einasto and U. Rümmel	Density distribution and the radial velocity field in the spiral arms of M31
9. J. Einasto and U. Rümmel	The rotation curve, mass, light, and velocity distribution of M31
10. V. C. Rubin and W. K. Ford, Jr.	A comparison of dynamical models of the Andromeda Nebula and the Galaxy
11. F. Börngen, G. Friedrich, G. Lenk, L. Richter, and N. Richter	OB stars on the outermost borders of M31
12. G. G. Pooley	Observations of radio continuum emission from M31
13. G. Monnet	Kinematics of M33, M51 and the L.M.C.
14. S. M. Simkin	The stellar velocity field in M51
15. K. Chuvaev and I. Pronik	H _{II} Regions in NGC 628, NGC 4254 and NGC 5194
16. E. Ye. Khachikian and K. A. Sahakian	Spiral structure and distribution of stellar associations in NGC 6946
	87

PART II /

OBSERVATIONS OF SPIRAL STRUCTURE IN OUR GALAXY

A. *Radio Observations*

17. F. J. Kerr	Spiral structure of neutral hydrogen in our Galaxy	95
18. P. G. Mezger	The distribution of H _{II} regions	107
19. G. Westerhout	A motion picture film of galactic 21-cm line emission	122
20. H. Weaver	Spiral structure of the Galaxy derived from the Hat Creek survey of neutral hydrogen	126
21. T. L. Wilson	Galactic continuum source counts	140
22. J. H. Oort	Matter far from the galactic plane associated with spiral arms	142
23. C. M. Varsavsky and R. J. Quiroga	On a possible corrugation of the galactic plane	147
24. S. L. Garzoli	A study of spiral structure for $270^\circ \leq l^{\text{II}} \leq 310^\circ$	151
25. E. Bajaja and F. R. Colomb	A peculiar neutral hydrogen concentration at $l^{\text{II}} = 280^\circ$, $b^{\text{II}} = 18^\circ$	154
26. D. Goniadzki and A. Jech	Contribution to the study of the distribution of neutral hydrogen in the region $230^\circ \leq l^{\text{II}} \leq 280^\circ$	157
27. L. Velden	Radial velocities of neutral hydrogen in the anticenter region of the Galaxy	164
28. N. V. Bystrova, J. V. Gossachinsky, T. M. Egorova, V. M. Rozanov, and N. F. Ryzhkov	Radio observations of some details in the H _I local spiral arm	169
29. H. M. Tovmassian	Hydrogen in the regions of four stellar clusters	173
30. G. Lyngå	The distribution in galactic longitude of observable pulsars	177
31. B. Y. Mills	Pulsar distances, spiral structure and the interstellar medium	178
32. M. Grewing, U. Mebold, and K. Rohlfs	On the physical conditions in interstellar H _I gas	182
33. S. W. McCuskey	Local stellar distribution and galactic spiral structure	189

B. *Optical Observations*

34. A. Blaauw	Remarks on local structure and kinematics	199
35. W. Becker and R. B. Fenkart	Galactic clusters and H _{II} regions	205
36. G. Courtès, Y. P. and Y.M. Georgelin, and G. Monnet	A new interpretation of the galactic struc- ture from H _{II} regions	209
37. H. R. Dickel, H. J. Wendker, and J. H. Bieritz	The distribution of H _{II} regions in the local spiral arm in the direction of Cygnus	213
38. R. Racine and S. van den Bergh	Reflection nebulae and spiral structure	219
39. E. D. Pavlovskaya and A. S. Sharov	The galactic structure and the appearance of the Milky Way	222
40. E. B. Kostjakova	The study of the Milky Way integrated spectrum and the spiral structure of the Galaxy	225
41. T. A. Uranova	Space distribution of interstellar dust in connection with the galactic spiral structure	228
42. W. Becker and R. Fenkart	A comparison of the density gradients of main sequence stars obtained by two dif- ferent methods in different galactic latitu- des	232
43. G. A. Tammann	The galactic distribution of young Cepheids	236
44. B. J. Bok, A. A. Hine, and E. W. Miller	A progress report on the Carina spiral feature	246
45. J. A. Graham	The space distribution of the OB-type stars in Carina	262
46. W. Seggewiss	Photometric investigation of the association Car OB 2	265
47. G. Lyngå	Photometric and spectroscopic data for some distant O and B stars	270
48. C. B. Stephenson and N. Sanduleak	Progress report on the Cleveland-Chile sur- vey for southern OB stars	276
49. A. G. Velghe	A study of O and B stars in Vela, along the galactic equator	278
50. J. Denoyelle	Progress report of the current research on the galactic structure in Vela	281
51. D. L. Crawford	Calibration of 4-color and H β photometry for B- and A-type stars	283
52. Th. Schmidt-Kaler	Wolf-Rayet stars, ring-type H _{II} regions, and spiral structure	284
53. J. Isserstedt	Stellar rings and galactic structure	287

