New Terms in Fe I, II, and III and Additional Far Ultraviolet Standards*

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The iron spectrum excited in the Schüler discharge in He and Ne and the iron arc and spark in nitrogen have been studied in the ultraviolet from λ2300 to λ600. New terms have been identified in Fe I, II, and III and in addition a number of unclassified levels have been found in Fe II. Lists of all the lines identified from new or previously known levels are given. These lists include a number of lines in the region λ2225 to λ1550 whose wave-length can be accurately calculated by the combination principle from levels whose positions are determined by measures at longer wave-lengths. These lines will be useful as standards.

THE iron spectrum has been investigated in the far ultraviolet from λ2300 to λ600. Plates have been taken, on the Princeton two-meter vacuum spectrograph, of the iron spectrum excited in the Schüler discharge in He and Ne and of the iron arc and spark in nitrogen. A large amount of laboratory work, which will be described elsewhere, has been devoted to the development of the Schüler tube technique to the point where the discharge becomes an effective source for the iron spectrum.

Fe I

Three new terms forming a $^5(PDF)$ triad, a separate ^5P,† and one new unidentified level have been found in Fe I; they are listed in Table I. The electron configuration is given in the first column, the term designation in the second, the J value in the third, the height of the level above a^5D_4 in the fourth, the interval in the fifth, and the number of combinations which the level makes in the sixth. An intensity diagram is given, Table II. The intensities of the lines arising from transitions down to a^5D are taken from the author's lists of the arc in nitrogen; the rest are from Burns and Walters[1] with the exception of those followed by B, Burns;[2] S, Schumacher;[3] K, Kayser.[4] The $v^5D_1^0$ level is not well established but nothing else in the region can be made to serve any better. An unusual distribution of intensity analogous to that in the $a^5D-v^5D^0$ multiplet has been found by Findlay[5] in the $d^74s\ ^5F-d^74p\ ^5F^0$ of Co II.

The question arises whether the new triad is in series with the upper or lower of the two known $^5(PDF)$ triads. The lower triad is usually attributed to $3d^64s(^6D)4p$ and the upper to $3d^64s(^4D)4p$. There is no proof that this is correct and the reverse assignment seems equally probable. However if for the moment we assume the first assignment, we can predict the position of the second triad in each series. The results are rough since series involving a running p electron are very rarely regular in many-electron spectra.

TABLE I. *New terms in* Fe I.

CONFIGURATION	TERM DESIG.	J	LEVEL	INTERVAL	NO. OF COMB.
	58^0	1	48350.65		9
$3d^64s(^6D)5p$	v^5F^0	5	51016.71	−364.80	3
$3d^64s(^6D)5p$	v^5F^0	4	51381.51	−237.63	5
$3d^64s(^6D)5p$	v^5F^0	3	51619.14	−208.48	7
$3d^64s(^6D)5p$	v^5F^0	2	51827.62	−118.24	7
$3d^64s(^6D)5p$	v^5F^0	1	51945.86		5
$3d^64s(^6D)5p$	v^5D^0	4	51076.67	−284.79	6
$3d^64s(^6D)5p$	v^5D^0	3	51361.46	−268.60	8
$3d^64s(^6D)5p$	v^5D^0	2	51630.06	−206.7	8
$3d^64s(^6D)5p$	v^5D^0	1	51836.8	−105.0	2
$3d^64s(^6D)5p$	v^5D^0	0	51941.76		3
$3d^64s(^6D)5p$	u^5P^0	3	51692.2	−252.9	5
$3d^64s(^6D)5p$	u^5P^0	2	51945.1	−165.5	4
$3d^64s(^6D)5p$	u^5P^0	1	52110.6		6
	t^5P^0	3	53388.68	−723.60	4
	t^5P^0	2	54112.28	−158.84	7
	t^5P^0	1	54271.12		9

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† These three levels were identified as ^5P by Professor H. N. Russell.
[1] K. Burns and F. M. Walters, Publication of the Allegheny Observatory **8**, No. 4.
[2] K. Burns, Lick Obs. Bull., No. 247 (1913).
[3] Schumacher, Zeits. f. Wiss. Photogr. **19**, 149 (1919).
[4] Kayser, *Handbuch der Spectroscopie* **6**, 892 and **7**, 405.
[5] J. H. Findlay, Phys. Rev. **36**, 5 (1930).

TABLE II. *Intensities of lines in* Fe *arc.*

		a^5D					a^5F					a^5P		
		4	3	2	1	0	5	4	3	2	1	3	2	1
	1			2	5	2							3*B*	1*K*
t^5P^0	2		5	8	1				1*uS*			4	2	3
	3	8	15						1*uS*			2		
	1			20	25	20*				1*S*			5	1*aK*
u^5P^0	2		25	25*	30*				12					
	3	25	25	25				45				2*K*		
	0				15						9			1
	1			20*	0									
v^5D^0	2		25	10	0				9	9	1*S*		2*K*	2*K*
	3	30	20	1				8	15*	5		1*K*	3	
	4	30	0				45	15	2			6		
	1			25*	30*	25				9*b*	4			
	2		10	25	25				10	8	10			1*K*
v^5F^0	3	25	25	20					12	15*		1*K*	1*K*	
	4	2	30				25	40	3					
	5	30					15†	3						
58_1^0				15	20	30				2	12		4*B*	2*B*

* These lines are used twice.
† An examination of an arc plate suggests that this intensity is in error. The line is definitely considerably stronger than $a^5F_4-v^5F_4^0$.

It is found that the second triad built on ^6D should lie about 2000 wave numbers below the new triad and the one built on ^4D about 7000 above it. If we assume the reverse assignment, we would expect the second member of the series built on ^6D about 1600 wave numbers above the new triad and the one built on ^4D about 3500 above the new triad. It appears therefore that the new triad is probably built on ^6D but it is impossible to say at present with which of the lower triads it is in series. A comparison of the intensities of the transitions between the three triads and low ^5D, ^5F and ^5P also fails to tell us which of the previously known groups goes to the ^6D limit. The possibility that the triad should be assigned to $d^6(^5D)4s4p(^{1,3}P)$ or $d^6(^5D)4p(^{6,4}P, D, F)4s$ instead of $d^6(^5D)4s(^{6,4}D)4p$ was considered. The term intervals for these various possibilities were calculated by the rule of Goudsmit and Humphreys.[6] However in no case was the agreement between the predicted and observed values sufficiently good to warrant an assignment.

