Recent Work at Arcetri.

NUMBERS 48 and 49 of the 'Osservazioni e Memorie del R. Osservatorio Astrofisico di Arcetri' give evidence that this Observatory is keeping well abreast of modern developments in astronomy, and playing an important part in international cooperation.

Spectroheliograms in Hα continue to be taken for the Bulletin for Character Figures of Solar Phenomena, and in a special article the results from this and the other contributing observatories are compared and analysed; the usual observations of prominences and chromosphere have been made and are summarized together with those of Catania, Madrid, and Zurich; and a further series of the images of the Sun's limb observed spectroscopically at Catania, Madrid, Zô-sé, and Zurich, has been published as an appendix to the 'Osservazioni e Memorie.'

In addition to this, the staff has carried on the regular observation of lunar occultations, meridian observations of planets, and a study of the spectrum variations of Cepheid stars.

The Hale spectrohelioscope was mounted in 1930, but could not be taken into regular use for lack of sufficient

staff. A new grating, ruled by Jacomini and generously presented by the Mt. Wilson Observatory, gives excellent results with the spectrograph and spectroheliograph of the Solar Tower. It has a ruled surface of 10×11 cm., with 600 lines to the mm., and very bright spectra are obtained in the first order on one side and the second order on the other side of the central image.

An intensive study of the solar spectrum has been made, using photographs taken at Arcetri, and also a series taken with the 150-ft. Tower Telescope at Mt. Wilson, where the Director, Dr. Abetti, spent six months in 1930. This study is described and discussed in detail in four papers by Drs. Abetti and Righini. The main conclusions are :—

(1) The equatorial rotation deduced from the reversing layer, and measured in the green region, on 18 plates taken at Arcetri in February to October 1930, is found to be 1·85 km./sec. ; and this value, when compared with other results, from Dunèr's in 1900 to those of Potsdam in 1930, seems to show that there has been a diminution of rotation speed.

We should bear in mind, however, that this question of a change in rotation velocity is a difficult one (as Dr. Righini allows). The recently published measures of Storey at Edinburgh * show no appreciable change from the year 1914 to the present time, and his values are consistently larger than the Mt. Wilson figures, averaging 1·98 km./sec.

(2) From the same 18 plates taken at Arcetri, the magnesium triplet in the green, representing a higher level, gives the rotation value of 1·90 km./sec. The contours of these lines were also studied, and are shown in diagrams, at six different points between the Sun's centre and limb.

(3) Limb spectra photographed by Ellerman at Mt. Wilson in 1924, showing some of the bright lines of the reversing layer, have been measured at Arcetri. Most of these lines are found to be due to ionized elements at comparatively low levels. The presence of praseodimium is clearly established.

(4) On 13 selected plates of limb spectra showing bright lines, photographed at Mt. Wilson in 1930 by

* *Monthly Notices R. A. S.* 92. 740 (1932).

Dr. Abetti and Dr. Nicholson, the rotation at the Sun's equator, deduced from these lines, was found to be 2·06 km./sec. The limb shift of these lines, by which is meant limb *minus* centre of disc after allowing for the shift to violet at the centre due to ascending currents, gives a mean value from 23 lines of −0·007 A ±0·001.

This assumes that the shift at the centre (St. John effect) amounts to −0·003 A. The lines measured, with the exception of two magnesium lines, are mainly of rare earths, the wave-lengths of which have not been compared directly with the Sun, and so the correction for the St. John effect we think must be very doubtful. The St. John effect depends markedly on intensity, yet practically the same correction is applied to the strong lines of magnesium and the very weak lines of the other elements.

Omitting this correction, there remains a small shift to the violet of these emission lines compared with the same lines at the centre of the disc. This we think needs careful confirmation, as other work has indicated that the *absorption* lines at the limb, which are the counterpart of the emission lines, are in general shifted to red compared with the centre, and the weaker lines are more shifted than the stronger *. Alternate exposures on different light-sources (limb and centre) are always subject to doubt unless terrestrial lines can be used as a check on the stability of the spectrograph. Also bright lines at the limb may be subject to a spurious shift due to the unsymmetrical illumination of the slit. It is not stated in the Memoir if these sources of error have been satisfactorily eliminated.

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