

separately for the two lines and excellent agreement was found. The slit pattern for an infinitely narrow line had a half-width of $\cdot 09$ A.U. for a slit width of $\cdot 025$ mm.

References.

- ¹ Ornstein and Minnaert, *Z. f. Phys.* **43**, 404, 1927.
- ² Allen, *Mem. Commonwealth Solar Obs.* **1**, no. 5, Part I, 1934.
- ³ Redman, *M. N.* **97**, 552, 1937.
- ⁴ F. E. Ross, *Physics of the Developed Photographic Image*, p. 37, 1924.
- ⁵ Allen, *Ap. J.* **85**, 156, 1937.
- ⁶ Unsöld, *Physik der Sternatmosphären*, 275,
 $f_{D_1} = 0.325$, $f_{D_2} = 0.650$, $\gamma = 0.63 \times 10^8 \text{ sec.}^{-1}$.
- ⁷ Schüller, *Naturwiss.* **16**, 572, 1928.
- ⁸ Shane, *Lick Obs. Bull.* **16**, no. 449, 76, 1932.

C O R R E S P O N D E N C E.

To the Editors of 'The Observatory'.

Forbidden Fe III-lines in Celestial Spectra.

GENTLEMEN,—

The analysis of the spectrum of the iron spark in vacuum has enabled us to determine the metastable levels of *Fe III* and the corresponding forbidden transitions. Table I. gives the lowest metastable levels up to 25000 cm.^{-1} .

TABLE I.—*Lowest Metastable Levels of the $3d^6$ Configuration.*

5D_4	0.0	3H_8	20050.0
5D_3	436.4	3H_5	20299.5
5D_2	738.3	3H_4	20481.4
5D_1	932.3		
		3F_4	21460.5
5D_0	1027.5	3F_3	21699.0
3P_2	19404.5	3F_2	21856.2
3P_1	20689.0		
		3G_8	24557.5
3P_0	21207.2	3G_4	24940.1
		3G_3	25141.8

The forbidden multiplet $^5D-^3F$ appears to be the most prominent in celestial spectra. It is especially

strong in the peculiar bright line spectrum of RY Scuti * as is apparent from Table II. giving the stellar and the [Fe III] wave-lengths; the wave-length difference is presumably due to the presence of absorption companions for the hydrogen and helium lines used in the radial velocity determinations.

TABLE II.—Comparison between the [Fe III] calculated Transitions and the unidentified Emission Lines in RY Scuti.

Stellar λ .	Int.	[Fe III] calc.	$\Delta\lambda$.	Transition.
4658.08	4	4658.4	+0.3	${}^5D_4-{}^3F_4$
4701.5	2	4701.8	+0.3	${}^5D_3-{}^3F_3$
4733.6	1+	4734.0	+0.4	${}^5D_2-{}^3F_2$
4755.0	1	4755.1	—	${}^5D_3-{}^3F_4$
4770.0	1	4769.5	—	${}^5D_2-{}^3F_3$

It may be noticed that, besides the lines of hydrogen and helium, the [Fe III] transitions are the only observed emission lines in RY Scuti. Incidentally, Table II. gives an estimation of the relative transition probabilities in the ${}^5D-{}^3F$ forbidden multiplet.

λ 4658 is also a well-marked line in the spectrum of R Aquarii at various phases †. On a spectrogram taken in 1924, Merrill found the line λ 4658 accompanied by $\lambda\lambda$ 4701 and 4733.

The strongest line at 4658 has been observed by Wright in the Orion Nebula ‡; there is also conclusive evidence for the emission of [Fe III] in various novæ (N. Herc., N. Serpentis, etc. . . .) and peculiar stars (Z And., B.D. +11° 4673 etc. . . .).

We are, Gentlemen,
Yours faithfully,

Physics Laboratory, Upsala
(Sweden), and Department of
Astrophysics, Liège (Belgium).

B. EDLÉN.
P. SWINGS.

* P. W. Merrill, *Ap. J.* **67**, 179, 1928.

† P. W. Merrill, *Ap. J.* **81**, 312, 1935.

‡ W. H. Wright, *Publ. of the Lick Obs.* **13**, 193, 1918.—*Cf.* also R. H. Stoy, *Lick Observ. Bull.* Nr. 480, 1935.