Table III contains the new identifications in Fe I. The columns are as follows: column one, the wave-length in vacuum up to λ2200 and in air for longer wave-lengths. When this is poorly determined, it is followed by a small "*p*." If the wave-length of a line below λ2200 can be calculated by means of the combination principle from measures made above λ2240, the calculated decimal is given in the second column. Column three contains the intensity in the arc; column four, the intensity in the He Schüler tube; a "*b*" after the intensity means that the line is a blend. Column five gives the observer, where *G* stands for Green, *BW* for Burns and Walters, *B* for Burns, *S* for Schumacher, and *K* for Kayser. Column six contains "*s*" if the line is regarded as especially suitable as a standard. The final column gives the identification; where this is regarded as uncertain it is followed by a question mark.

Fe II

In the tables below are listed all the new even and odd levels which have been found in Fe II together with six which were previously found by Dobbie[7] and which have been given new assignments on the basis of additional material. The following information is contained in the columns of the tables: in the first, the electron configuration; in the second, the term symbol; in the

[6] S. Goudsmit and C. J. Humphreys, Phys. Rev. **31**, 960 (1928).

[7] J. C. Dobbie, *Proc. Roy. Soc. London* **A151**, 703 (1935).

TABLE III. *New identifications in* Fe I. *In the column S, the source is given and in column st, those lines are designated which are especially suitable as standards.*

λ VAC		INTENSITY				
OBS.	CALC.	ARC	S.T.	*S*	*st*	IDENTIFICATION
1862.318	0.324	5	15	*G*	*s*	$a^5D_3-t^5P_2^0$
1866.815	.817	2	10	*G*		$a^5D_2-t^5P_1^0$
1872.359	.369	8	15	*G*	*s*	$a^5D_2-t^5P_2^0$
1873.052	.056	8	12	*G*		$a^5D_4-t^5P_3^0$
1873.259	.256	5	15	*G*		$a^5D_1-t^5P_1^0$
1876.421	.417	2	10	*G*		$a^5D_0-t^5P_1^0$
1878.849	.846	1	2	*G*	*s*	$a^5D_1-t^5P_2^0$
1887.761	.763	15	20	*G*		$a^5D_3-t^5P_3^0$
1934.528		25	25	*G*		$a^5D_4-u^5P_3^0$
1937.274	.266	25	35	*G*		$a^5D_4-v^5F_3^0$
1940.649		25	25	*G*		$a^5D_3-u^5P_2^0$
1945.070	.083	10	20*b*	*G*		$a^5D_3-v^5F_2^0$
1945.294		20	25	*G*		$a^5D_2-u^5P_1^0$
1946.219	.225	2	10	*G*	*s*	$a^5D_4-v^5F_4^0$
1946.978	.986	30	25	*G*	*s*	$a^5D_4-v^5D_3^0$
1950.223		25	20	*G*		$a^5D_3-u^5P_3^0$
1951.556	.529	25	25	*G*		$a^5D_2-v^5F_1^0$
						$a^5D_2-u^5P_2^0$
1952.262		25	20	*G*		$a^5D_1-u^5P_1^0$
1952.596	.586	25	30	*G*	*s*	$a^5D_3-v^5D_2^0$
1952.997	3.002	25	20	*G*		$a^5D_3-v^5F_3^0$
1955.690		20	20	*G*		$a^5D_2-v^5D_1^0$
						$a^5D_0-u^5P_1^0$
1956.026	.043	25	30	*G*	*s*	$a^5D_2-v^5F_2^0$
1957.831	.841	30	25	*G*	*s*	$a^5D_4-v^5D_4^0$
1958.598	.567	30	30	*G*		$a^5D_1-v^5F_1^0$
						$a^5D_1-u^5P_2^0$
1958.739	.724	15	15	*G*	*s*	$a^5D_1-v^5D_0^0$
1960.129	.142	30	25	*G*	*s*	$a^5D_4-v^5F_5^0$
1961.236		25	20	*G*		$a^5D_2-u^5P_3^0$
1962.031*p*	.023	25 }	30	*G*		$a^5D_0-v^5F_1^0$
1962.100*p*	.108	30 }		*G*		$a^5D_3-v^5F_4^0$
1962.746		0	15	*G*		$a^5D_1-v^5D_1^0$
1962.871	.881	20	20	*G*	*s*	$a^5D_3-v^5D_3^0$
1963.110	.113	25	25	*G*	*s*	$a^5D_1-v^5F_2^0$
1963.629	.631	10	15	*G*	*s*	$a^5D_2-v^5F_2^0$
1964.043	.052	20	20	*G*		$a^5D_3-v^5F_3^0$
1970.771	.757	—	0	*G*	*s*	$a^5D_1-v^5D_2^0$
1973.911	.915	0	1	*G*	*s*	$a^5D_3-v^5D_4^0$
1974.059	.043	—	1	*G*	*s*	$a^5D_2-v^5D_3^0$
2098.759	.783	15	25*b*	*G*		$a^5D_2-58_1^0$
2106.931	.926	20	15	*G*	*s*	$a^5D_1-58_1^0$
2110.910	.926	30	25	*G*		$a^5D_0-58_1^0$
2155.820	.906	1*u*	10*b*	*S*		$a^5F_3-t^5P_2^0$?
2189.997	90.071	1*u*	12*b*	*S*		$a^5F_3-t^5P_3^0$?
λ AIR						
2248.855		25		*BW*		$a^5F_5-v^5F_4^0$
2255.859		45		*BW*		$a^5F_4-u^5P_3^0$
2260.860		12		*BW*		$a^5F_3-u^5P_2^0$

