

THE SPIRAL STRUCTURE OF OUR GALAXY

SYMPOSIUM No. 38

This book is an account of the recent observational and theoretical results concerning spiral structure, with the main emphasis on the spiral structure of our Galaxy.

Part I deals with spiral structure in other galaxies, where observations are much easier than in our own Galaxy. There is a wealth of spiral forms in other galaxies, and also a continuous transition between regular and barred spirals. Spiral features are observed – clearly in the hydrogen line and the dust, but other optical and radio observations are also very informative.

Part II contains many new observational results about the spiral structure of our Galaxy: we have now a much better picture of the distribution of its neutral and ionized hydrogen. From the optical point of view extensive work has been done recently covering the neighborhood of the Sun and many more distant regions. Observations of bright objects, like open clusters and association, give most of the information, but much progress has been made also in the study of later type stars, dust, and particular spiral features.

The theoretical developments (Part III) contain many recent results of the gravitational theory of spiral structure. The search of spiral modes and their evolution constitute the main present problems of the linear theory, while non-linear effects are emphasized. Some mechanisms for the generation of spiral waves are suggested. A comparison with barred spirals is made and numerical experiments providing spiral waves are described.

The last Part contains various comparisons between theory and observations. The gravitational theory explains many features and provides suggestions for the understanding of various phenomena. Magnetic effects are insufficient in explaining the main features of spiral structure; however, magnetic fields in spiral arms play an important role in e.g. polarization. The book ends with a set of desiderata for future galactic work.

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