

## PREFACE

In our opinion, the origin of and need for this colloquium is related mainly to two different reasons. The HR diagram region where the A-type stars lie comprises a high percentage of so-called Chemically Peculiar (CP) stars which, among other peculiarities, are characterized by a low value of  $v \sin i$ . The second reason is that until the last decade the most widely used detector in astronomical spectroscopy was the photographic emulsion; this, having low sensitivity and a non-linear response when compared to the new detectors, produces low S/N data.

The resulting situation is that, for more than half a century, astronomers produced detailed analyses of sharp-lined A stars, mostly belonging to some peculiar groups, but could not fit the observed anomalies into any of the theories then available.

We may recall that the first meeting dealing with A-type stars (*The Magnetic and Related Stars*, ed. R.C. Cameron) took place in 1965. It was at that time that the possible presence of Ap-stars in young stellar groups, together with the impossibility of explaining the existence and the variation of strong magnetic fields, raised serious doubts on current theories, all of which were based on a complicated evolutionary history of A-type stars and invoked surface or internal nuclear reactions.

At the next meeting (*Physics of the Ap Stars*, eds. W.W. Weiss, H. Jenkner, H.J. Wood) in Vienna, 1975, two new non-nuclear theories were presented and amply discussed: that of selective diffusion and that of magnetic accretion. The fossil versus dynamo-excited origin of the stellar magnetic field also gave origin to a lively debate.

In 1981, the 23th Colloque de Liège was again dedicated to the subject of CP stars. By that time systematic analyses of observations collected in wavelength ranges outside the terrestrial atmosphere allowed us to extend our knowledge to some rare elements, not easily detectable on ground spectra; the other main point assessed at that meeting was the fact that the diffusion theory accounted for so many observational facts about CP stars that other competing theories started to decline.

At the following meeting, the 90th IAU Coll. held in Crimea (*Upper Main Sequence Stars with Anomalous Abundances*, eds. C.R. Cowley, M.M. Dworetzky, C. Mégessier), in 1985, the large variety of chemical abundances, even in A stars not officially belonging to a peculiar class, started to appear. The role of additional factors such as mass loss, turbulent convection, superficial magnetic field on the structure of stellar surface layers was discussed. Results of space observations with IUE and future programs for the HST were reviewed; the geometry of the spotted surface of a magnetic star started to develop in spite of the difficulty of mastering the number of free parameters.

However, the complications induced by the very delicate balance of different parameters needed to assess properly the structure of these atmospheres and the fact that the presence of superficial magnetic fields could not be properly included in the models, discouraged and almost stopped accurate abundance analyses in this  $T_{eff}$  domain of the HR diagram.

The search, analysis and interpretation of fine details characterizing other A-type stars with spectral lines broadened by average-high values of  $v \sin i$  have been neglected for long time, mainly because they require an abundance

analysis based on the computation of synthetic spectra. This task has been made possible and relatively easy through the availability of new spectroscopic data, of more reliable atmospheric models, and also thanks to the widespread use of powerful computers. A large variety of surface abundances appears to distinguish A-type stars, and the recent revival of interest in stars characterized by underabundances, such as the  $\lambda$  Boo stars, is indicative. We are only starting to realize that the A-type stars are, among those belonging to the upper main sequence, the ones least studied and understood.

At the IAU General Assembly at Baltimore, in 1988, the need for a new meeting on the atmospheric properties of A-type stars was felt to be desirable; following the early suggestions of S.J. Adelman, C.R. Cowley and K. Sadakane, the present meeting has been organized. We hope that it will open a new era of revival of interest in

**"The peculiar versus normal phenomena  
in A-type stars".**

This meeting has already pointed up the need for detailed analyses of the fine structure of the atmospheres, taking into account the effects of mass loss and accretion besides diffusion, in order to explain the abundance peculiarities of the different classes of CP stars. Another very interesting result concerns the details observable on high-resolution, high S/N line profiles, which permit us to describe the distribution of elements on a spotted stellar surface. While the majority of stellar spectra can be described by homogeneous atmospheres, in CP stars the surface dishomogeneity is an important factor that cannot be forgotten.

This meeting has been made possible thanks to the financial contribution of several institutions and to the hospitality given us by the International School for Advanced Study and by the International Centre for Theoretical Physics. It is a pleasure to thank all our sponsors:

- The International Astronomical Union (IAU)
- The European Astronomical Society (EAS)
- The National Council of Research (CNR)
- The University of Trieste
- The Interuniversity Regional Center for Astrophysics and Cosmology (CIRAC)
- The Consortium for the Development of the Researches of the Physics Institutes of Trieste University
- The Interdisciplinary Laboratory for Natural and Humanistic Sciences
- The Trieste Astronomical Observatory
- Informatica per il Sistema degli Enti Locali (INSIEL)
- The International School for Advanced Study (ISAS)
- The International Centre for Theoretical Physics (ICTP)
- Ente Regionale per il Diritto allo Studio (ERDISU)

Margherita HACK, President of the SOC  
Rosanna FARAGGIANA, President of the LOC