λ VAC		INTENSITY				
OBS.	CALC.	ARC	S.T.	*S*	*st*	IDENTIFICATION
λ AIR						
2264.390		45		*BW*		$a^5F_5-v^5D_4^0$
2265.60		1		*S*		$a^5F_2-u^5P_1^0$
2266.903		10		*BW*		$a^5F_3-v^5F_2^0$
2267.465		15		*BW*		$a^5F_5-v^5F_5^0$
2271.778		40		*BW*		$a^5F_4-v^5F_4^0$
2272.816		8		*BW*		$a^5F_4-v^5D_3^0$
2274.087		9		*BW*		$a^5F_2-v^5F_1^0$
						$a^5D_2-12_2^0$
2277.094		9		*BW*		$a^5F_3-v^5D_2^0$
2277.663		12		*BW*		$a^5F_3-v^5F_3^0$
2280.222		8		*BW*		$a^5F_2-v^5F_2^0$
2282.861		4		*BW*		$a^5F_1-v^5F_1^0$
2283.079		9		*BW*		$a^5F_1-v^5D_0^0$
2287.628		15		*BW*		$a^5F_4-v^5D_4^0$
2289.032		10		*BW*		$a^5F_1-v^5F_2^0$
2290.064		3		*BW*		$a^5F_3-v^5F_4^0$
2290.546		9		*BW*		$a^5F_2-v^5D_2^0$
2290.771		3		*BW*		$a^5F_4-v^5F_5^0$
2291.117		15		*BW*		$a^5F_3-v^5D_3^0$
						$a^5F_2-v^5F_3^0$
2299.42		1		*S*		$a^5F_1-v^5D_2^0$
2304.727		5		*BW*		$a^5F_2-v^5D_3^0$
2306.164		2		*BW*		$a^5F_3-v^5D_4^0$
2476.654		2		*BW*		$a^5F_2-58_1^0$
2487.064		12		*BW*		$a^5F_1-58_1^0$
2734.266		4		*BW*		$a^5P_3-t^5P_2^0$
2735.611		3		*B*		$a^5P_2-t^5P_1^0$
2747.553		2		*BW*		$a^5P_2-t^5P_2^0$
2750.72		1		*K*		$a^5P_1-t^5P_1^0$?
2762.770		3		*BW*		$a^5P_1-t^5P_2^0$
2789.477		2		*BW*		$a^5P_3-t^5P_3^0$
2907.518		5		*BW*		$a^5P_2-u^5P_1^0$
2920.3		1		*K*		$a^3P_0-t^5P_1^0$
2924.6		1*u*		*K*		$a^5P_1-u^5P_1^0$
2928.11		2		*K*		$a^5P_3-u^5P_3^0$
2934.4		1		*K*		$a^5P_3-v^5F_3^0$
2939.072		1		*BW*		$a^5P_1-v^5D_0^0$
2948.69		2		*K*		$a^5P_2-v^5D_2^0$
2948.94		1		*K*		$a^5P_1-v^5F_2^0$
2949.8		1		*K*		$a^5P_2-v^5F_3^5$
2956.7		1		*K*		$a^5P_3-v^5D_3^0$
2966.23		2		*K*		$a^5P_1-v^5D_2^0$
2972.277		3		*BW*		$a^5P_2-v^5D_3^0$
2981.852		6		*BW*		$a^5P_3-v^5D_4^0$
3264.522		4		*B*		$a^5P_2-58_1^0$
3286.026		2		*B*		$a^5P_1-58_1^0$
3339.588		1*b*		*B*		$c^3P_2-t^5P_1^0$
3388.966		1*b*		*B*		$c^3P_1-t^5P_1^0$
3935.31		2		*K*		$b^3P_1-58_1^0$
4804.6		1		*K*		$a^1P_1-58_1^0$?

TABLE IV. *New even levels in* Fe II.

CONFIG.	DESIG.	*J*	LEVEL	INTERVAL	NO. OF COMB.	POSSIBLE DESIG.	DOBBIE'S DESIG.
$d^6(^5D)4d$	e^6F	$5\frac{1}{2}$	82853.5		3		
$d^6(^5D)4d$	e^6F	$4\frac{1}{2}$	82978.9	−125.4	6		$f^6D_{4\frac{1}{2}}$
$d^6(^5D)4d$	e^6F	$3\frac{1}{2}$	83136.5	−157.6	7		$f^6D_{3\frac{1}{2}}$
$d^6(^5D)4d$	e^6F	$2\frac{1}{2}$	83308.4	−171.9	8		$f^6D_{2\frac{1}{2}}$
$d^6(^5D)4d$	e^6F	$1\frac{1}{2}$	83459.7	−151.3	7		
$d^6(^5D)4d$	e^6F	$\frac{1}{2}$	83558.5	− 98.8	4		
$d^6(^5D)4d$?	30	$3\frac{1}{2}$	83713.3		4	^6D	
$d^6(^5D)4d$?	31	$4\frac{1}{2}$ or $3\frac{1}{2}$	83726.2		4	^6D	$e^6P_{3\frac{1}{2}}$
$d^6(^5D)4d$?	32	$2\frac{1}{2}$	83812.1		6	^6D	
$d^6(^5D)4d$?	33	$1\frac{1}{2}$	83989.7		4	^6D	
$d^6(^5D)4d$?	34	$\frac{1}{2}$ or $1\frac{1}{2}$	84131.2		3	^6D	
$d^6(^5D)4d$?	35	$2\frac{1}{2}$	84266.9		6		$e^6P_{2\frac{1}{2}}$
$d^6(^5D)4d$?	36	$2\frac{1}{2}$	84327.0		5		$e^6P_{1\frac{1}{2}}$

TABLE V. *New odd levels in* Fe II.

Config.	Desig.	J	Level	Interval	No. of Comb.	Possible Desig.
$3d^54s(\ \ )4p$	y^6P^0	$1\frac{1}{2}$	61974.9		3	
				$+74.1$		
$3d^54s(\ \ )4p$	y^6P^0	$2\frac{1}{2}$	62049.0		3	
				$+122.7$		
$3d^54s(\ \ )4p$	y^6P^0	$3\frac{1}{2}$	62171.7		3	
$3d^54s(^5S)4p$	x^4P^0	$2\frac{1}{2}$	69102.4		3	
				-199.7		
$3d^54s(^5S)4p$	x^4P^0	$1\frac{1}{2}$	69302.1		3	
				-124.7		
$3d^54s(^5S)4p$	x^4P^0	$\frac{1}{2}$	69426.8		2	
$3d^54s(\ \ )4p$	x^6P^0	$1\frac{1}{2}$	79244.6		3	
				$+40.1$		
$3d^54s(\ \ )4p$	x^6P^0	$2\frac{1}{2}$	79284.7		4	
				$+46.5$		
$3d^54s(\ \ )4p$	x^6P^0	$3\frac{1}{2}$	79331.2		4	
$3d^6(^5D)5p$	y^6F^0	$5\frac{1}{2}$	87340.4		1	
				-130.4		
$3d^6(^5D)5p$	y^6F^0	$4\frac{1}{2}$	87470.8		2	
				-66.1		
$3d^6(^5D)5p$	y^6F^0	$3\frac{1}{2}$	87536.9		3	
				-34.9		
$3d^6(^5D)5p$	y^6F^0	$2\frac{1}{2}$	87571.8		3	
				-30.1		
$3d^6(^5D)5p$	y^6F^0	$1\frac{1}{2}$	87601.9		3	
				-33.3		
$3d^6(^5D)5p$	y^6F^0	$\frac{1}{2}$	87635.2		2	
	1^0	$3\frac{1}{2}$	88208.6		4	$^6P^0$
	2^0	$3\frac{1}{2}$	89127.7		3	$^6P^0$
	3^0	$2\frac{1}{2}$	89443.7		3	$^6P^0$
	4^0	$1\frac{1}{2}$	89625.0		3	$^6P^0$
	5^0	$3\frac{1}{2}$	90300.0		4	
	6^0	$4\frac{1}{2}$ or $3\frac{1}{2}$	90385.5		4	
	8^0	$\frac{1}{2}$ or $1\frac{1}{2}$	90828.4		2	$^4P^0$
	9^0	$1\frac{1}{2}$	90898.2		3	$^4P^0$
	10^0	$2\frac{1}{2}$ or $1\frac{1}{2}$	90981.5		2	$^4P^0$
	11^0	$2\frac{1}{2}$	91067.1		6	
	w^6P^0	$3\frac{1}{2}$	91167.3		4	
				-407.5		
	w^6P^0	$2\frac{1}{2}$	91574.8		4	
				-268.3		
	w^6P^0	$1\frac{1}{2}$	91843.1		4	
	13^0	$3\frac{1}{2}$	93986.9		4	
	14^0	$2\frac{1}{2}$	94210.1		5	
	15^0	$3\frac{1}{2}$	94762.3		4	
	16^0	$3\frac{1}{2}$	106863.2		6	
	17^0	$3\frac{1}{2}$ or $2\frac{1}{2}$	107165.6		5	
	18^0	$2\frac{1}{2}$	107196.2		4	
	20^0	$3\frac{1}{2}$	107886.6		6	$^6D^0$
	21^0	$4\frac{1}{2}$ or $3\frac{1}{2}$	107964.7		4	$^6D^0$
	22^0	$2\frac{1}{2}$	108130.6		4	$^6D^0$
	23^0	$1\frac{1}{2}$	108191.6		3	$^6D^0$
	24^0	$3\frac{1}{2}$	108239.2		4	
	25^0	$1\frac{1}{2}$	108371.7		4	
	26^0	$3\frac{1}{2}$	108373.8		6	
	27^0	$1\frac{1}{2}$	108780.0		6	
	28^0	$1\frac{1}{2}$	109780.0		4	
	29^0	$2\frac{1}{2}$	111929.0		4	

