

# Summary of the Czechoslovak Solar Corona Observations

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Solar eclipse expedition of the Astronomical Institute of the Slovak Academy of Sciences was carefully prepared in 1979. From January 10 to February 5, 1980 the fully equipped expedition reached by a lorry and a landrover the chosen place of observation near village of Jawala Gera ( $\lambda = -76^\circ 52'$ ,  $\phi = +15^\circ 51'$ ) in Raichur District, Karnataka State. We have found a camp very well prepared by our Indian colleagues (including electricity, time signal, housing, eating, etc.). Many thanks. From the quite clear and sufficiently windless fourteen days we have spent in the camp, the eclipse day was the best one and this was the most important circumstance. Final part of our expedition returned to Czechoslovakia on April 1 only, so, our results are quite preliminary, describing the obtained observational material.

## 1. WHITE LIGHT PHOTOGRAPHY (V. Rušín —leader of the expedition, P. Zimmermann).

A 20-centimetre f/15 achromatic telescope, fed by a 30-centimetre Jensch coelostat, was used to photograph the corona through yellow Schott GG-14 filter. Four exposures taken on ORWO NP-27 plates with exposure-times from 1/200 to 2 seconds are of very good quality. The pictures (see example in Figure 1) show clearly a circular maximum-type corona with large number of coronal streamers and other structural details, seen up to  $3R_\odot$ . In the future elaboration, we would like to study the coronal structure in detail, namely in connection with activity on the disk. The absolute photometry and density calculations are also intended.

## 2. POLARIZATION STUDY OF WHITE LIGHT CORONA

### (a) Up to $3.5R_\odot$ (Š. Knoška, J. Sýkora)

A 10-centimetre f/10 achromatic telescope was used to photograph the corona through a polaroid filter at three positions differing by  $120^\circ$ . Eighteen photographs were taken on ORWO NP-27 35-millimetre film. Exposure-times were 1/250, 1/60, 1/15, 1, 4 and 16 seconds. The last two series are a little over-exposed. Three 1/15 exposures are shown in Figure 2.

### (b) Up to $9R_\odot$ (V. Rušín, P. Zimmermann)

We used a 300-millimetre f/4 object-glass to obtain the similar series of three pictures as in experiment under (a). In this case, exposure-times were 1/250, 1/4, 4 and 16

seconds. Two last series are also over-exposed but three pictures taken with exposure-time of 1/4 second show polarization up to  $9R_\odot$ .

Though the study of the polarization in white light corona belongs to standard experiments made during total solar eclipses, the investigation of the variability of the polarized corona with the activity on the limb and with the solar cycle call for further observations. That is to say, measurements of polarization are the only direct method of determining the electron density along the line of sight. The degree and plane of polarization should be simply calculated and we would like to derive the absolute intensities also.

## 3. POLARIZATION IN THE CORONAL EMISSION LINES 530.3 nm AND 637.4 nm (J. Sýkora, L. Scheirich)

Two equal 130-millimetre f/15 telescopes have been employed to record polarization of the corona in the green and red emission lines. The telescopes were equipped with narrow pass-band filters and rotating polaroids. The filters were Type B-13 of fy Baird-Atomic production — green of 0.2 nm and red of 0.3 nm in bandwidth. Thermostats were used to keep the pass-bands on the spectral lines. Three 40 seconds exposures were made in both lines at three positions of the polaroid in settings separated by  $120^\circ$ . ORWO NP-27  $6 \times 6$  centimetre film was used.

More and more attention is being devoted to the study of polarization in coronal emission lines, because it may be one of the most hopeful sources of information about the structure of the magnetic field and other physical parameters in the solar corona. Since the degree of polarization increases with distance from the solar limb, the most reliable results can be obtained during solar eclipses.

Our original negatives (see example of the copies in Figure 3) show polarization up to about  $0.5R_\odot$  for the green line and  $0.3R_\odot$  for the line. Direction and degree of the polarization will be calculated for both lines and possible discrepancies from the theoretical values will be discussed. We hope that analysis and comparison of the emission lines polarization with white light polarization, activity and magnetic structures on the solar limb will be also very interesting.