54. J. P. Kaufmann	Radial velocities of early-type stars	290
55. R. B. Shatsova	The velocity dispersions of O- and B-stars within a few kpc	291
56. L. V. Mirzoyan and M. A. Mnatsakanian	On the distribution of space velocities of OB-stars	295
57. W. Seitter	Questions concerning the usefulness and feasibility of large-scale stellar statistics	297

PART III / THEORY OF SPIRAL STRUCTURE

A. *Normal Spirals*

58. G. Contopoulos	Gravitational theories of spiral structure	303
59. L. S. Marochnik	The theory of spiral structure of galaxies	317
60. A. J. Kalnajs	Small amplitude density waves on a flat galaxy	318
61. F. H. Shu	The propagation and absorption of spiral density waves	323
62. C. Hunter	Large scale oscillations of galaxies	326
63. D. Lynden-Bell	Generating mechanisms for spiral waves	331
64. A. Toomre	Spiral waves caused by a passage of the LMC?	334
65. C. L. Berry and P. O. Vandervoort	Non-linear density waves in pressureless disks	336
66. P. O. Vandervoort	Density waves in galaxies of finite thickness	341
67. B. Barbanis	Particle resonance in a spiral field	343

B. *Barred Spirals*

68. K. C. Freeman	Barred spiral galaxies	351
69. G. de Vaucouleurs and K. C. Freeman	Structure and dynamics of barred spiral galaxies with an asymmetric mass distribu- tion	356

C. *Numerical Experiments*

70. R. H. Miller, K. H. Prendergast, and W. J. Quirk	Numerical experiments in spiral structure	365
71. F. Hohl	Computer models of spiral structure	368

PART IV / COMPARISON OF THEORY AND OBSERVATIONS

A. *Gravitational Effects*

72. C. C. Lin	Interpretation of large-scale spiral structure	377
73. C. Yuan	Theoretical 21-cm line profiles: Comparison with observations	391

74. W. B. Burton and W. W. Shane	Neutral hydrogen in the Sagittarius and Scutum spiral arms	397
75. W. W. Roberts, Jr.	Large-scale galactic shock phenomena and the implications on star formation	415
76. R. Woolley	Deviation of the vertex of the velocity ellipse of young stars and its connection with spiral structure	423
77. M. Mayor	Possible influence of the galactic spiral struc- ture on the local distributions of stellar resi- dual velocities	433
78. K. Rudnicki	Additional evidence for the cataclysmic origin of spiral structure in galaxies	435
	B. Magnetic Effects	
79. L. Woltjer	Magnetic fields and spiral structure	439
80. E. A. Spiegel	On the circulation of gas near the galactic center	441
81. M. Fujimoto and M. Miyamoto	Magnetohydrodynamical models of helical magnetic fields in spiral arms	444
82. G. D. Verschuur	Local magnetic field and its relation to the local spiral arm structure	448
83. G. Klare and T. Neckel	Polarization of southern OB-stars	449
84. P. Pişmiş	On a corollary to the magnetic dipole theory of the origin of spiral structure	452
	PART V	
85. B. J. Bok	Summary and outlook	457
86. J. H. Oort, W. Becker, C. C. Lin	Desiderata for future work	474