third, the J value; in the fourth, the level value; in the fifth, the interval; in the sixth, the number of combinations which the level makes; in the seventh, a possible term symbol for some of the unclassified levels; in the eighth, the designation previously assigned to the level by Dobbie. Numbers have been given to the unclassified levels. When two J values are possible the more probable one is listed first.

Since there is no place for y^6P^0 or x^6P^0 in the $3d^64p$ configuration, they have been assigned to $3d^54s4p$, which is the only other odd configuration between 60,000 and 80,000. On the other hand, x^4P^0 could be the missing $3d^6(^3D)4p\ ^4P^0$, were it not for the fact that it combines strongly with a^4D. Since neither the ^4D nor the ^4F from $3d^6(^3D)4p$ combines with a^4D, x^4P^0 has also been assigned to $3d^54s4p$. The three terms now appear in the same order as in the isoelectronic spectrum of Mn I; they have also the same arrangement of J values, that is, the sextets are normal and the quartet inverted. An attempt was made to determine by the rule of Goudsmit and Humphreys,[6] whether these terms arise from $3d^54s(^{7,\ 5}S)4p$, or $3d^5(^6S)4s4p(^{3,\ 1}P)$, or $3d^54p(^{7,\ 5}P)4s$. However, in none of the three cases was the agreement between the predicted and observed intervals sufficiently good to warrant an assignment.

The sextet triad of $3d^6(^5D)5p$ would be expected to lie about 88,000 wave numbers above a^6D. The term found in this region appears to be ^6F rather than ^6D. The corresponding triad from $3d^6(^5D)6p$ would be expected in the

TABLE VI. *Intensities of lines in* Fe *spark.*

Dobbie's desig.	Desig.	J	z^6D^0 $4\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	z^6F^0 $5\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	z^6P^0 $3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$
$^6P_{1\frac{1}{2}}$	36	$2\frac{1}{2}$			4	8				10					1	10
$^6P_{2\frac{1}{2}}$	35	$2\frac{1}{2}$		10	5	20				0				6	20	
	34	$\frac{1}{2}$ or $1\frac{1}{2}$				4	6									6
	33	$1\frac{1}{2}$			10	1	4									0
	32	$2\frac{1}{2}$		20	2	10								10	5	5
$^6P_{3\frac{1}{2}}$	31	$4\frac{1}{2}$ or $3\frac{1}{2}$	30	30					8					20		
	30	$3\frac{1}{2}$	20		30						0			25		
	e^6F	$\frac{1}{2}$				8	30					6	3			
	e^6F	$1\frac{1}{2}$			20	25	8				10	5	5		0	
$^6D_{2\frac{1}{2}}$	e^6F	$2\frac{1}{2}$		25	30	10				15	8	15		1	2	
$^6D_{3\frac{1}{2}}$	e^6F	$3\frac{1}{2}$	20	35	25				10	10	5			8		
$^6D_{4\frac{1}{2}}$	e^6F	$4\frac{1}{2}$	45	50				20	25	15				3		
	e^6F	$5\frac{1}{2}$	80					40	25							

TABLE VII. *Identified* Fe II *lines. In the column S, the source is given and in column st, those lines are designated which are especially suitable as standards.*