## 4. SATELLITE CORONAGRAPH (M. Minarovjech)

The instrument is intended to be used to observe K-corona in the range  $2-10R_\odot$  from the satellite outside

solar eclipses. During February 16, 1980 eclipse the right technical functions of the all instrumental details were verified. Namely, connection of the telescope with TV-camera and employment of the field vignetting caused by external discs as a radial filter were of

the main interest. The image was recorded from TV-monitor.

The instrument is prepared in frame of the Inter-cosmos program and should be on the orbit in 1984-85.

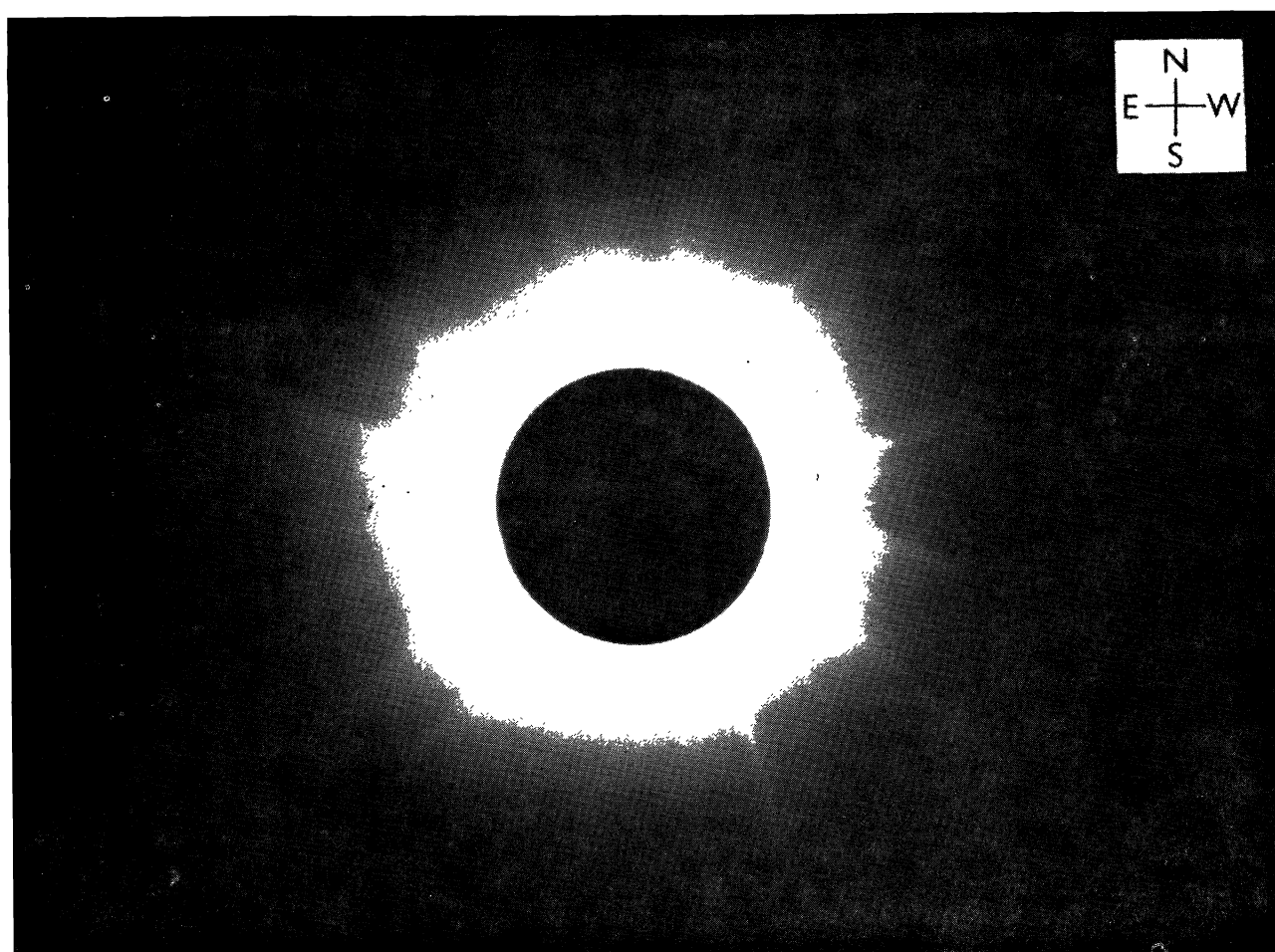


Fig. 1 : White light corona taken with exposure-time of 2 seconds. Details see in the text.



