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Radial Velocity of ρ Leonis

BY

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RADIAL VELOCITY OF ρ LEONIS.

BY W. E. HARPER, M.A.

This star ($\alpha = 10^{\text{h}} 27.5^{\text{m}}$, $\delta = +9^{\circ} 49'$, photographic magnitude about 3.7) was announced as a spectroscopic binary by Campbell in L. O. B., Vol. V, 174. Six plates were secured by the Lick observers, one each in the years 1902-3-4-6-7-8. Outside of the 1907 plate the range in velocity of the measures is 6 km. — from + 35 km. to + 41 km. per sec. The 1907 plate gave + 58.0 km.* by one measure and + 53.1 by another.

While the spectrum contains both hydrogen and helium lines, being classed as Bp, it is not such as will yield very accurate measures. One feature discovered here was that the *K* line (λ 3933) gave velocities more negative than those of the other lines to the extent of some 30 km. per sec. on the average. There was no regular run to these differences, *i.e.*, the high positives for the hydrogen and helium lines did not necessarily occur with the high positive for the *K* line.

Sixty-five spectrograms were secured with the single-prism camera, dispersion of 33.4 tenth-metres per mm. at H_{γ} . Thirty-one of these were on Seed 27, and the remainder on Seed 23 Emulsion, the finer-grained plates improving considerably the quality of the *K* as well as of the other lines. A few plates notably 4336 and 4775 are of poor quality. Plate 4273 is peculiar. Taken immediately after 4272 it shows two of the lines as complex though they appear as single on 4272.

At first all the lines that were at all measurable were used. After a

*Since this was written these figures have been changed in the errata to Vol. V. to +43.8 and +38.8 and the star has been removed from their list of spectroscopic binaries.

considerable number of plates were thus measured a selection was made of those lines which seemed, by the residuals from the mean of the plate, to be the best. The following eight were those selected and used throughout. The *K* line was always kept separate.

LINES USED IN ρ LEONIS.

Element.	Wave-Length.	Times Measured.	Mean Numerical Residual.	Mean Algebraic Residual.
<i>Si</i>	4567.967	24	9.2 km.	- 1.4 km.
<i>Si</i>	4552.762	53	8.4 km.	- 2.3 km.
<i>He</i>	4471.676	61	5.6 km.	+ 0.4 km.
<i>He</i>	4388.100	58	7.3 km.	- 0.4 km.
<i>Hγ</i>	4340.634	61	6.0 km.	+ 1.8 km.
<i>He</i>	4143.928	47	7.5 km.	- 1.8 km.
<i>Hδ</i>	4101.890	56	7.0 km.	+ 1.7 km.
<i>He</i>	4026.352	60	6.5 km.	- 0.2 km.

MEASURES OF ρ LEONIS.

λ	3341		3363		3378		3405		3825		3925		3942	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	+ 54.1	$\frac{1}{2}$	.....	.....	.....	.....	+ 52.0	$\frac{1}{2}$	.....	.....	.....	.....	+ 0.3	$\frac{1}{2}$
4552	53.5	$\frac{1}{2}$	+ 79.0	$\frac{1}{2}$	+ 66.8	1	64.4	$\frac{1}{4}$	.....	.....	.....	.....	.....	.....
4471	62.3	$\frac{1}{2}$	51.8	$\frac{1}{2}$	65.9	1	55.8	$\frac{1}{2}$	.....	.....	+ 8.4	1	25.3	$\frac{1}{2}$
4388	52.0	$\frac{1}{2}$	67.3	$\frac{1}{2}$	82.8	1	.....	.....	+ 15.2	$1\frac{1}{2}$	21.8	1	14.6	1
4340	53.2	$1\frac{1}{2}$	50.1	1	66.8	1	84.2	$1\frac{1}{2}$	14.5	$\frac{1}{2}$	19.2	$1\frac{1}{2}$	24.9	1
4143	59.2	$\frac{1}{4}$	.....	.....	42.8	$\frac{1}{2}$	62.2	$\frac{1}{2}$	10.4	$\frac{1}{2}$	25.2	$\frac{1}{2}$	30.3	$\frac{1}{2}$
4101	+ 42.7	$\frac{1}{2}$	58.1	$\frac{1}{2}$	.....	.....	62.1	1	+ 17.7	$\frac{1}{2}$	27.9	1	30.8	$\frac{1}{2}$
4026	.....	.....	+ 88.7	$\frac{1}{2}$	+ 52.7	$\frac{1}{2}$	+ 53.8	$\frac{1}{2}$	0.0	$\frac{1}{2}$	+ 21.1	1	+ 20.6	1
Weighted mean	+ 53.34		+ 63.59		+ 66.01		+ 66.06		+ 12.59		+ 20.10		+ 20.69	
V_a	- 10.99		- 15.57		- 21.04		- 25.34		+ 29.85		+ 21.86		+ 19.12	
V_s	+ .12		- .02		- .07		- .09		- .09		+ .04		- .12	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 42.2		+ 47.7		+ 44.6		+ 40.4		+ 42.1		+ 41.7		+ 39.4	