λ VAC OBS.	λ VAC CALC.	INTENSITIES Ne S.T.	INTENSITIES He S.T.	INTENSITIES SPARK	*st*	IDENTIFICATION
896.504		1	—			$a^6D_{3\frac12}-29_{2\frac12}^0$
898.776		0	—			$a^6D_{2\frac12}-29_{2\frac12}^0$
900.360		5	—			$a^6D_{1\frac12}-29_{2\frac12}^0$
918.118		—	1			$a^6D_{1\frac12}-28_{1\frac12}^0$
919.095		—	0			$a^6D_{\frac12}-28_{1\frac12}^0$
923.884		30	—			$a^6D_{4\frac12}-24_{3\frac12}^0$
924.970		15	—			$a^6D_{2\frac12}-27_{1\frac12}^0$
926.220		60	20			$a^6D_{4\frac12}-21_{4\frac12}^0$
926.618		10	—			$a^6D_{1\frac12}-27_{1\frac12}^0$
926.900		25	—			$a^6D_{4\frac12}-20_{3\frac12}^0$
927.176		30	2			$a^6D_{3\frac12}-24_{3\frac12}^0$
927.632		8	—			$a^6D_{\frac12}-27_{1\frac12}^0$
928.107		30	1			$a^6D_{3\frac12}-22_{2\frac12}^0$
928.470		20	—			$a^6D_{2\frac12}-25_{1\frac12}^0$
929.538		30	1			$a^6D_{3\frac12}-21_{4\frac12}^0$
929.612		30	—			$a^6D_{2\frac12}-24_{3\frac12}^0$
930.030		30	1			$a^6D_{2\frac12}-23_{1\frac12}^0$
930.165		30}	1			$a^6D_{1\frac12}-25_{1\frac12}^0$
930.219		30}				$a^6D_{3\frac12}-20_{3\frac12}^0$
930.558		30	—			$a^6D_{2\frac12}-22_{2\frac12}^0$
931.142		25	—			$a^6D_{\frac12}-25_{1\frac12}^0$
931.709		10	—			$a^6D_{1\frac12}-23_{1\frac12}^0$
932.244		30	0			$a^6D_{1\frac12}-22_{2\frac12}^0$
932.687		30	0			$a^6D_{\frac12}-23_{1\frac12}^0$
						$a^6D_{2\frac12}-20_{3\frac12}^0$
935.783		0	—			$a^6D_{4\frac12}-16_{3\frac12}^0$
936.484		8	—			$a^6D_{3\frac12}-17_{3\frac12}^0$
938.967		10	—			$a^4F_{4\frac12}-26_{3\frac12}^0$
						$a^6D_{2\frac12}-17_{3\frac12}^0$
939.159		20	—			$a^6D_{3\frac12}-16_{3\frac12}^0$
941.660		12	—			$a^6D_{2\frac12}-16_{3\frac12}^0$
942.589		5	—			$a^4F_{4\frac12}-21_{4\frac12}^0$
943.267		12	—			$a^4F_{4\frac12}-20_{3\frac12}^0$
943.910		15	—			$a^4F_{2\frac12}-27_{1\frac12}^0$
						$a^4F_{3\frac12}-26_{3\frac12}^0$
945.095		25	*m*			$a^4F_{3\frac12}-24_{3\frac12}^0$
946.051		0	—			$a^4F_{3\frac12}-22_{2\frac12}^0$
947.564		1	—			$a^4F_{2\frac12}-26_{3\frac12}^0$
						$a^4F_{3\frac12}-21_{4\frac12}^0$
952.470		10	—			$a^4F_{4\frac12}-16_{3\frac12}^0$
954.496		1	—			$a^4F_{3\frac12}-18_{2\frac12}^0$
954.786		2	—			$a^4F_{3\frac12}-17_{3\frac12}^0$
995.829		8	—			$a^4D_{3\frac12}-26_{3\frac12}^0$
999.003		1	—			$a^4D_{1\frac12}-27_{1\frac12}^0$
1000.183		2	—			$a^4D_{2\frac12}-26_{3\frac12}^0$
1000.665		1	—			$a^4D_{\frac12}-27_{1\frac12}^0$
						$a^4D_{3\frac12}-20_{3\frac12}^0$
1005.082		1	—			$a^4D_{2\frac12}-20_{3\frac12}^0$
1007.657		20	—			$a^4D_{3\frac12}-18_{2\frac12}^0$
1007.975		25	—			$a^4D_{3\frac12}-17_{3\frac12}^0$
1011.037		25	—			$a^4D_{3\frac12}-16_{3\frac12}^0$
1012.088		20	—			$a^4D_{2\frac12}-18_{2\frac12}^0$
1012.417		25	1			$a^4D_{2\frac12}-17_{3\frac12}^0$
1015.083		10	—			$a^4D_{1\frac12}-18_{2\frac12}^0$
1015.520		20	—			$a^4D_{2\frac12}-16_{3\frac12}^0$
1038.370			1			$a^4P_{2\frac12}-28_{1\frac12}^0$
1055.269			25			$a^6D_{4\frac12}-15_{3\frac12}^0$
1059.571			20			$a^6D_{3\frac12}-15_{3\frac12}^0$
1062.758			20			$a^6D_{2\frac12}-15_{3\frac12}^0$
1063.982			15			$a^6D_{4\frac12}-13_{3\frac12}^0$
1068.356			30			$a^6D_{3\frac12}-13_{3\frac12}^0$
1069.038			15			$a^6D_{2\frac12}-14_{2\frac12}^0$
1071.260			5			$a^6D_{1\frac12}-14_{2\frac12}^0$
1071.596			30			$a^6D_{2\frac12}-13_{3\frac12}^0$
1076.556			2			$a^4F_{4\frac12}-15_{3\frac12}^0$
1096.616			20			$a^6D_{3\frac12}-w^6P_{2\frac12}^0$
1096.793*p*			20			$a^6D_{2\frac12}-w^6P_{1\frac12}^0$
1096.886*p*			30			$a^6D_{4\frac12}-w^6P_{3\frac12}^0$
1097.782			2			$a^4F_{1\frac12}-14_{2\frac12}^0$
1099.117			25*h*			$a^6D_{1\frac12}-w^6P_{1\frac12}^0$
1100.026			20			$a^6D_{2\frac12}-w^6P_{2\frac12}^0$
1100.525*p*			20			$a^6D_{\frac12}-w^6P_{1\frac12}^0$
1101.538			20			$a^6D_{3\frac12}-w^6P_{3\frac12}^0$
1102.385			8			$a^6D_{1\frac12}-w^6P_{2\frac12}^0$
1102.758			1			$a^6D_{3\frac12}-11_{2\frac12}^0$
1104.978			1			$a^6D_{2\frac12}-w^6P_{3\frac12}^0$
1106.215			15			$a^6D_{2\frac12}-11_{2\frac12}^0$
1106.362			5			$a^6D_{4\frac12}-6_{4\frac12}^0$
1111.114			15			$a^6D_{3\frac12}-6_{4\frac12}^0$
1121.987			25			$a^6D_{4\frac12}-2_{3\frac12}^0$
1122.858			25			$a^6D_{3\frac12}-3_{2\frac12}^0$
1124.134			20			$a^6D_{2\frac12}-4_{1\frac12}^0$
1126.425			20			$a^6D_{2\frac12}-3_{2\frac12}^0$
1126.603			20			$a^6D_{1\frac12}-4_{1\frac12}^0$
1126.850			20			$a^6D_{3\frac12}-2_{3\frac12}^0$
1128.074			25*b*			$a^6D_{\frac12}-4_{1\frac12}^0$
1128.180			5			$a^4F_{3\frac12}-11_{2\frac12}^0$