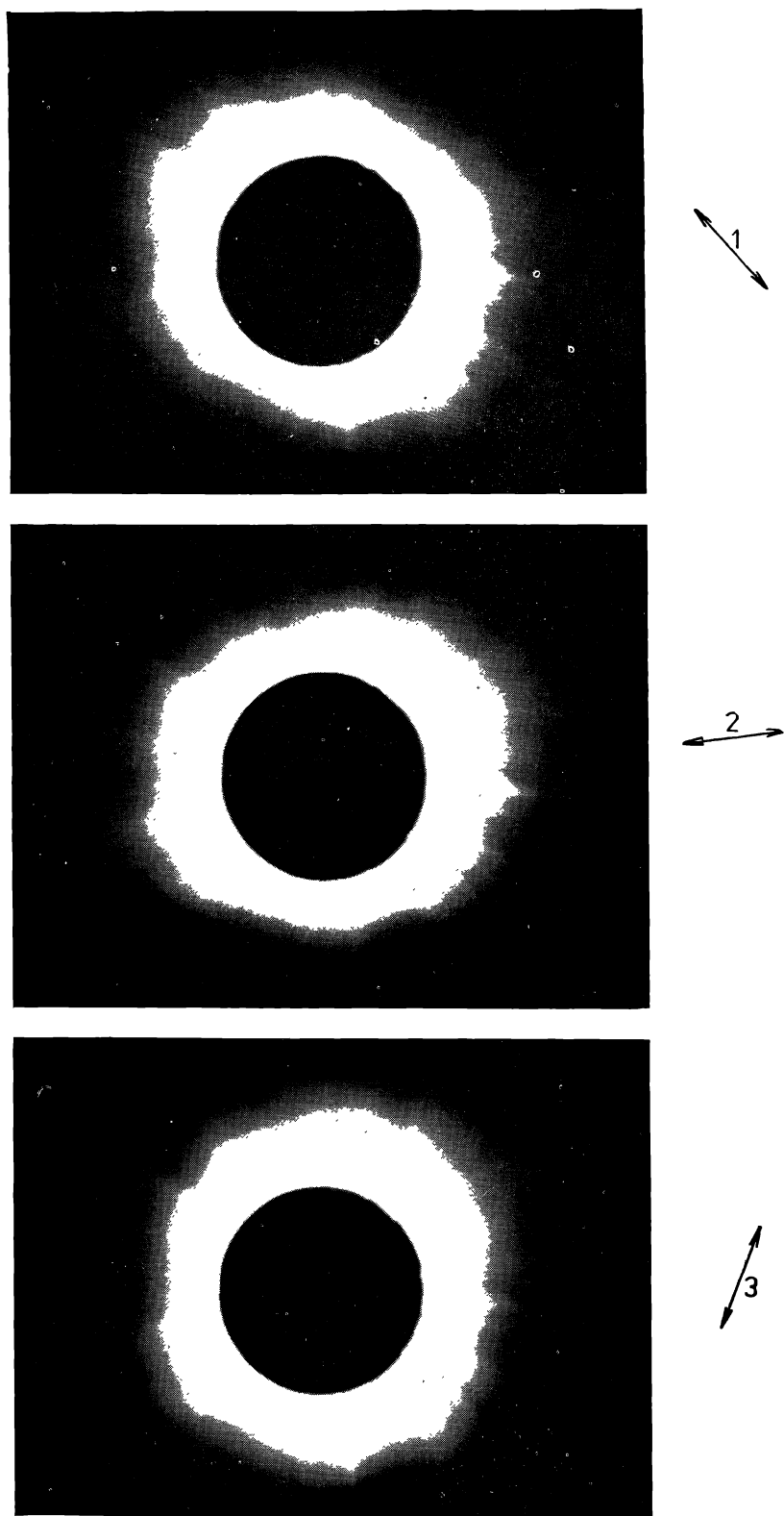


Fig. 2 : Polarization pictures of the white light corona obtained at an exposure of 1/15 s. The position of the polaroid axis during the exposure is shown on the r. h. s. North is up and about  $10^\circ$  to the right.