MEASURES OF ρ LEONIS—Continued.

λ	3977		4009		4023		4040		4048		4060		4083	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567					+ 34.9	$\frac{1}{2}$								
4552			+ 56.4	$\frac{1}{2}$			+ 55.3	$\frac{1}{2}$			+ 37.0	1	+ 41.4	$\frac{1}{2}$
4471	+ 15.0	1	52.2	1	41.3	$\frac{1}{2}$	47.6	$\frac{1}{2}$	+ 42.6	1	40.2	$\frac{2}{3}$	50.7	$\frac{2}{3}$
4388	27.8	$\frac{2}{3}$	41.5	$\frac{1}{2}$	43.9	1	40.0	$\frac{1}{2}$			68.5	$\frac{1}{2}$	64.6	$\frac{1}{2}$
4340	29.5	$1\frac{1}{2}$	39.6	1	35.5	$1\frac{1}{2}$	40.8	$\frac{2}{3}$	29.2	1	34.7	$\frac{2}{3}$	58.7	1
4143	47.3	1					56.2	$1\frac{1}{2}$	31.9	1	29.5	1	55.4	$\frac{2}{3}$
4101	44.3	1	42.8	1	38.1	$\frac{2}{3}$			40.6	$\frac{1}{2}$	56.9	1	52.5	$\frac{1}{2}$
4026	+ 37.8	$\frac{1}{2}$	+ 47.5	1	+ 45.5	$\frac{1}{2}$	+ 45.2	1	+ 39.1	$\frac{1}{2}$	+ 48.2	1	+ 57.7	$\frac{1}{2}$
Weighted mean	+ 33.12		+ 46.21		+ 39.30		+ 48.75		+ 35.88		+ 43.67		+ 54.76	
V_a	+ 12.89		+ 1.23		- 1.35		- 2.94		- 3.44		- 4.97		- 6.03	
V_d	- .04		- .09		00		- .13		- .07		- .05		- .21	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 45.7		+ 47.1		+ 37.7		+ 45.4		+ 32.1		+ 38.4		+ 48.2	

MEASURES OF ρ LEONIS—Continued.

λ	4105		4121		4145		4187		4197		4203		4212								
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.							
4567									+	49.6	$\frac{1}{2}$										
4552	+	58.5	$\frac{1}{2}$	+	50.8	$\frac{1}{2}$	+	43.4	$\frac{1}{2}$	+	46.5	1	67.3	$\frac{1}{2}$	+	60.0	$\frac{1}{2}$				
4471		48.1	1		45.7	$\frac{1}{2}$		50.7	$\frac{1}{2}$		61.2	1	69.0	1	73.9	$\frac{1}{2}$	+	66.1	$\frac{1}{2}$		
4388		58.9	1		66.9	$\frac{3}{4}$					67.9	1	49.7	$\frac{3}{4}$	79.4	$\frac{1}{2}$		77.1	$\frac{1}{2}$		
4340		69.2	$\frac{3}{4}$		45.3	1		66.0	1		55.2	1	66.6	1	65.5	$\frac{3}{4}$		64.7	1		
4143					48.2	$\frac{1}{2}$					39.5	$\frac{1}{2}$			75.7	$\frac{1}{2}$		60.4	$\frac{1}{2}$		
4101		53.9	$\frac{1}{2}$		44.7	1		58.4	$\frac{3}{4}$		40.2	$\frac{1}{2}$		52.5	$\frac{3}{4}$		79.1	$\frac{1}{2}$	87.7	$\frac{1}{2}$	
4026	+	54.2	$\frac{3}{4}$	+	64.0	$\frac{3}{4}$	+	63.9	$\frac{1}{2}$	+	72.6	1	+	56.4	$\frac{3}{4}$	+	79.7	1	+	57.6	$\frac{1}{2}$
Weighted mean	+	56.83		+	52.10		+	58.10		+	57.21		+	61.00		+	72.28		+	69.70	
V_a	-	8.53		-	9.97		-	15.51		-	21.00		-	22.05		-	23.32		-	23.64	
V_d	-	.20		-	.13		-	.23		-	.08		-	.17		-	.12		-	.09	
Curv.	-	.28		-	.28		-	.28		-	.28		-	.28		-	.28		-	.28	
Radial Velocity	+	47.8		+	41.7		+	42.2		+	35.9		+	38.5		+	48.6		+	45.7	