λ VAC OBS.	λ VAC CALC.	INTENSITIES Ne S.T.	INTENSITIES He S.T.	INTENSITIES SPARK	*st*	IDENTIFICATION
1128.530			10*h*			$a^6S_{2\frac12}-29_{2\frac12}^0$
1128.909			20			$a^6D_{1\frac12}-3_{2\frac12}^0$
1129.777			12			$a^4F_{4\frac12}-6_{4\frac12}^0$
1130.428			25*b*			$a^6D_{2\frac12}-2_{3\frac12}^0$
1130.874			2			$a^4F_{4\frac12}-5_{3\frac12}^0$
1133.413			25			$a^4F_{2\frac12}-11_{2\frac12}^0$
1133.678			25			$a^6D_{4\frac12}-1_{3\frac12}^0$
1138.039			5			$a^4F_{3\frac12}-5_{3\frac12}^0$
1138.642			25			$a^6D_{3\frac12}-1_{3\frac12}^0$
1142.334			25			$a^6D_{4\frac12}-y^6F_{3\frac12}^0$
						$a^6D_{2\frac12}-1_{3\frac12}^0$
1143.235			25			$a^6D_{4\frac12}-y^6F_{4\frac12}^0$
1144.946			35*hb*			$a^6D_{4\frac12}-y^6F_{5\frac12}^0$
1146.963			15			$a^6D_{3\frac12}-y^6F_{2\frac12}^0$
1147.413			25			$a^6D_{3\frac12}-y^6F_{3\frac12}^0$
1148.295			30			$a^6D_{3\frac12}-y^6F_{4\frac12}^0$
1150.292			20			$a^6D_{2\frac12}-y^6F_{1\frac12}^0$
1150.689			20			$a^6D_{2\frac12}-y^6F_{2\frac12}^0$
1151.163			25			$a^6D_{2\frac12}-y^6F_{3\frac12}^0$
1152.440			15			$a^6D_{1\frac12}-y^6F_{\frac12}^0$
1152.882			20			$a^6D_{1\frac12}-y^6F_{1\frac12}^0$
1153.281			20			$a^6D_{1\frac12}-y^6F_{2\frac12}^0$
1153.955			15			$a^6D_{\frac12}-y^6F_{\frac12}^0$
1154.401			20			$a^6D_{\frac12}-y^6F_{1\frac12}^0$
1156.575			2			$a^6S_{2\frac12}-28_{1\frac12}^0$
1159.347			20			$a^4D_{3\frac12}-14_{2\frac12}^0$
1162.351			2			$a^4D_{3\frac12}-13_{3\frac12}^0$
1165.269			12			$a^4D_{2\frac12}-14_{2\frac12}^0$
1175.699			1			$a^6S_{2\frac12}-26_{3\frac12}^0$
						$a^6S_{2\frac12}-25_{1\frac12}^0$
1213.149			20			$a^4D_{3\frac12}-6_{4\frac12}^0$
1213.764			20			$a^4D_{1\frac12}-11_{2\frac12}^0$
1214.409			10			$a^4D_{3\frac12}-5_{3\frac12}^0$
1220.882			5			$a^4D_{2\frac12}-5_{3\frac12}^0$
1260.542			20			$a^6D_{4\frac12}-x^6P_{3\frac12}^0$
1266.694			20			$a^6D_{3\frac12}-x^6P_{3\frac12}^0$
1267.437			25			$a^6D_{3\frac12}-x^6P_{2\frac12}^0$
1271.235			1			$a^6D_{2\frac12}-x^6P_{3\frac12}^0$
1272.001			25*b*			$a^6D_{2\frac12}-x^6P_{2\frac12}^0$
1272.638			15			$a^6D_{2\frac12}-x^6P_{1\frac12}^0$
1275.154			15			$a^6D_{1\frac12}-x^6P_{2\frac12}^0$
1275.801			20			$a^6D_{1\frac12}-x^6P_{1\frac12}^0$
1290.204			15			$a^4P_{2\frac12}-10_{2\frac12}^0$
1291.594			15			$a^4P_{2\frac12}-9_{1\frac12}^0$
1293.543			0			$a^4P_{1\frac12}-10_{2\frac12}^0$
1294.914			12			$a^4P_{1\frac12}-9_{1\frac12}^0$
1296.088			20			$a^4P_{1\frac12}-8_{\frac12}^0$
1298.815			2			$a^4P_{\frac12}-9_{1\frac12}^0$
1299.984			0			$a^4P_{\frac12}-8_{\frac12}^0$
1459.311			15			$a^6S_{2\frac12}-w^6P_{1\frac12}^0$
1465.043			20			$a^6S_{2\frac12}-w^6P_{2\frac12}^0$
1473.834			20			$a^6S_{2\frac12}-w^6P_{3\frac12}^0$
1476.054			10			$a^6S_{2\frac12}-11_{2\frac12}^0$
1541.011		1	0			$a^6S_{2\frac12}-1_{3\frac12}^0$
1550.260	0.273	—	1	—	*s*	$a^4F_{4\frac12}-x^4F_{3\frac12}^0$
1558.543	.538	8	10	—		$a^4F_{2\frac12}-y^2D_{2\frac12}^0$?
1558.706	.691	8	10	—		$a^4F_{1\frac12}-y^2D_{1\frac12}^0$?
1559.106	.084	25	20	2	*s*	$a^4F_{4\frac12}-x^4F_{4\frac12}^0$
1563.790	.788	25	25	2	*s*	$a^4F_{3\frac12}-x^4F_{3\frac12}^0$
1566.825	.821	20	20	1	*s*	$a^4F_{4\frac12}-x^4G_{4\frac12}^0$
1568.031	.017	5	8	—	*s*	$a^4F_{2\frac12}-x^4F_{1\frac12}^0$
1569.670	.674	10	12	—	*s*	$a^4F_{4\frac12}-x^4G_{5\frac12}^0$
1570.248	.244	20	20	1	*s*	$a^4F_{2\frac12}-x^4F_{2\frac12}^0$
1572.750	.754	5	1	—	*s*	$a^4F_{3\frac12}-x^4F_{4\frac12}^0$
1573.831	.826	2	5	—	*s*	$a^4F_{2\frac12}-x^4F_{3\frac12}^0$
1574.778	.769	0	0	—	*s*	$a^4F_{3\frac12}-x^4G_{3\frac12}^0$
1574.931	.921	20	20	1	*s*	$a^4F_{1\frac12}-x^4F_{1\frac12}^0$
1577.158	.167	1	1	—	*s*	$a^4F_{1\frac12}-x^4F_{2\frac12}^0$
1580.635	.627	20	25*b*	1		$a^4F_{3\frac12}-x^4G_{4\frac12}^0$
1581.293	.268	20	8	—		$a^4F_{2\frac12}-x^4G_{2\frac12}^0$
1584.954	.949	20	15	1	*s*	$a^4F_{2\frac12}-x^4G_{3\frac12}^0$
1588.295	.288	8	10	1		$a^4F_{1\frac12}-x^4G_{2\frac12}^0$
1608.446		40	35	15		$a^6D_{4\frac12}-y^6P_{3\frac12}^0$
1610.933	.922	8	15*h*	1		$a^4F_{4\frac12}-y^4G_{4\frac12}^0$
1612.814	.805	20	20	8	*s*	$a^4F_{4\frac12}-y^4G_{5\frac12}^0$
1618.464		25	25	2		$a^6D_{3\frac12}-y^6P_{3\frac12}^0$
1621.685		30	30	10		$a^6D_{3\frac12}-y^6P_{2\frac12}^0$
1623.102	.090	8	8	1	*s*	$a^4F_{3\frac12}-y^4G_{3\frac12}^0$
1625.525	.520	15	20	8	*s*	$a^4F_{3\frac12}-y^4G_{4\frac12}^0$
1625.919		12	15	—		$a^6D_{2\frac12}-y^6P_{3\frac12}^0$
1629.155		25	30	8		$a^6D_{2\frac12}-y^6P_{2\frac12}^0$
1631.124		25	30	2		$a^6D_{2\frac12}-y^6P_{1\frac12}^0$
1632.672	.665	2	1	—	*s*	$a^4F_{2\frac12}-y^4G_{2\frac12}^0$
1633.907	.906	15	15	2	*s*	$a^4F_{2\frac12}-y^4G_{3\frac12}^0$
1634.353		20	20	1		$a^6D_{1\frac12}-y^6P_{2\frac12}^0$
1635.389		25	35	15		$a^4D_{3\frac12}-x^4P_{2\frac12}^0$
1636.334		25	30	5		$a^6D_{1\frac12}-y^6P_{1\frac12}^0$

