Preface

IAU Colloquium 167 on "New Perspectives on Solar Prominences" was held in Aussois, France from April 28 to May 3, 1997. The purpose of the meeting was to review, discuss and try to understand the new observations of prominences and their environment. One hundred and seven scientists from twenty-one countries participated. The sponsors were the International Astronomical Union (IAU), the Scientific Committee for Solar-Terrestrial Physics (SCOSTEP), the European Office for Aerospace Research and Development (EOARD), l'Observatoire de Paris, le Centre National de la Recherche Scientifique (CNRS), le Commissariat à l'Énergie Atomique (CEA), and le Centre National d'Etudes Spatiales (CNES).

The meeting site was the Centre Paul Langevin, a conference center run by CNRS in Aussois in the French Alps. Scientific sessions were held each morning and early evening. In the afternoons, participants were free to hike in the Alps or linger over poster papers. The afternoon breaks in the alpine air kept the participation level in the scheduled sessions high and the discussions unusually lively. Late evenings were filled with videos of erupting prominences, both simulated and real, a banquet, and a well-received concert of baroque and classical music played for us by several of the participants – Veronique Bommier, Bernard Foing, Petr Heinzel, Pierre Mein, and Jean Francois Mein.

Prominences have been known from eclipse observations for several centuries. Twentieth-century research on them began with the invention of the spectroheliograph, which led to the subsequent pioneering studies by Lucien d'Azambuja and his colleagues at the Observatory of Paris at Meudon. The spectroheliograph enabled d'Azambuja to see prominences without an eclipse, and to describe their characteristics and global distribution in detail. The Colloquium and the Proceedings are dedicated to d'Azambuja and his work, which is discussed in the introductory article of this book.

Measurements of magnetic fields in prominences, begun in the 1960s, enabled realistic testing of prominence models proposed in the 1950s. The magnetic field observations became the starting point for all modern discussions of the physical processes involved in the birth and stability of prominences and of their dissolution and ejection from the Sun. Prominence material is either hoisted from the chromosphere by emerging magnetic fields or siphoned up along magnetic flux tubes. Or it may condense from the corona during magnetic field reconnection or contraction. Advocates of all these possibilities attended the colloquium, leading to spirited debates about prominence origins. On the other hand, prominence stability was hardly touched on, possibly because the most popular magnetic models, such as those originally proposed by Kippenhahn and Schlüter and Kuperus and Raadu, have been shown to provide prominences with stable support against gravity and a shield against thermal conduction from the corona.

Since early 1996, space observations of prominences have been available on a daily basis from the Solar and Heliospheric Observatory. Conference participants were dazzled by the images and other data from the SOHO EIT (Extreme-

Ultraviolet Imaging Telescope), LASCO (Large Angle Spectrometric Coronagraph), SUMER (Solar Untraviolet Measurements of Emitted Radiation), and UVCS (Ultraviolet Coronagraph Spectrometer for SOHO) instruments. An EIT image of a quiescent prominence obtained on June 23, 1997 graces the cover of this book. Results of analyses of the SOHO data are presented throughout this book and are yielding a much clearer picture than before of how prominences interact with the corona.

A highlight of the colloquium was discussion of the new evidence for a global pattern of helical magnetic fields in the solar atmosphere, as revealed by the distribution of filaments, north and south of the equator, according to their chirality. It is now clear that the helical fields in prominences can help us to understand the solar dynamo, which drives the 22-year solar magnetic cycle.

A special highlight of the Colloquium was the session on stellar prominences. Evidence of prominence-like clouds of material was reported to have been detected in a few active field dwarf stars. These are rapid rotators, and the prominences are often in Keplerian orbits. Patrick Brendan Byrne led the discussions. Tragically, while this volume was being edited, Dr. Byrne died while observing with the Herschel Telescope at the Observatorio de Roque de Los Muchachos in La Palma (Canary Islands). He passed away just days before celebrating his 50th birthday, at the peak of an intense and scientifically fruitful life. The community of his colleagues and friends mourns the loss of one of our science's most active and competent members. He entered this research field when he organized with Marcello Rodono IAU Colloquium 71 on "Activity in Red Dwarf Stars". He co-edited the conference proceedings, a hefty 668-page book that is still quoted often. As Editors of the Colloquium 167 Proceedings, we have the privilege of printing Dr. Byrne's last paper, a review of the evidence for prominences on cool late-type stars.

Acknowledgments. Edward Cliver of the Air Force Research Laboratory originally suggested that a colloquium on prominences would be timely, and we are grateful for his help in making it happen. It takes months of work by many people to make a successful conference and we are especially grateful to the following: The members of the Local Organizing Committee – led by B. Schmieder and including T. Amari, K. Bocchialini, V. Bommier, P. Demoulin, J. M. Malherbe, Z. Mouradian and D. Webb – for making our meeting so pleasant and fruitful; E. Cliver (USA), O. Engvold (Norway), V. Gaizauskas (Canada), I. Kim (Russia), Z. Mouradian (France), G. Peres (Italy), T. Sakurai (Japan), R. Schwenn (Germany), and J-X. Wang (China) who served with us on the Scientific Organizing Committee and ensured a productive scientific meeting; M. Rodono for the Byrne tribute; and, finally, K. S. Balasubramaniam and John Mariska who provided invaluable advice on preparation of the manuscript.

Bedford, MA, USA David Webb, David Rust and Brigitte Schmieder

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