COMMISSION 12: RADIATION AND STRUCTURE OF THE SOLAR ATMOSPHERE
(RADIATION ET STRUCTURE DE L'ATMOSPHERE SOLAIRE)

PRESIDENT: M.K.V. Bappu

A short business meeting was held on August 14. The slate of new officers was approved, and the Commission elected the following Organizing Committee:

President: Y. Uchida

Vice-President: R.W. Noyes

Organizing Committee: Ph. Delache, F.L. Deubner, A.H. Gabriel, S.I. Gopasyuk, J. Harvey, R. Howard, P.R. Wilson, C. Zwaan, M.K.V. Bappu (ex. officio).

The Commission approved of the format of its triennial report. This constituted a critical review of new results obtained and an outline of trends in areas within its purview that are of topical interest.

The Chairman of the Working Group on Eclipses (Newkirk) gave a brief account of the activities of this group. Principally, activity has been confined to foster contacts between scientists interested in observing eclipses and the coordinators in the countries that are favourably located for such observation. The President thanked G. Newkirk for his splendid effort over the years as Chairman. The Working Group was reconstituted with J.L. Leroy as Chairman and A. Fiala as member.

The Commission agreed that it would be useful to plan on a symposium or colloquium in 1982 with a location in the vicinity of the venue of the next General Assembly. The Commission had co-sponsored the joint discussions scheduled for the current General Assembly on (1) Velocity Fields on the Sun (2) Stellar Instabilities (3) Chromosphere-Corona Wind Complex and Mass Loss in Stellar Atmospheres. In addition, two meetings with Commission 10 were held on (1) The Coming Solar Maximum and (2) The MHD of Sunspots. The Commission also had a three hour session on August 17, 1979 for a presentation of review talks on "Waves in the Solar Atmosphere". The session was chaired by Y. Uchida. The topics were (1) The generation of Alfven waves by the overstable convection and the cooling of sunspots (2) Is the coronal heating by waves? (3) Additional acceleration of solar wind streams in coronal holes. The speakers were E.N. Parker, M. Kuperus and T. Holzer. A brief summary follows:

Parker restressed the possibility that Alfven waves, which are generated in the over stable convection and escape from the umbral subphotosphere carry the energy out of the region that results in the cooling. The cooled gas would fall due to smaller scaleheight and a sideward collapse would follow to push the field together to form a sunspot. Admitting that the escape of the waves to the outer layer (corona) was difficult to consider by virtue of observational restrictions, he considered their downward propagation. He then introduced the idea that the fluxtube inside the umbra might be a

bunch of smaller flux tubes and that the umbral subphotosphere might consist of magnetic and nonmagnetic regions. He proposed that the gas between the fluxtubes would play a vital role in such a situation, and in the presence of a down-draft, the heat which would pile up in the subphotosphere would be swept away from the region.

Kuperus pointed out that the acoustic shock wave theory had in recent years seemed unsatisfactory. The Skylab observations had shown the corona to be highly structured, suggestive of a very close relationship with the magnetic field as well as the lack of detection of any pressure wave type of motion being propagated through the transition layer. Among alternate possibilities of the heating mechanisms, that relating to Alfven waves seem attractive since these propagate along the magnetic field structure. The value and temperature distribution profile are determined by the property of heat conduction and are independent of the specific nature of the heat source. Mode coupling of such a basically non-dissipative wave to a dissipative mode was indicated as a means of converting the kinetic energy into heat. He also stressed the importance of another possibility of heating by Alfvenic surface waves which propagate along the surfaces of magnetic tubes and are termed kinetic Alfven waves because of the need to use the kinetic theory, since the gyro-radius is larger than the wavelength perpendicular to the field.

The identification of the source of the high speed wind stream with the coronal hole has raised a riddle since the original thermal expansion model of the solar wind requires a higher temperature region to maintain the faster stream, but the condition in the coronal hole suggests the contrary. In his talk on topic (3), Holzer first discussed observational results which confirmed the above-mentioned identification. Then, citing the result of one of the possible hypotheses, the calculation of the flow with the funnelled crossection, he argued that although the coronal density could be lowered to explain that of the coronal hole and the velocity could be raised near the sun by this funnelling-crossection mechanism, the velocity at 1 AU in this hypothesis was systematically lower than what was needed. He turned to another hypothesis in which either the addition of heat or the addition of momentum was taken into account, and showed that both could give rise to higher velocity around 1 AU. Momentum addition in the supersonic region seemed to be favoured more by the observations. It was also considered to be most likely due to the interaction of the flow with Alfven waves.