CORRESPONDENCE.

To the Editors of 'The Observatory.'

The Spectrum of Sirius.

GENTLEMEN,—

In the discussion which followed Prof. Newall's account of my paper at the Royal Astronomical Society (*The Observatory*, June 1922) Prof. Lindemann expressed the opinion that the widening of the hydrogen lines in the spectrum of Sirius is due to the Stark effect resulting from the electric field of the ionized atoms.

But, according to the experiments immediately following Stark's discovery, the number of components and the maximum displacements of the outer components of spectrum lines in a series increase regularly with the term number of the series *. In the Balmer lines of hydrogen, therefore, the widening should increase largely towards the violet; whereas I have particularly drawn attention to the fact that there is no such increase of width.

In the case of the iron lines Takamine has shown that the Stark effect is closely related to pole effect, which varies greatly from line to line. But in Sirius the widening is nearly constant throughout the range of spectrum photographed. It is probably

* *Astrophysical Journal*, xli. p. 361.

proportional to wave-length, but the photographs do not cover a sufficient range to settle this point. In any case we can certainly rule out Stark effect, Zeeman effect, and pressure.

Mr. Gregory suggested that long exposure-time might cause an apparent widening of the lines. Owing to a desire to fall in with the urgent request of the Editors of the *Monthly Notices* to make papers as concise as possible, I omitted experimental details; I may now state that the spectrograph used is amply protected against temperature-changes, and perfectly sharp narrow lines are obtained with a two hours' exposure on the iron arc, whether it is continuous or interrupted.

For Sirius the exposure-time ranges from $1\frac{1}{2}$ to $2\frac{1}{2}$ hours' duration, and the iron arc is given about an hour's total exposure during the exposure on the star. The narrow arc lines in the Sirius spectra prove, therefore, that the widening is not of instrumental origin.

Two small reflecting prisms are used on the spectrograph-slit to give the comparison spectrum; but, as the method of illumination is different from that usually employed, a brief description may not be out of place. An enlarged image of the arc is projected on a plate with a hole in it, which allows light from the centre of the arc to pass through; several feet behind this and a few inches in front of the reflecting prisms on the slit is placed a screen of ground glass on which the transmitted light falls as a uniform circular patch, the angular size of which viewed from the slit is several times greater than that of the collimator lens. This ensures the complete and uniform illumination of the collimator and prisms with light from the central portion of the arc. Also the reduction of intensity is such that the arc spectrum is comparable with that of the star, so that long exposures are required.

The very perfect spectrograph, which I built for Venus spectra chiefly, will be taken to Australia for the Eclipse of the Sun, and it is hoped that an opportunity will be found to photograph the spectrum of Canopus on nearly the same scale as the Sirius spectra. A comparison of these would be of great interest.

I am, Gentlemen,

Yours faithfully,

J. Evershed

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