Universe formed ‘bottom-up’ (i.e. small units such as globular clusters coming together to form galaxies and then clusters of galaxies) or ‘top-down’.

The highest peaks in the clustering terrain are the rich (Abell) clusters. The radio/optical/X-ray correlation papers on this topic were all solid, but some were just refinements of earlier work. The recent increased sensitivity of hydrogen-line receivers, however, has resulted in some very good work, particularly Jacqueline van Gorkom’s VLA maps of spiral galaxies in the Virgo cluster which show normal HI disks in the outer regions of the cluster, very small disks in the core, and some distorted disks in between, providing quite direct evidence for ram-pressure stripping. It is a shame that the small width of the protected 21-cm band limits such investigations to nearby systems. Also worth reading are the papers on detailed velocity measurements of galaxies in clusters such as the observations by Lucey et al. demonstrating the merging of two sub-condensations in Centaurus.

Thank goodness that multi-aperture spectrographs will mean that this sort of work can be done in future in less than five years.

Interest in poorer groups of galaxies has increased in recent years and redshift surveys confirm that many groups are bound systems with M/L ratios similar to those of rich clusters. Papers, such as the X-ray observations by Kriss of MKW cD-dominated groups, reinforce the relationship of poor groups to their richer brothers.

In summary, this book is a collection of papers of generally high quality on most aspects of the clustering phenomenon, and as such is a useful reference work which I expect to find in all good libraries; but its high price means I will be surprised to find it anywhere else. Unfortunately, as with most conference proceedings, the reader is not overwhelmed by excessive organization and it would have been helpful if the eight pages of contents had been divided into sections to aid subject location.—IAN MCHARDY.


Magnetic fields pervade almost all of the Universe and are increasingly recognized as central to any explanation of many astrophysical phenomena. In the case of the Sun, there is hardly a single atmospheric phenomenon in which the magnetic field does not play a vital rôle. In sunspots, spicules, prominences, coronal heating and in flares the key to a successful physical model undoubtedly resides in the magnetic field, though the precise mechanisms at work are still not understood despite extensive investigations. Much the same could be said of other astrophysical plasmas, such as in accretion disks, planetary magnetospheres, and jets.

Of universal interest is the question of what happens when a magnetic field becomes unstable, and what physical processes brought it to that state. Magnetic reconnection, the local disruption of a magnetic field’s topology, is widely believed to underlie an explanation of the flare phenomenon, for example. For reconnection to occur, it is necessary to depart from Alfvén’s frozen-flux state through the effects of finite electrical conductivity.

In the present IAU Symposium the editors have succeeded in bringing together a wide range of expertise, covering laboratory, planetary, solar, stellar and galactic plasmas. A good way to start with this volume is at the end! There one will find an excellent summary (and, in fact, guide), by V. Vasyliunas, to the broader aspects of unstable current systems. Thereafter one may delve into whichever corner of the