3D views on cool stellar atmospheres: theory meets observation

Joint Discussion 10, IAU General Assembly, Rio de Janeiro, August 10-11, 2009

Scientific Organizing Committee

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FOREWORD

Much of what we know about the chemical composition of the Universe actually stems from the chemical composition of stars, which is often deciphered from the spectra emerging from their atmospheres. Cool, low-mass and long-living stars allow to study the evolution of the Universe's chemistry from a time shortly after the big bang until today. The observation and interpretation of stellar spectra is a classical field in astronomy but is still undergoing vivid developments. The enormous increase in available computational resources opened-up possibilities which led to a revolution in the degree of realism to which modelers can mimic Nature. High-resolution, high-stability, high-efficiency spectrographs are now routinely providing stellar spectra whose full information content can only be exploited if a very much refined description of a stellar atmosphere is at hand.

This situation motivated Commission 36 *Theory of Stellar Atmospheres* to organize an exchange of latest views on the modelling of atmospheres of cool stars, and their inherent complexities related to multi-dimensional hydrodynamics and magnetic fields. This idea materialized in the form of a Joint Discussion of one and a half days length at the 27^{th} IAU General Assembly in Rio de Janeiro, Brazil, in summer 2009. Being a Joint Discussion ample time could be allocated to discussions, and indeed many lively disputes revolved around the diverse topics presented by the speakers and illustrated in posters. It is fair to say that they touched upon practically all aspects of stellar atmospheres – theoretical as well as observational with emphasis on their multi-dimensional nature. The collection of papers in this volume summarizes this vivid exchange of views; it hopefully serves as a happy reminder to the participants of the *3D Views on Cool Stellar Atmospheres: Theory Meets Observation*, and provides some flavor of the event to those who have missed it.

In this volume we collect the various contributions to Joint Discussion 10, invited reviews, contributed talks and posters. The index has been divided into "Sessions", grouping the contributions by topics which follow, more or less, the programme as it took place at Rio de Janeiro. We wish to thank the IAU for promoting this Joint Discussion. We are grateful to all the participants who have made this a lively meeting, and in particular to the collegues who chaired the different sessions. Special thanks are due to the Sociedade Astronômica Brasileira who took care of the organization of the IAU General Assembly and welcomed us at Rio de Janeiro. Finally we are grateful to the Società Astronomica Italiana, for the publication of the proceedings on Memorie.

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