TABLE VII.—*Continued.*

λ vac		Intensities				
OBS	CALC	Ne S.T.	He S.T.	Spark	st	Identification
1637.400	0.398	20	15	2	s	$a^4F_{4\frac{1}{2}}-x^4D_{3\frac{1}{2}}^0$
1639.403		25	30	2		$a^6D_{\frac{1}{2}}-y^6P_{1\frac{1}{2}}^0$
1640.167	.150	12	12	2	s	$a^4F_{1\frac{1}{2}}-y^4G_{2\frac{1}{2}}^0$
1641.761		20	25	8		$a^4D_{2\frac{1}{2}}-x^4P_{1\frac{1}{2}}^0$
1643.588	.576	15	15	2	s	$a^4F_{3\frac{1}{2}}-x^4D_{2\frac{1}{2}}^0$
1646.187		10	20	1		$a^4D_{1\frac{1}{2}}-x^4P_{\frac{1}{2}}^0$
1647.161		10	25	1		$a^4D_{2\frac{1}{2}}-x^4P_{2\frac{1}{2}}^0$
1649.444	.423	12	15*b*	1		$a^4F_{2\frac{1}{2}}-x^4D_{1\frac{1}{2}}^0$
1649.583		12	20	1		$a^4D_{1\frac{1}{2}}-x^4P_{1\frac{1}{2}}^0$
1650.709		15	20	1		$a^4D_{\frac{1}{2}}-x^4P_{\frac{1}{2}}^0$
1652.489	.482	1	0	—	s	$a^4F_{3\frac{1}{2}}-x^4D_{3\frac{1}{2}}^0$
1654.105		20*b*	5	—		$a^4D_{\frac{1}{2}}-x^4P_{1\frac{1}{2}}^0$
1654.484	.476	10	5	1	s	$a^4F_{1\frac{1}{2}}-x^4D_{\frac{1}{2}}^0$
1655.042		—	1	—		$a^4D_{1\frac{1}{2}}-x^4P_{2\frac{1}{2}}^0$
1658.785	.771	10	15	2	s	$a^4F_{4\frac{1}{2}}-y^4F_{4\frac{1}{2}}^0$
1659.487	.479	20	20	10	s	$a^4F_{3\frac{1}{2}}-y^4D_{2\frac{1}{2}}^0$
1662.369	.357	—	0	—		$a^4F_{1\frac{1}{2}}-x^4D_{2\frac{1}{2}}^0$
1663.226	.220	15	15	2	s	$a^4F_{2\frac{1}{2}}-y^4D_{1\frac{1}{2}}^0$
1670.759	.746	20	25	20		$a^4F_{4\frac{1}{2}}-y^4D_{3\frac{1}{2}}^0$
	.787					$a^4F_{2\frac{1}{2}}-y^4D_{2\frac{1}{2}}^0$
1671.010	70.990	0	1	—	s	$a^4F_{1\frac{1}{2}}-y^4D_{1\frac{1}{2}}^0$
1673.470	.466	15	15	15		$a^2G_{4\frac{1}{2}}-w^2F_{3\frac{1}{2}}^0$
1674.258	.254	10	2	1	s	$a^4F_{3\frac{1}{2}}-y^4F_{4\frac{1}{2}}^0$
1676.871	.854	1	1	—	s	$a^4F_{3\frac{1}{2}}-y^4F_{3\frac{1}{2}}^0$
1679.388	.379	8	15	10		$a^2G_{3\frac{1}{2}}-w^2F_{2\frac{1}{2}}^0$
1685.953	.952	8	5	1	s	$a^4F_{2\frac{1}{2}}-y^4F_{2\frac{1}{2}}^0$
1686.457	.454	2	8	1	s	$a^4F_{3\frac{1}{2}}-y^4D_{3\frac{1}{2}}^0$
1686.717	.690	1	2	—		$a^4F_{2\frac{1}{2}}-z^2D_{1\frac{1}{2}}^0$?
1689.821	.832	2	10*b*	—		$a^4P_{2\frac{1}{2}}-w^4D_{3\frac{1}{2}}^0$
1690.781	.755	2	8	—		$a^4P_{2\frac{1}{2}}-w^4D_{2\frac{1}{2}}^0$
1691.289	.272	5	8	1	s	$a^4F_{1\frac{1}{2}}-y^4F_{1\frac{1}{2}}^0$
1693.477	.475	0	0	—	s	$a^4P_{2\frac{1}{2}}-w^4D_{1\frac{1}{2}}^0$
1693.961	.935	—	0	—	s	$a^4F_{1\frac{1}{2}}-y^4F_{2\frac{1}{2}}^0$
1696.800	0.794	2	8	—	s	$a^4F_{4\frac{1}{2}}-z^4G_{4\frac{1}{2}}^0$
1698.190	.134	—	0	—		$a^4F_{2\frac{1}{2}}-y^4D_{3\frac{1}{2}}^0$?
1699.199	.195	1	2	—	s	$a^4P_{1\frac{1}{2}}-w^4D_{1\frac{1}{2}}^0$
1701.952	.938	1	2	—		$a^4P_{1\frac{1}{2}}-w^4D_{\frac{1}{2}}^0$
1702.045	.044	25	25	25	s	$a^4F_{4\frac{1}{2}}-z^4G_{5\frac{1}{2}}^0$
1706.179	.144	—	1	—		$a^4F_{3\frac{1}{2}}-z^4G_{2\frac{1}{2}}^0$
1708.627	.621	8	8	2		$a^4F_{3\frac{1}{2}}-z^4G_{3\frac{1}{2}}^0$
	.675					$a^4P_{\frac{1}{2}}-w^4D_{\frac{1}{2}}^0$
1709.560	.551	—	0	—	s	$a^4F_{2\frac{1}{2}}-y^4P_{1\frac{1}{2}}^0$
1713.002	2.998	25	20	25	s	$a^4F_{3\frac{1}{2}}-z^4G_{4\frac{1}{2}}^0$
1716.569	.576		2	0		$a^4F_{2\frac{1}{2}}-z^2D_{2\frac{1}{2}}^0$
1718.123	.100		2	—	s	$a^4F_{2\frac{1}{2}}-z^4G_{2\frac{1}{2}}^0$
1720.621	.611		20	20	s	$a^4F_{2\frac{1}{2}}-z^4G_{3\frac{1}{2}}^0$
1724.847	.853		8	1		$a^4F_{1\frac{1}{2}}-z^2D_{2\frac{1}{2}}^0$
