

I. PHYSICS

Astrophysics (Solar Corona)

EXPERIMENTS OF THE GERMAN GROUP AT PALEM/INDIA

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THE main purpose of the experiments listed below was to provide teaching materials for students showing the principal working methods in solar eclipse investigation:—

- 1) Corona polarimetry.
- 2) Photometry of the inner corona.
- 3) Flash and corona spectrum.
- 4) Mapping of the outer corona.

Keywords: Corona Polarimetry; Photometry of the Inner Corona; Flash and Corona Spectrum; Mapping of the Outer Corona.

EQUIPMENT

- (1) 62.5 mm *f*/16 objective, polarimeter, motor film drive exposures of 1/4, 1/5 and 1/60 second at polarimeter settings of 0°, 45°, 90°, 135°, 60° and 120° were taken.
- (2) 89 mm *f*/14 objective.
- (3) 2.8/135 mm Zeiss lens and grating with 1200 lines/mm and two special prisms to divide the spectrum in two parts to get it on the same frame. Slitless spectra of the chromosphere from 3800–6900Å were taken with a motor camera. Time resolution was 0.2 seconds. With the same equipment coronal spectra (41Å/mm) were taken with exposure times upto 4 seconds.
- (4) 50 mm *f*/4 objective.

RESULTS

(1) *Corona Polarimetry*

24 photos during eclipse had been taken. The photos show the polarisation of the corona upto 1.5 solar radii in six different orientations. In Fig. 1 the orientation of the polarisation filter is changed successively by 45°. The existence of polarisation in the solar corona is obvious.

(2) *Photometry of the Inner Corona*

20 white light pictures of the inner corona had been taken. Some show very delicate structure especially at the west limb.

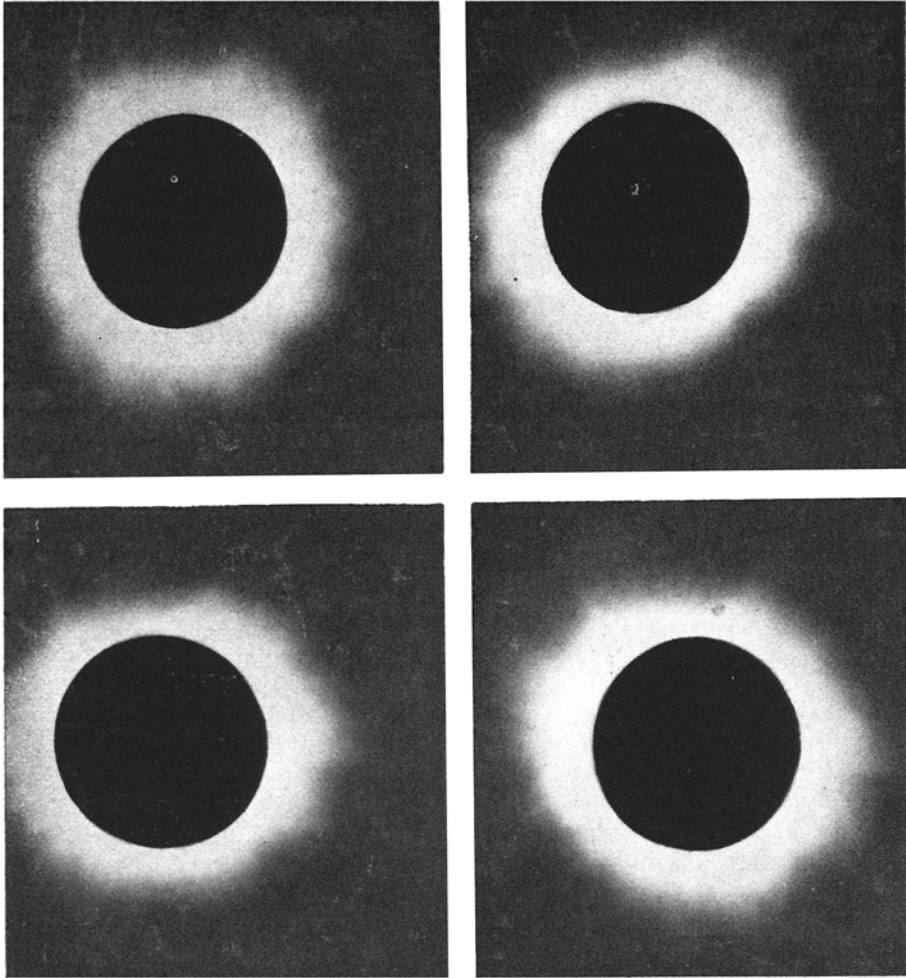


FIG. 1. Polarisation of the solar corona. Filter position in 45° intervals. Exposure times : $1/4$ second each. West is to the left.