MEASURES OF ρ LEONIS—Continued.

λ	4229		4230		4238		4254		4264		4272		4273	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4552	+ 70.5	$\frac{1}{2}$	+ 81.4	$\frac{3}{4}$	+ 62.1	$\frac{1}{2}$	+ 66.7	$\frac{1}{2}$	.....	.....	+ 87.2	$\frac{1}{2}$	.....	.....
4471	64.8	$\frac{3}{4}$	66.5	1	83.2	$\frac{3}{4}$	.....	.....	.....	.....	59.8	1	+ 80.1	$\frac{1}{2}$
4388	54.4	$\frac{3}{4}$	.....	.....	92.8	$\frac{3}{4}$	89.0	$\frac{1}{2}$	+ 67.6	$\frac{3}{4}$	62.1	1	99.6	$\frac{1}{2}$
4340	65.2	$\frac{1}{2}$	64.5	1	65.1	$\frac{3}{4}$	77.8	1	64.6	$\frac{3}{4}$	81.9	1	62.0	$\frac{1}{2}$
4143	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	+ 91.6	$\frac{1}{2}$
4101	63.5	$\frac{1}{2}$	.....	.....	54.4	$\frac{1}{2}$	65.8	$\frac{3}{4}$	.....	.....	74.1	$\frac{1}{2}$	.....	.....
4026	+ 59.5	$\frac{1}{2}$	+ 84.7	$\frac{1}{2}$	+ 69.5	$\frac{1}{2}$	+ 60.7	$\frac{1}{2}$	+ 84.2	$\frac{1}{2}$	+ 71.3	1	.....	.....
Weighted mean	+ 63.12		+ 71.08		+ 71.60		+ 71.02		+ 68.70		+ 71.15		+ 83.33	
V_a	- 24.20		- 24.20		- 24.78		- 25.27		- 25.52		- 26.01		- 26.01	
V_d	- .13		- .17		- .14		- .04		- .17		- .10		- .14	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 38.5		+ 46.4		+ 46.4		+ 45.4		+ 42.7		+ 44.8		+ 56.9	

MEASURES OF ρ LEONIS—Continued.

