

FIVE STARS WHOSE RADIAL VELOCITIES VARY.

By EDWIN B. FROST and WALTER S. ADAMS.

IN the course of the observations we have been making with the Bruce spectrograph during the past year on stars having spectra of the *Orion* type, the following four stars of this class have been found to vary in respect to their motions in the line of sight, in addition to the three previously announced in this journal (η *Orionis*, α *Persei*, β *Cephei*).¹

The determinations of velocity so far made are given below. The G. M. T. of the observations is not now communicated, as we do not deem the data at present available to be sufficient for the accurate determination of the orbits of these stars. The number of star lines measured is given for each plate in the fifth column.

δ CETI ($\alpha=4^h 31^m$; $\delta=-0^\circ 6'$; Mag.=4.1)

Plate	Date	Taken by	Velocity	No. of Lines	Measured by
A 291	1901, Nov. 1	F.	+ 8 km	15	A.
B 227	Nov. 13	F.	+12	10	F.
A 295	Dec. 19	A.	+16	7	A.
A 298	1902, Jan. 4	A.	+ 6	7	A.
B 383	Aug. 7	F.	+13	8	A.
B 388	Aug. 11	A.	+ 6	9	A.
B 400	Aug. 27	A.	+ 9	9	A.
B 404	Sept. 3	A.	+12	8	A.
A 376	Sept. 6	A.	+12	10	A.
A 381	Sept. 7	F.	+ 6	10	A.
B 432	Oct. 29	A.	+ 9	8	A.

The spectrum is of Miss Maury's Class IV α and has numerous oxygen lines and the usual ones of helium, silicon, hydrogen, and magnesium. The lines are fairly sharp, so that the spectrum is relatively well measurable. The above range of variation in velocity is not large, from +6 to +16 km per sec., but we cannot question its reality.

¹ ASTROPHYSICAL JOURNAL, 15, 214, 340, 1902; 17, 68, 1903.

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 ν ERIDANI ($\alpha=4^h 31^m$; $\delta=-3^\circ 33'$; Mag.=4.1)

Plate	Date	Taken by	Velocity	No. of Lines	Measured by
B 242	1901, Nov. 20	A.	+12 km	5	A.
B 438	1902, Oct. 30	F.	{ +28	10	F. }
			{ +26	12	A. }
B 443	Oct. 31	A.	+18	7	A.
B 447	Nov. 6	A.	+3	8	A.
B 472	Dec. 18	F.	+12	8	F.
B 494	1903, Feb. 5	A.	+25	7	F.

The spectrum resembles that of δ Ceti, but the lines are more difficult to measure. The range so far observed is 24 km.

 π^5 ORIONIS ($\alpha=4^h 49^m$; $\delta=+2^\circ 17'$; Mag.=3.9)

Plate	Date	Taken by	Velocity	Number of Lines	Measured by
A 332	1902, March 4	A.	+1	3	A.
B 469	Dec. 17	A.	+58	5	A.
B 475	Dec. 31	A.	{ +70	5	A. }
			{ +72	6	F. }
B 480	1903, Jan. 1	Ellerman	+32	4	A.
A 384	Jan. 16	A.	+7	6	A.
B 488	Jan. 21	F.	{ -35	4	A. }
			{ -32	4	F. }
A 390	Jan. 22	A.	+73	4	A.

The spectrum of this star is not well adapted for accurate measurement, the lines being broad and very diffuse. A few oxygen lines are present, but they are faint and difficult to set upon. The period is evidently short.

 ξ TAURI.

The spectrum of the star is peculiar, as has been noted by Lockyer and probably by others. The conspicuous feature in the region of spectrum covered by our plates is the remarkable sharpness and intensity of $H\gamma$. Settings can be made upon this line with such accordance that the radial velocity determined from this line alone is probably not much less reliable than that based on several lines in the case of most other stars of the *Orion* type. Other lines are faintly discernible in the spectrum, chiefly the enhanced lines of titanium and iron. These lines are in general so faint and broad, however, that they have commonly not been employed in the determination of the star's motion.

ζ TAURI ($\alpha = 5^h 32^m$; $\delta = +21^\circ 5'$; Mag. = 3.0).

Plate	Date	Taken by	Velocity	Number of Lines	Measured by
B 219	1901, Nov. 8	A.	{ + 17	1	A. }
			+ 16	1	F. }
A 317	1902, Feb. 12	A.	+ 23	1	A. }
			+ 24	1	F. }
B 332	April 23	F.	+ 15	1	A. }
			+ 11	1	F. }
B 410	Sept. 13	A.	+ 18	6	A.
B 425	Oct. 15	A.	+ 34	1	A.
B 440	Oct. 30	F.	+ 31	1	A. }
			+ 28	2	F. }
B 452	Nov. 6	A.	+ 19	1	A. }
			+ 21	1	F. }
B 462	Nov. 19	A.	+ 14	1	A.
B 470	Dec. 17	A.	+ 7	1	A.
B 473	Dec. 18	F.	+ 9	1	F.
B 476	Dec. 31	A.	+ 4	1	A.
B 482	1903, Jan. 8	A.	+ 2	1	A.
B 485	Jan. 9	A.	+ 5	1	A.
A 386	Jan. 16	A.	+ 4	1	A.

The period is probably rather long. Plate B 452 of the above series is underexposed, and the value derived from it is somewhat uncertain.

η VIRGINIS ($\alpha = 12^h 15^m$; $\delta = -0^\circ 7'$; Mag. = 4.1).

This star has a composite spectrum, both components belonging to Vogel's type Ia 2, or Miss Maury's VIII a. On account of the weakness of the lines of the fainter component the discussion of the star's motion will be based mainly upon the absolute velocity of the brighter component. The binary character of the star was established by the first plate, taken and measured by A.

Plate	Date	Taken by	BRIGHTER COMPONENT		FAINTER COMPONENT		Measured by
			Velocity	No. of Lines	Velocity	No. of Lines	
A 388	1903, Jan. 16	A.	- 31.5	14	+ 42	4	A. }
B 493	Feb. 4	F.	+ 0.7	16	+ 60	4	F. }
			+ 0.2	15	+ 63	6	A. }
A 399	Feb. 5	A.	+ 3.4	16	A.

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NOTE ADDED FEBRUARY 18, 1903.

When it was decided to publish at this time the observations of the above stars, we expected also to include the *Orion* type star π^4 *Orionis*, the first two plates of which indicated a range of variation of about 15 km. It was, however, withheld until we should obtain additional plates, as the third and fourth plates gave results nearly like that of the second. We see today in the *Publications of the Astronomical Society of the Pacific* (15, 20, 1903) a notice by Dr. H. M. Reese, stating that spectrograms of this star, taken with the Mills spectrograph of the Lick Observatory, on October 6, 1902, and January 4 and 12, 1903, yielded values respectively of $+43$, ± 0 , and $+6$ km. per second.

There is accordingly no reason for longer withholding our observations, which are as follows:

π^4 ORIONIS ($\alpha = 4^h 46^m$; $\delta = +5^\circ 26'$; Mag. 4.0)

Plate	Date	Taken by	Velocity	Number of Lines	Measured by
A 332	1902, March 4	A.	$+13$ km	8	A.
B 466	Nov. 27	F.	$\left\{ \begin{array}{l} -2 \\ -1 \end{array} \right.$	5 7	F. } A. }
B 468	Dec. 17	A.	$+1$	6	F.
A 389	1903, Jan. 22	F.	$\left\{ \begin{array}{l} +3 \\ +0 \end{array} \right.$	7 6	F. } A. }

YERKES OBSERVATORY,
February 8, 1903.