

difficulties in stellar spectroscopy, are not however of much moment here for, owing to the short and simultaneous exposures on opposite limbs, temperature changes will have no appreciable effect, and there can be no flexure when the spectrograph is stationary during the exposure. It may not be amiss to repeat here the four essential precautions for accurate observations given in the previous paper.

(a) The emulsion on the photographic plate must be exactly in the focus of the spectrum.

(b) The illumination of the grating from the opposite limbs of the sun must be similar and uniform.

(c) The solar definition must be good, the image steady, and the sky free from haze.

(d) Care must be taken that the reflecting prisms receive light from the desired latitudes.

6. Precautions *a* and *b*, conditions inside the spectrograph, to which may be added the avoidance of undue heating of the slit jaws, are very necessary to prevent systematic displacements of the lines as a whole introducing corresponding errors in the velocity values. If either *a* or *b* are exactly fulfilled an approximate realization of the other should be sufficient; but, as it is practically impossible either to get or keep the plate at the exact focus or to have absolutely equal and uniform illumination of the lens and grating from the opposite limbs, the only safe procedure is to fulfil both conditions as closely as possible. Consequently the plate focus was determined frequently both by the definition test and, as a check, by the Hartmann method of extra-focal exposures. It was found that the field both in the $\lambda 5600$ and in the $\lambda 4250$ region was curved, concave to the lens, about 2.5 mm. longer at the centre than at the ends of a plate 30 cm. long and inclined about 1° , in opposite directions for the two regions, to the normal to the axis. The illumination of lens and grating was tested before and after each plate, which consisted usually of seven spectra one of each of the six latitudes from 0° to 75° , and one of the pole. This was done by opening the slit wide enough to allow a visible image of the illuminated concave mirror to be projected on the diaphragmed front surface of the collimating objective. If this image was not central for both systems of prisms it was easily made so by the adjusting screws provided. It was found frequently that a slight change in position of the overlapping images occurred during the time the seven exposures were made, but never sufficient (since the image is considerably larger than the used portion of the grating) to prevent uniform illumination. This change of adjustment of the prisms must be due to the heating produced by the sun's rays and to minimise this effect, the heating of the slit jaws, and the distortion of the coelostat, secondary