λ	4281		4284		4292		4303		4308		4319		4324	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	+ 83.8	$\frac{1}{2}$	.....	.....	.....	.....	+ 60.0	$\frac{1}{2}$	+ 81.0	1	.....	.....	+ 67.0	$\frac{1}{2}$
4552	75.6	$\frac{1}{2}$	+ 50.0	$\frac{3}{4}$	+ 64.1	$\frac{1}{2}$	75.4	1	68.6	1	.....	.....	.....	.....
4471	81.1	$\frac{3}{4}$	81.5	1	54.3	$\frac{3}{4}$	64.7	$1\frac{1}{2}$	97.6	1	+ 81.9	1	72.2	1
4388	59.3	$\frac{1}{2}$	73.3	$\frac{3}{4}$	41.8	$\frac{1}{2}$	68.8	$1\frac{1}{2}$	78.0	$\frac{1}{2}$	80.4	1	94.9	1
4340	69.8	$1\frac{1}{2}$	73.6	$\frac{3}{4}$	58.8	$\frac{1}{2}$	48.8	1	72.7	1	74.3	1	80.8	1
4143	.....	.....	78.9	$\frac{1}{2}$	74.7	$\frac{1}{2}$	+ 69.8	1	98.7	$\frac{1}{2}$	72.9	1	108.0	$\frac{1}{2}$
4101	63.0	$\frac{1}{2}$	84.8	$\frac{1}{2}$	66.0	$\frac{1}{2}$	.....	.....	87.1	$\frac{1}{2}$	75.8	1	72.5	1
4026	+ 87.0	$\frac{1}{2}$	+ 74.7	$\frac{3}{4}$	+ 49.7	$\frac{3}{4}$	.....	.....	+ 72.1	1	+ 70.4	1	+ 79.3	1
Weighted mean	+ 73.65		+ 73.90		+ 57.68		+ 65.27		+ 80.60		+ 75.94		+ 81.20	
V_a	- 27.08		- 27.29		- 27.50		- 28.91		- 29.13		- 29.35		- 29.39	
V_d	- .14		- .04		- .03		- .20		- .12		- .14		- .15	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 46.2		+ 46.3		+ 29.9		+ 35.9		+ 51.1		+ 46.2		+ 51.4	

MEASURES OF ρ LEONIS—Continued.

λ	4336		4341		4699		4349		4699 remeasured		4711		4720	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	.....		+ 87.8	$\frac{1}{2}$	.....		+ 63.3	1	.....		+ 31.6	$\frac{1}{2}$	+ 21.9	$\frac{1}{2}$
4552	.....		83.3	$\frac{1}{2}$	.....		78.1	1	.....		18.7	$\frac{1}{2}$	4.3	$\frac{1}{2}$
4471	.....		79.2	1	.....		76.6	1	- 9.6	$\frac{1}{2}$	14.8	1	10.9	1
4388	+ 63.6	$\frac{1}{2}$	70.6	$\frac{1}{2}$	.....		50.8	1	.....		18.8	1	5.6	$\frac{1}{2}$
4340	70.6	$\frac{1}{2}$	72.7	1	+ 13.0	1	56.2	1	+ 13.3	$\frac{1}{2}$	13.1	1	1.6	1
4143	.....		86.9	$\frac{1}{2}$	- 7.1	1	80.5	1	+ 7.6	$\frac{1}{2}$	13.8	$\frac{1}{2}$	21.0	$\frac{1}{2}$
4101	46.1	1	89.3	1	- 4.9	$\frac{1}{2}$	63.1	1	- 6.1	$\frac{1}{2}$	6.5	1	7.0	1
4026	+ 55.3	1	+ 71.6	$\frac{1}{2}$	+ 20.2	$\frac{1}{2}$	+ 63.2	1	+ 25.6	$\frac{1}{2}$	+ 8.9	$\frac{1}{2}$	+ 20.1	1
Weighted mean	+ 56.18		+ 80.27		+ 4.50		+ 66.48		+ 3.12		+ 14.80		+ 10.99	
V_{α}	- 29.35		- 29.21		+ 29.60		- 29.14		+ 29.60		+ 30.00		+ 29.79	
V_{δ}	- .20		- .20		+ .10		- .23		+ .11		.00		+ .10	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 26.4(?)		+ 50.6		+ 33.9		+ 36.8		+ 32.5		+ 44.5		+ 40.6	

MEASURES OF ρ LEONIS—Continued.

