Photometry and precise spectroscopy, where the impact of fibres was once thought likely to be considerable, are not mentioned much. One newer area which must be important is the use of fibres in the infrared; there are two papers on this promising aspect. Interferometry with fibres is likewise an area with great potential, and here there is a single paper.

In general, therefore, although not many startling new ideas will be gleaned from this book, it is a record of considerable technical achievement in an important area of astronomical instrumentation. All libraries will want a copy, and astronomers who make frequent use of fibre optics would do well to browse through it. — CHARLES JENKINS.


Understanding the solar transition region, which separates the chromosphere from the corona, is of fundamental importance in solar physics. A review of its observational properties and how they have been used to model its structure and energy balance is a welcome addition to the literature.

Mariska concentrates on observations made from the instruments on the Apollo Telescope Mount (ATM) during the Skylab missions in 1973 to 1974, and from subsequent space missions. The ‘historical’ aspects are therefore somewhat eclectic and not all relevant earlier material is included.

The main body of the book begins with a summary of how optically-thin emission lines are formed, and of the atomic processes that determine the state of ionization. There is also a useful section on methods of determining electron densities and temperatures from line ratios. This material forms a foundation for the interpretation of the many different observational results, which are discussed later.

Observations of line intensities in the transition region, and their relation to the observed properties of the chromosphere, corona, and surface magnetic fields are then described. The ATM observations showed clearly the persistence of the supergranulation cell network through the transition region and important quantities such as the cell boundary to cell interior intensity contrasts were measured. These observations form the basis of modelling the structure of the transition region, through the determination of the emission measure \( \int n_e^2 \, dr \).

The small average thickness of the transition region up to about \( 2 \times 10^5 \) K \((<100 \text{ km})\) is apparent when the emission measure is divided by the average electron density. Relative element abundances can also be found. The methods of measuring the density and temperature from emission-line ratios are then applied to show that the mean electron pressure (in the ‘quiet’ Sun) is around \( 10^{15} \text{ cm}^{-3} \, \text{K} \), and that spatially- and time-averaged temperatures are close to those deduced from the maxima of theoretical relative ion populations. Mariska stresses that higher-resolution observations are required to test the validity of these results on smaller spatial and shorter time scales.

While observations on spatial scales down to 5 arcsec \((\sim 3625 \text{ km})\) were obtained from the Harvard College Observatory Spectrometer on the ATM, the spectral resolution was only about 1 Å. Measurements of emission-line profiles are crucial in determining the non-thermal energy density, and the rocket programmes of the USA and UK provided the early observations. The instruments of the Naval Research Laboratory (NRL) (flown on the ATM, rockets, and the Spacelab 2 Shuttle Mission), in particular the High-Resolution Telescope...