

PREFACE

The purpose of this Colloquium was the confrontation of realistic models of simple stars with high quality observations in order to obtain quantitative information about fundamental physics. Consequently, this meeting was focussed on *stars on the main sequence and close to it*. Their structure is the simplest possible among stars and these stars are barely influenced by the complexity of many yet unknown parameters. They populate the solar neighbourhood and can be observed with the highest accuracy.

Stars provide the basis for most of the calibrations of the parameters describing our Universe, like age, distances and masses. The precise knowledge of stellar parameters is therefore fundamental for understanding our Universe.

The next few years will provide us with new powerful computational facilities and observational data which will be either completely new or much more precise than ever before. We refer here only to few of the issues:

- Pulsation frequency spectra of eigenmodes of a significant number of stars will be determined by space experiments and ground based networks.
- Stellar distances will be very accurately determined by Hipparcos.
- Rotational velocities and magnetic fields will be measured by Doppler- and Zeeman imaging techniques.
- New detectors with increasing size and sensitivity will dramatically improve the signal-to-noise ratio of photometric and spectrometric observations.
- Several new and exciting observing facilities are currently under consideration, in particular space missions.
- Dramatic advances in computer technology will permit increasingly complex modelling, for example in hydrodynamics, radiation transfer and statistical physics.

A further motivation for organizing this conference provided a decision of the European Space Agency (ESA) to elect PRISMA (described in this volume) as a candidate for the next medium-size mission. It was felt by the Science Team that a concentration of theoretical and observational efforts is crucial to achieve an optimally designed space project.

The Colloquium was opened in the large ceremonial hall of the University of Vienna with a review subtitled *Outside the Stars*. The Scientific Organizing Committee intentionally invited an outstanding scientist working in the field of extragalactic research and cosmology to present the opening speech. Malcolm Longair was asked to highlight topics of current importance in the astrophysics of galaxies, active galaxies and cosmology in which an understanding of the origin and evolution of stars is crucial and to demonstrate how reliable astrophysical conclusions critically depend on how secure our understanding is of the structure and evolution of the stars.

After the stage was set in this manner, two reviews on the controversial sun and on the impact of solar space experiments followed. These two

presentations linked our conference to IAU colloquium *Inside the Sun*, which was focussed on a very particular star. At that conference in 1989 it was demonstrated that it is necessary to study other stars with different physical parameters (temperature, luminosity, chemical composition, rotation rate, magnetic field, etc.), and to confront realistic stellar models with high quality observations. Otherwise, a significant improvement of our understanding of normal stars, which, after all, are the most frequent and easily observable ingredients of the universe, will not be possible.

The conference continued with seven sections: Atmospheres, a window to the interior - Input physics for stellar structure - Basic stellar data - The changing interior - Asteroseismology, Theory - Activity, a break of spherical symmetry - Asteroseismology; Observation. A total of 30 invited speakers covered the subject of the conference with three to five reviews per section. More than 200 abstracts for short communications were submitted by closely 280 participants to the Scientific Organizing Committee.

Editing the proceedings was a major task not only due to the size of the volume. Although e-mailing and text processing is generally used nowadays, communication with various authors turned out to be quite cumbersome due to a high failure rate in the mailing system. A considerable fraction of submitted manuscripts did not follow the style rules for the conference proceedings. The help of Rainer Kuschnig in transforming the input from the participants into a useable output for the publisher is greatly acknowledged.

Since communication within the scientific community was a prime goal for the conference, it was decided to include the manuscripts from all posters to this proceedings. With about 150 expected manuscripts, refereeing would have delayed the publication of the proceedings and was therefor abandoned. The responsibility for the contents of the contributions lies fully with the authors.

It would not have been possible to organize this conference without sponsors and many dedicated helpers who contributed numerous working hours and much effort, most of it in their free time. In addition to the members of the Scientific and Local Organizing committees we have to express our thanks also to students of the Institute for Astronomy, M. Gelbmann, R. Fensl, F. Hiesberger, Mag. W. Ostermann and G. Reiss. Last, but not least, we are grateful for all the support we have received from Werner Däppen for scientific matter, who was visiting professor in Vienna while this conference was being prepared.

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