λ	4741		4753		4764		4775		4783		4795		4806	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	+ 35.0	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	+ 32.3	$\frac{1}{2}$	+ 24.3	1	+ 50.5	1
4552	37.0	$\frac{1}{2}$	+ 29.8	$\frac{1}{2}$	+ 35.8	$\frac{1}{2}$	+ 44.1	$\frac{1}{2}$	31.8	1	31.5	1	42.2	1
4471	17.2	1	17.6	1	28.2	1	20.0	1	25.8	1	12.7	1	23.4	1
4388	13.2	1	21.1	$1\frac{1}{2}$	23.5	$\frac{1}{2}$	.....	.....	13.8	$\frac{1}{2}$	26.6	1	27.2	1
4340	15.0	1	21.3	1	22.6	1	.....	.....	20.2	1	20.5	1	27.2	1
4143	24.3	1	18.0	1	32.3	1	.....	.....	13.8	$\frac{1}{2}$	30.4	1	26.9	1
4101	1.7	1	19.4	$\frac{1}{2}$	15.8	1	.....	.....	34.4	$\frac{1}{2}$	20.2	1	16.4	1
4026	+ 11.8	1	+ 30.1	1	+ 23.5	1	+ 20.2	$\frac{1}{2}$	+ 25.7	1	+ 25.6	1	+ 15.0	1
Weighted mean	+ 17.03		+ 22.04		+ 25.34		+ 26.07		+ 25.11		+ 23.97		+ 28.60	
V_a	+ 26.61		+ 22.68		+ 21.60		+ 21.22		+ 20.84		+ 19.27		+ 17.99	
V_d	+ .12		+ .04		+ .04		- .12		+ .04		+ .10		- .02	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 43.5		+ 44.5		+ 46.7		+46.9(?)		+ 45.7		+ 43.1		+ 46.3	

MEASURES OF ρ LEONIS—Continued.

λ	4814		4824		4837		4842		4844		4861		4867	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	+ 39.1	$\frac{1}{2}$	.....	.....	+ 30.5	$\frac{1}{2}$	.....	.....	+ 44.6	$\frac{1}{2}$	+ 46.0	1	+ 60.0	1
4552	25.0	1	+ 29.3	1	20.8	1	+ 42.4	1	44.4	1	58.5	$\frac{1}{2}$	52.4	1
4471	23.7	1	28.2	1	46.3	1	33.8	1	42.7	1	46.9	$1\frac{1}{2}$	38.2	1
4388	36.4	$\frac{1}{2}$	34.4	1	37.9	1	45.7	$\frac{1}{2}$	40.2	$\frac{1}{2}$	48.0	1	38.8	$1\frac{1}{2}$
4340	31.5	1	18.5	1	27.3	$1\frac{1}{2}$	44.0	1	33.9	1	40.8	1	31.1	1
4143	30.7	$\frac{1}{2}$	21.9	1	36.9	1	23.0	$\frac{1}{2}$	51.6	$\frac{1}{2}$	.....	.....	39.4	1
4101	32.8	1	28.3	1	37.0	1	33.3	1	+ 39.2	$\frac{1}{2}$	45.9	1	26.0	$\frac{1}{2}$
4026	+ 35.2	1	+ 22.4	$1\frac{1}{2}$	+ 35.2	1	+ 31.0	1	.....	.....	+ 39.7	1	+ 32.4	1
Weighted mean	+ 30.97		+ 25.90		+ 33.80		+ 36.48		+ 41.76		+ 46.54		+ 40.60	
V_a	+ 15.35		+ 12.57		+ 6.57		+ 6.06		+ 5.56		- 1.74		- 2.81	
V_d	.00		+ .09		+ .03		+ .11		+ .11		.00		- .12	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 46.0		+ 38.3		+ 40.1		+ 42.4		+ 47.1		+ 44.5		+ 37.4	

MEASURES OF ρ LEONIS—Continued.

λ	4887		4895		4904		4908		4916		4929		4934	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4567	+ 43.9	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	+ 57.8	1	.....	.....
4552	72.8	$\frac{1}{2}$	+ 45.4	1	+ 76.3	1	+ 54.9	$\frac{1}{2}$	+ 58.8	$\frac{1}{2}$	56.1	1	+ 69.2	1
4471	56.7	1	45.3	1	69.2	1	59.4	1	69.7	1	53.2	1	57.5	1
4388	70.6	1	45.5	1	57.0	1	62.6	1	55.0	1	46.0	1	60.3	1
4340	57.8	$\frac{2}{3}$	40.3	1	62.1	1	49.0	1	58.2	1	55.5	1	54.8	1
4143	58.2	$\frac{2}{3}$	37.8	1	61.0	1	69.2	1	69.6	1	51.8	1	66.3	1
4101	.....	.....	35.6	1	63.6	1	59.8	$\frac{1}{2}$	60.6	1	49.1	1	52.0	1
4026	+ 45.8	$\frac{1}{2}$	+ 41.0	1	+ 66.5	$1\frac{1}{2}$	+ 69.0	1	+ 59.4	1	+ 58.8	1	+ 65.2	1
Weighted mean	+ 59.10		+ 41.56		+ 65.19		+ 61.09		+ 61.83		+ 53.54		+ 60.76	
V_a	- 8.85		- 11.29		- 12.19		- 13.12		- 14.47		- 17.07		- 18.27	
V_d	- .02		- .09		+ .02		.00		- .02		- .12		- .06	
Curv.	- .28		- .28		- .28		- .28		- .28		- .28		- .28	
Radial Velocity	+ 50.0		+ 29.9		+ 52.7		+ 47.7		+ 47.1		+ 36.1		+ 42.2	

