

I. PHYSICS

Astrophysics (Solar Corona)

OBSERVATION OF TOTAL SOLAR ECLIPSE OF 16 FEBRUARY 1980

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THE aim of the experiment is to observe, in general, the Solar Eclipse of February 16, 1980, to obtain the vertical intensity gradients of spectral lines in the vicinity of MgI b lines and to verify the effect of relative shifts of some lines, in the same spectral region, found by Houtgast and Namba (1975).

Keywords: Solar Eclipse; Vertical Intensity Gradient; Relative Shifts.

EQUIPMENT

The flash spectrum equipment consisted of a horizontal heliostat (the light beam shared with another experiment of Indian Institute of Astrophysics), a 74 mm × 82 mm, 1200 lines per mm grating and a 89 mm diameter telescope Questar, 1200 mm focal length—making a slitless spectrograph of 0.29Å/mm dispersion. It was followed by Vidicon, Model 1254 B, camera and the OMA-2 system, capable of recording 12 photometric profiles across the 12.5 × 12.5 mm field with 25 μm resolution, ± 12 μm position accuracy and 1 : 10,000 contrast. It was decided to preprogramme the OMA-2 system to record a time sequence of 12 spectra in 1-second intervals around the moment of second contact of eclipse—in order to obtain the vertical intensity gradients of spectral lines in the vicinity of MgI b line. In the case of the third contact of the eclipse we intended to try to verify an unusual effect of relative shifts of some lines in the same spectral region, found by Houtgast and Namba (1975). The system was preprogrammed to record 12 quasi-instantaneous profiles in the two-dimensional field, couple of seconds after the third eclipse contact.

The instrument for the corona polarimetric programme was a 60 mm diameter, 850 mm focal length refractor, azimuthally mounted, with a polaroid rotating in 60° steps in front of a 35mm still-camera Zenit ES. The spectral region has been selected to orange and red in order to avoid the 530.3 nm green coronal emission. ORWO NP-27 superpanchromatic film was used.

The same refractor, with a Barlow lens extending its focal length to 1300 mm, was used for the partial-phase eclipse observation. An orange filter has been applied and the pictures were taken on FOTOKEMIKA Mikrofilm N orthochromatic emulsion.

RESULTS

The observational material contains:

(1) Twelve quasi-instantaneous photometric profiles of the spectrum at different position angles around the third contact point of the Sun. They cover some chromospheric portions as well as a piece of already visible photosphere (the

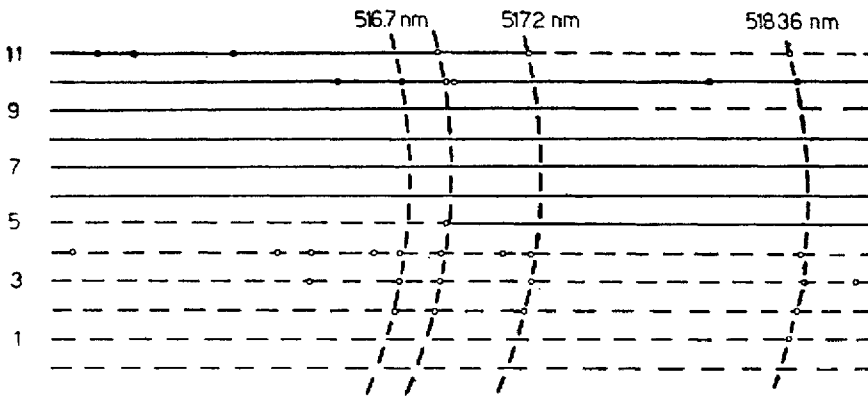


FIG. 1

“diamond”), Fig. 1. Geometrical reconstruction of the field and further photometric procedures are in progress.

The time-sequence of the second contact flash was not recorded successfully—most probably due to high temperature (near the limit of the working temperature range of OMA-2).

(2) A set of pictures of inner corona has been obtained. Due to the overcrowded programme of the same telescope, the pictures turned out to be slightly out of focus. Nevertheless, the photometric reduction will be undertaken.

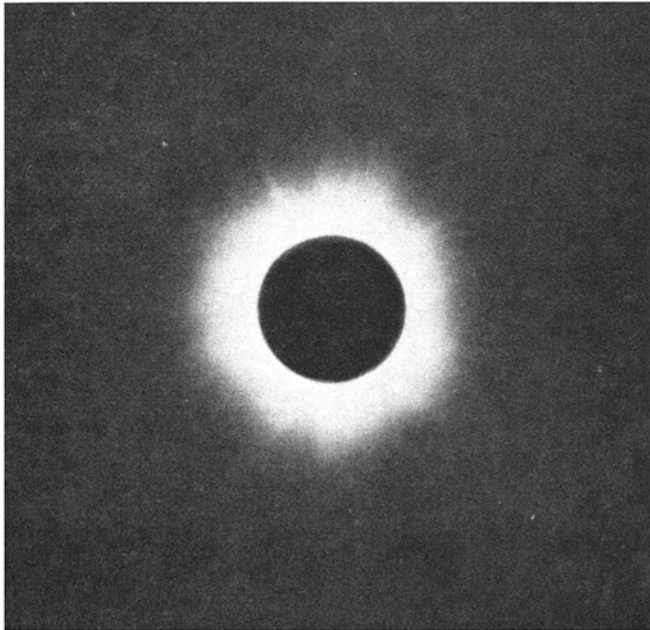


FIG. 2

(3) During the partial phase of the eclipse, 66 pictures were taken in a two-hour time interval, except for a half-an-hour interruption around the totality (at the same telescope the coronal programme was performed). The observational material has been handed over to the corresponding astrometric group of Belgrade Astronomical Observatory for further analysis.

(4) The corona, Fig. 2, and the Diamond ring have been taken by N. Uzelac.

LOCATION

The observations were done at Jawalagera Central State Farm (Long. $76^{\circ} 52' 52''$ E, Lat. $15^{\circ} 50' 57''$ N, $h = 400$ m) in Karnataka.

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REFERENCES

- Arsenijevic', J. (1969). Resultants de l' observation polarimetrique de la couronne solaire du 15 Feorier 1961. *Bull. astr. Obs. Beograd*, **27**, 40.
- Houtgast, J., and Namba, O. (1975) A 16-mm film "Solar Spectrum at the Extreme Limb observed during the 1973 June 30 Total Eclipse at Atar, Mauritania." (Report at the first European Solar Meeting, Florence during February 25-27, 1976); *Osservazioni e Memoir Observation de Arcetri (Firenze)*, n-105.
- Kubicela, A. (1968) Une modification du spectrographe cromospherique a plaque mobile. *Publ. astr. Obs. Beograd*, **15**, 1.