(3) *Flash and Corona Spectrum*

A single densitometer-tracing of flash spectrum shows some of the strongest lines (Fig. 2). When the motor function was well again, the flash spectrum had already disappeared.

Coronal spectrum negatives are fairly good and show mostly structures in chromospheric lines. The coronal structures in different lines are very weak but we will also examine these negatives with the help of image processing.

(4) *Mapping of the Outer Corona*

The reddening of the outer corona starting at about $18 R_0$ is to be seen on the

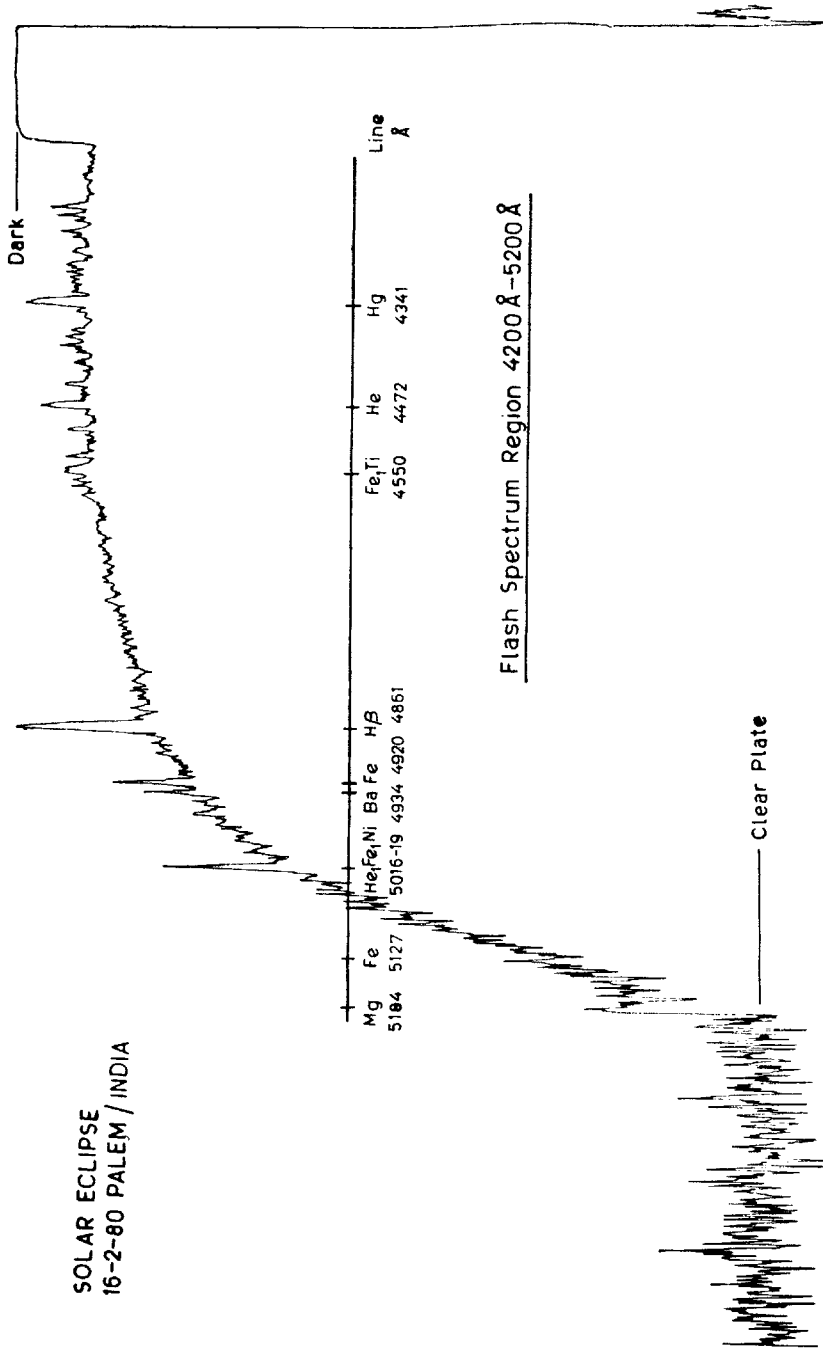


FIG. 2

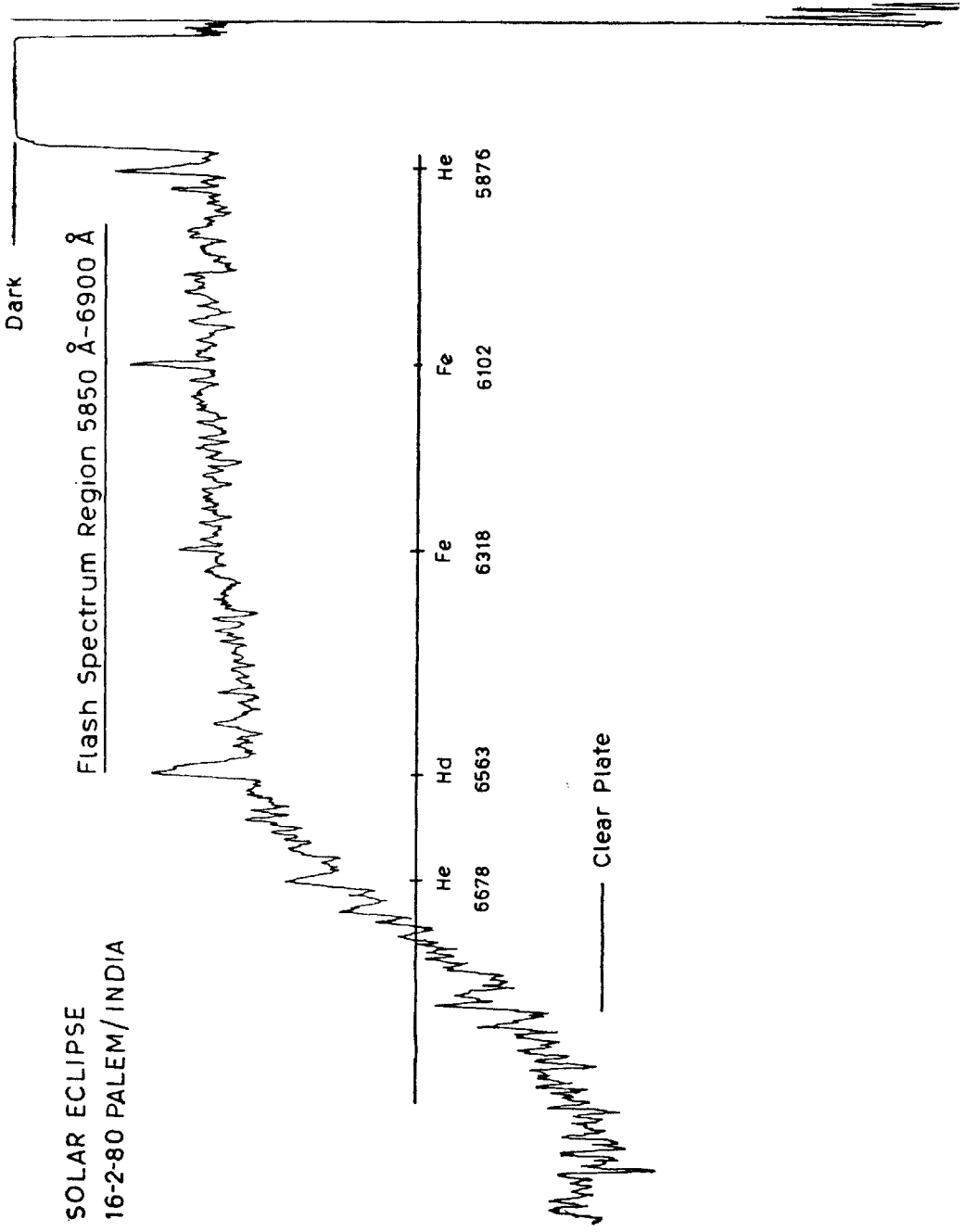


FIG. 3

negatives. A preliminary image analysis (Fig. 3) shows isophotes to more than 10 solar radii. In a later study, we will transform the already measured density map with a computer program simulating a radially graded filter. We hope to show coronal structure upto considerable distances.

LOCATION

Palem. (Long. $-78^{\circ} 15'.0$; Lat. $16^{\circ} 31'.5$ Elevation 642m

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