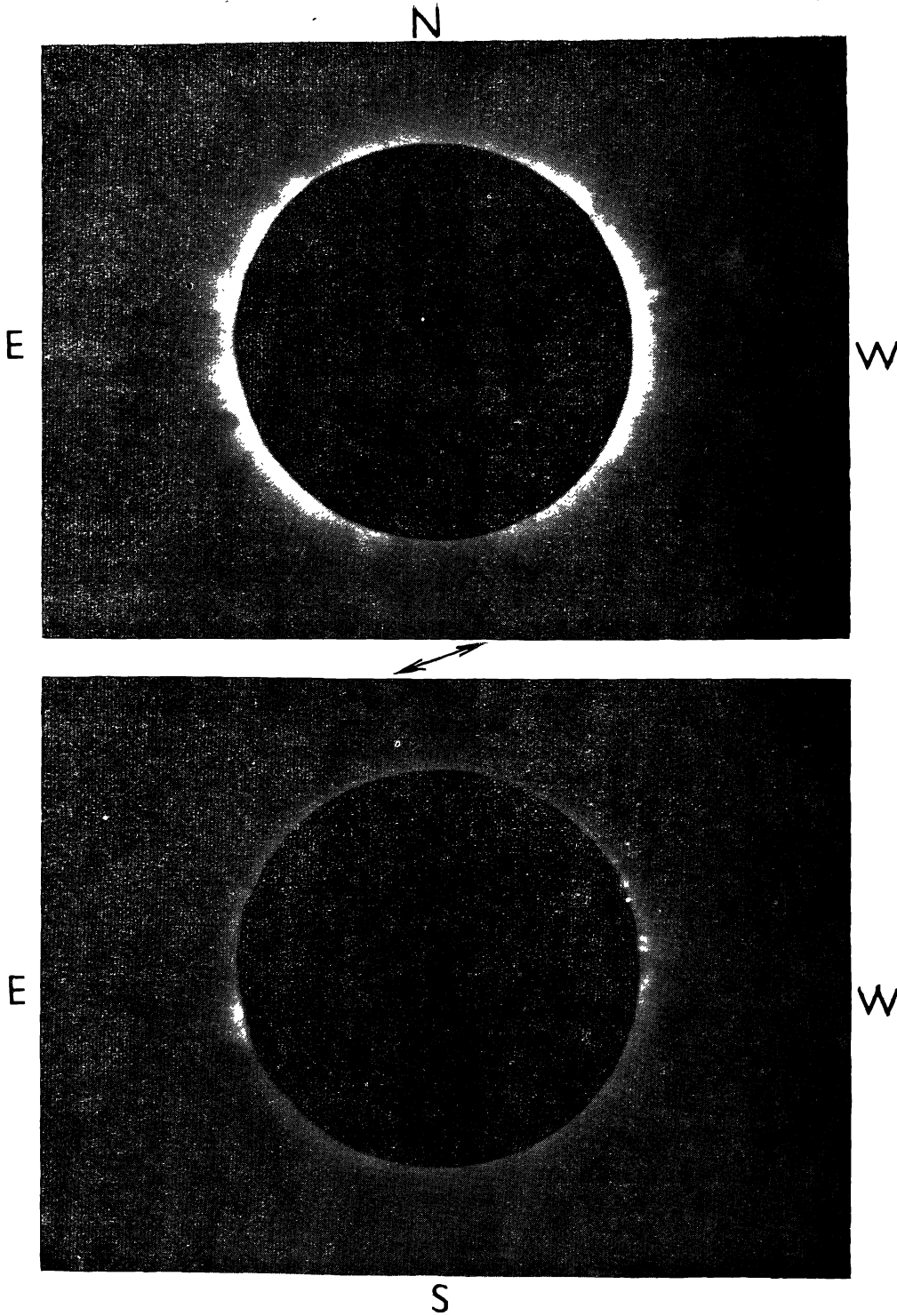


Fig. 3: Polarization filtergrams in the green (above) and red (below) coronal lines taken with exposure of 40 seconds. Between the pictures the orientation of the polaroid filter is indicated.

