B. JOINT DISCUSSION
ON
SOLAR MAGNETIC FIELDS

Friday 18 August 1961 at 14^h00^m

ORGANIZING COMMITTEE: Dr Leo Goldberg, Dr H. Alfvén, Dr A. Severny, Dr M. Waldmeier

MEETING CHAIRMAN: Dr M. Minnaert

SECRETARIES: Dr Edith A. Müller and Dr K. O. Kiepenheuer

PROGRAM

1. The Solar Magnetic Cycle: *H. W. Babcock*
2. Magnetically Active Regions on the Sun: *A. B. Severny*
3. Sunspot Magnetic Fields and Loop Prominences: *V. Bumba* and *J. Kleczek*
4. Configuration of Magnetic Fields in Sunspot Umbrae: *V. Bumba*
5. The Sun's Magnetic Field from Radio Observations: *A. Hewish*
6. Variations of the Sun's Poloidal Magnetic Field: *M. Waldmeier*
7. Filamentary Currents and the Magnetic Conditions on the Sun: *H. Alfvén*
8. Cosmic Ray Flares: *M. A. Ellison*
9. The Solar Magnetic Field in Plage Regions: *R. B. Leighton*
10. Un Magnétomètre Mesurant les Champs Magnétiques Perpendiculaires au Rayon Visuel. Applications a l'Etude des Champs Radiaux Autour des Taches: *A. Dollfus* et *J.-L. Leroy*
11. Magnetic Fields in Prominences at the Limb: *H. Zirin*

1. THE SOLAR MAGNETIC CYCLE

H. W. Babcock

First I should like to refer briefly to the observations that make this development possible. Records obtained with the improved solar magnetograph, showing the pattern of weak magnetic fields distributed over the Sun, and the changes in these fields, now enable us to specify many features of the topology of the lines of force, both above and below the surface. These observations depend on the Zeeman effect, which is fundamental and quantitative.

The magnetograph has been developed for automatically scanning the entire disk of the Sun with a resolution of 23″ in a period of one hour. Seven distinct electronically-calibrated levels of field intensity are recorded, along with the magnetic polarity of each point. The short recording line is made to slant to right or left to indicate magnetic polarity, while it is made to undergo abrupt changes in brightness or form at calibrated levels of 1 gauss, 2, 6, 10, 15, 25, and 60 gauss.

As was shown some years ago, optical activity occurs wherever the magnetic field is sufficiently strong. Generally, a BMR (bipolar magnetic region) emerges in a small and compact form. It grows rather rapidly until the magnetic field lines, looping through the surface, reach a maximum, after which the total flux seems to remain nearly constant. As the field intensity grows in a young BMR, calcium plages, faculae, and sunspots appear in that order. Later, the BMR expands, and gradually the various kinds of optical activity subside in reverse order