SUMMARY OF MEASURES OF ρ LEONIS.

Plate Number.	Date.	Julian Date.	General Lines.			K Line.	
			Lines.	Weight.	Velocity.	Weight.	Velocity.
1910							
3341	Mar. 18.....	2,418,749.603	7	3	+ 42.2	.....	.....
3363	Mar. 28.....	759.645	6	3	47.7	.....	.....
3378	April 11.....	773.469	6	4	44.6	$\frac{1}{2}$	+ 14.3
3405	April 25.....	787.593	7	4	40.4	.....	.....
3825	Dec. 5.....	9,011.979	5	3	42.1	$\frac{1}{2}$	+ 5.5
1911							
3925	Jan. 9.....	046.828	6	4	41.7	.....	.....
3942	Jan. 16.....	053.888	7	4	39.4	.....	.....
3977	Jan. 30.....	067.801	6	4	45.7	$\frac{1}{2}$	+ 1.6
4009	Feb. 22.....	090.762	6	4	47.1	.....	.....
4023	Feb. 27.....	095.716	6	4	37.7	.....	.....
4040	Mar. 2.....	098.771	6	3	45.4	$\frac{1}{2}$	+ 6.1
4048	Mar. 3.....	099.734	5	3	32.1	1	+ 12.1
4060	Mar. 6.....	102.716	7	4	38.4	1	+ 12.6
4083	Mar. 8.....	104.802	7	4	48.2	.....	.....
4105	Mar. 13.....	109.785	6	4	47.8	$\frac{1}{2}$	- 1.8
4121	Mar. 16.....	112.732	7	4	41.7	$\frac{1}{2}$	+ 14.3
4145	Mar. 28.....	124.765	5	3	42.2	$\frac{1}{2}$	+ 4.0
4187	April 11.....	138.632	7	4	35.9	.....	.....
4197	April 14.....	141.685	8	5	38.5	.....	.....
4203	April 18.....	145.638	7	4	48.6	.....	.....
4212	April 19.....	146.610	5	3	45.7	$\frac{1}{2}$	- 1.0
4229	April 21.....	148.636	6	3	38.5	.....	.....
4230	April 21.....	148.656	4	2	46.4	.....	.....
4238	April 23.....	150.639	6	3	46.4	$\frac{1}{2}$	+ 27.0
4254	April 25.....	152.583	5	3	45.4	.....	.....
4264	April 26.....	153.651	3	2	42.7	.....	.....
4272	April 28.....	155.598	"	4	44.8	.....	.....
4273	April 28.....	155.624	4	2	56.9?	.....	.....
4281	May 3.....	160.614	7	4	46.2	1	+ 1.0
4284	May 4.....	161.593	7	4	46.3	$\frac{1}{2}$	+ 8.1
4292	May 5.....	162.550	7	4	29.9	$\frac{1}{2}$	+ 15.6
4303	May 16.....	173.619	6	4	35.9	.....	.....
4308	May 19.....	176.559	8	5	51.1	$\frac{1}{2}$	- 8.4
4319	May 25.....	182.562	6	4	46.2	$\frac{1}{2}$	+ 11.9
4324	May 26.....	183.559	7	4	51.4	1	+ 5.0
4336	May 30.....	187.577	4	2	26.4?	$\frac{1}{2}$	+ 14.0
4341	June 1.....	189.571	8	4	50.6	.....	.....
4349	June 2.....	190.590	8	5	36.8	$\frac{1}{2}$	+ 6.8
4699	Nov. 16.....	357.940	5	3	33.2	$\frac{1}{2}$	+ 28.7
4711	Dec. 3.....	374.949	8	5	44.5	$\frac{1}{2}$	+ 4.5
4720	Dec. 6.....	377.892	8	5	40.6	1	+ 22.5
4741	Dec. 25.....	396.826	8	5	+ 43.5	$\frac{1}{2}$	+ 10.7

