
The importance of comparing solar and stellar observations of chromospheres was recognized many years ago but much of the current work can be regarded as having its origins in the survey of stellar Ca II emission, begun by O. C. Wilson at Mount Wilson, in 1965. Observations with the International Ultraviolet Explorer (IUE) over the past ten years, and with the Einstein Observatory and Exosat have led to a rapid expansion in the field of 'solar–stellar connections'. It was therefore timely for the Solar Physics Section of the European Physical Society to choose this theme for its meeting in 1987.

Following a general introduction by Weiss the volume is arranged in three sections; Lower Atmospheres, Convection Zones; Outer Atmospheres, Winds; Observations from Space. Of these the first provides the most comprehensive account of recent research. Stix gives an authoritative review of the origins of stellar magnetism, the underlying controlling factor for stellar activity. The importance of rotation as well as convection in determining dynamo action is brought out by Rodonó. Although rotation and magnetic fields are essential factors in the dynamo process the difficulty of treating convection even without their influence is apparent from the review by Zahn. Whilst there have been substantial advances in numerical simulations of convection and in observations of both small- and large-scale photospheric magnetic and velocity fields, Zahn stresses the importance of further high spatial resolution observations from space and of helioseismology in exploring rotation within the convection zone.

In the second section Hammer gives a thorough and lucid review of work concerning the structure and heating of the solar and stellar chromospheres, themes which are continued by Pallavicini in the context of X-ray emitting coronae. However, the examples discussed by Pallavicini are mostly active stars, such as flare stars and RS CVn binaries. Single main-sequence stars, for which the solar–stellar connection may be more direct, are neglected. There is also an undue preoccupation with simple models of magnetic loop structures as the building blocks of coronae. Loops are certainly relevant to solar active regions, which are emphasized by the temperature sensitivity of X-ray instruments. But the ambient corona, observed through images of EUV lines formed at \(T_e \leq 2 \times 10^6\) K, may be more appropriately treated as an open atmosphere since any loop structures will have lengths which exceed the isothermal hydrostatic scale height. Until variations of stellar X-ray fluxes and temperatures are observed we cannot say whether or not the total X-ray flux observed originates from the ‘average’ corona or stellar active regions. Also the simple models used for loops and stellar flare decays have inbuilt assumptions with consequences that are not brought out. Montmerle gives an up-to-date review of work on pre-main-sequence stars and the signatures of winds, chromospheres and accretion disc boundary layers. Reimers takes a phenomenological approach in describing recent results on winds from evolved stars and the solar wind. Overall the section is incomplete in that a review of results from the IUE satellite would have been of value in making comparisons between solar and stellar chromospheres and transition regions.

The final section provides a useful discussion by Kneer of the pros and cons of optical observations from the ground and space. Some results from the Spacelab 2 SOUP experiment on granulation and velocity fields are given by Title. Bonnet reviews future prospects for observing the Sun and stars from space.