SUMMARY OF MEASURES OF ρ LEONIS—*Concluded.*

Plate Number.	Date.	Julian Date.	General Lines.			K Line.	
			Lines.	Weight.	Velocity.	Weight.	Velocity.
	1912						
4753	Jan. 7.....	2,419,409.811	7	5	+ 44.5	$\frac{1}{2}$	+ 14.5
4764	Jan. 10.....	412.796	7	4	46.7	1	+ 11.3
4775	Jan. 11.....	413.902	3	2	46.9?	.....	.....
4783	Jan. 12.....	414.820	8	5	45.7	1	+ 19.8
4795	Jan. 16.....	418.776	8	5	43.1	.....	.....
4806	Jan. 19.....	421.828	8	5	46.3	$\frac{2}{3}$	+ 12.2
4814	Jan. 25.....	427.806	8	5	46.0	$\frac{2}{3}$	+ 19.8
4824	Jan. 31.....	433.725	7	5	38.3	$\frac{2}{3}$	+ 5.7
4837	Feb. 12.....	445.736	8	5	40.1	.....	.....
4842	Feb. 13.....	446.695	7	4	42.4	$\frac{1}{2}$	+ 16.3
4844	Feb. 14.....	447.694	7	4	47.1	.....	.....
4861	Feb. 28.....	461.706	7	5	44.5	1	+ 6.5
4867	Mar. 1.....	463.771	8	5	37.4	$\frac{1}{2}$	+ 0.3
4887	Mar. 13.....	475.681	7	4	50.0	.....	.....
4895	Mar. 18.....	480.697	7	5	29.9	.....	.....
4904	Mar. 20.....	482.644	7	5	52.7	1	- 4.1
4908	Mar. 22.....	484.642	7	4	47.7	$\frac{2}{3}$	+ 16.6
4916	Mar. 25.....	487.646	7	5	47.1	$\frac{1}{2}$	+ 22.3
4929	Mar. 31.....	493.683	8	5	36.1	$\frac{1}{2}$	+ 10.9
4934	April 3.....	496.641	7	5	42.2	$\frac{1}{2}$	+ 10.5
4941	April 8.....	501.610	7	4	49.3	1	+ 1.1
4946	April 9.....	502.629	7	5	44.7	$\frac{1}{2}$	+ 6.8
4959	April 15.....	508.640	4	3	+ 49.0	.....	.....

The writer has spent considerable time, so far without success, in trying to find a period for this star. Though the range in velocity is small I feel that the variation is real. The measures of the hydrogen and helium lines show a range from + 30 km. to + 50 km., but some of this may be ascribed to accidental error. The vast majority of the measures fall around + 41 to + 45 and if we were to consider that the star was of constant velocity we would have:

Weighted mean velocity for hydrogen and helium lines = + 43.2 km. \pm 3.4 km.

The probable error of \pm 3.4 km. is no greater than that obtained from stars of somewhat similar spectra whose orbits have been determined here and would lend strength to the assumption that the star has a constant velocity.

THE K LINE.

The *H* and *K* lines in stars where this characteristic difference of velocity occurs are usually sharp. This cannot be said of this star although in a few plates the *K* line is well measurable. There would seem to be causes, other than kind of plate and exposure, having to do with the changed appearance which *K* undergoes. One would be led to suspect two spectra present—never separated sufficiently to show definitely the two components. The same suggestion would hold for the hydrogen and helium lines.

The measures on *K* vary from zero or slightly negative to about + 28 km. The real variation is probably considerably less than this. On the assumption that its velocity is constant we have:

Weighted mean velocity for K line = + 10.0 km. \pm 5.4 km.

The paper may be summed up as follows:

(1) Measures on 65 plates of the star show a small range in radial velocity, possibly 15 km. There are suspicions of complexity.

(2) The *K* line velocity differs from that of the other lines.

(3) The weighted mean velocity of all the measures is for the hydrogen and helium lines + 43.2 km. and for the *K* line + 10.0 km. per sec.