1724.963	.962		8	1	s	$a^4F_{3\frac{1}{2}}-y^4P_{2\frac{1}{2}}^0$
1726.394	.391		12	8	s	$a^4F_{1\frac{1}{2}}-z^4G_{2\frac{1}{2}}^0$
1731.364	.337		1	—		$a^2G_{4\frac{1}{2}}-w^2H_{5\frac{1}{2}}^0$
1749.136	.120		1	—		$a^2G_{4\frac{1}{2}}-x^2F_{3\frac{1}{2}}^0$
1764.118	.117		1	—		$a^2G_{3\frac{1}{2}}-x^2F_{2\frac{1}{2}}^0$
1765.325	.320		0	—		$a^2G_{3\frac{1}{2}}-x^2F_{3\frac{1}{2}}^0$
1772.518	.512		15	20		$a^2G_{4\frac{1}{2}}-x^2H_{5\frac{1}{2}}^0$
1776.661	.649		1	—		$a^2G_{4\frac{1}{2}}-x^2H_{4\frac{1}{2}}^0$
1781.529	.508		1	—		$a^4P_{2\frac{1}{2}}-y^2F_{3\frac{1}{2}}^0$?
1785.262			40	30		$a^6S_{2\frac{1}{2}}-x^6P_{3\frac{1}{2}}^0$
1786.448	.437		1	—		$a^4P_{1\frac{1}{2}}-y^2F_{2\frac{1}{2}}^0$?
1786.738			40	30		$a^6S_{2\frac{1}{2}}-x^6P_{2\frac{1}{2}}^0$
1787.997*p*			35	25		$a^6S_{2\frac{1}{2}}-x^6P_{1\frac{1}{2}}^0$
1793.371	.366		10	20		$a^2G_{3\frac{1}{2}}-x^2H_{4\frac{1}{2}}^0$
1815.406	.411		0	1	s	$a^2D_{2\frac{1}{2}}-w^2F_{3\frac{1}{2}}^0$
1818.509	.516		2	1	s	$a^4D_{3\frac{1}{2}}-x^4D_{3\frac{1}{2}}^0$
1822.150	.120		1	0*h*		$a^4D_{2\frac{1}{2}}-x^4D_{2\frac{1}{2}}^0$
	.188					$a^4D_{1\frac{1}{2}}-x^4D_{\frac{1}{2}}^0$
1823.888	.869		1	1		$a^2P_{1\frac{1}{2}}-y^2P_{1\frac{1}{2}}^0$
	.925					$a^2P_{1\frac{1}{2}}-y^2P_{\frac{1}{2}}^0$
1826.991	.994		1	1	s	$a^4D_{3\frac{1}{2}}-y^4D_{2\frac{1}{2}}^0$
1831.261	.263		1	1		$a^2D_{1\frac{1}{2}}-w^2F_{2\frac{1}{2}}^0$
1831.724	.751		1	—		$a^4D_{1\frac{1}{2}}-x^4D_{2\frac{1}{2}}^0$
1833.071	.073		0	—	s	$a^4D_{2\frac{1}{2}}-x^4D_{3\frac{1}{2}}^0$
1835.869	.872		15	10		$a^2G_{4\frac{1}{2}}-x^2G_{4\frac{1}{2}}^0$
1841.701	.687		10*h*	1		$a^4D_{2\frac{1}{2}}-y^4D_{2\frac{1}{2}}^0$
1842.256	.238		0	—	s	$a^4D_{1\frac{1}{2}}-y^4D_{1\frac{1}{2}}^0$
1846.581	.574		12	2		$a^2G_{3\frac{1}{2}}-x^2G_{3\frac{1}{2}}^0$
1848.768	.771		12	2	s	$a^2D_{2\frac{1}{2}}-x^2D_{2\frac{1}{2}}^0$
1851.517	.526		1	—	s	$a^4D_{1\frac{1}{2}}-y^4D_{2\frac{1}{2}}^0$
1859.744	.744		15	10	s	$a^4D_{3\frac{1}{2}}-y^4D_{3\frac{1}{2}}^0$
1860.040	.052		20	20		$a^2G_{4\frac{1}{2}}-y^2F_{3\frac{1}{2}}^0$
1874.931	.970		0	—		$a^4D_{2\frac{1}{2}}-y^4D_{3\frac{1}{2}}^0$
1876.173	.212		8*h*	—		$a^2D_{1\frac{1}{2}}-x^2D_{2\frac{1}{2}}^0$
1876.835	.836		15	10		$a^2G_{3\frac{1}{2}}-y^2F_{2\frac{1}{2}}^0$
1877.462	.470		20	20		$a^2H_{5\frac{1}{2}}-w^2H_{5\frac{1}{2}}^0$
1880.046	.050		2	0		$a^2D_{1\frac{1}{2}}-x^2D_{1\frac{1}{2}}^0$
1888.729	.734		20	25		$a^2H_{4\frac{1}{2}}-w^2H_{4\frac{1}{2}}^0$
1894.006	.022		10*b*	25*b*		$a^2H_{4\frac{1}{2}}-w^2H_{5\frac{1}{2}}^0$
1898.538	.535		10	2	s	$a^2D_{2\frac{1}{2}}-y^2P_{1\frac{1}{2}}^0$
1903.370	.384		1	—	s	$a^2D_{2\frac{1}{2}}-x^2F_{2\frac{1}{2}}^0$
1904.784	.785		15	5	s	$a^2D_{2\frac{1}{2}}-x^2F_{3\frac{1}{2}}^0$
1910.150	.147		1	—		$a^4H_{6\frac{1}{2}}-w^2H_{5\frac{1}{2}}^0$?
1917.337	.321		15*b*	8*b*		$a^2G_{4\frac{1}{2}}-y^2H_{4\frac{1}{2}}^0$
1918.114	.100		2	—		$c^2D_{2\frac{1}{2}}-w^4D_{3\frac{1}{2}}^0$
1922.234	.268		0	—		$a^4H_{4\frac{1}{2}}-w^2H_{5\frac{1}{2}}^0$?
1922.797	.794		20*b*	30*b*		$a^2D_{2\frac{1}{2}}-w^4D_{1\frac{1}{2}}^0$
1925.987	.986		20*b*	25*b*		$a^2H_{5\frac{1}{2}}-x^2H_{5\frac{1}{2}}^0$
1927.481	.485		1*hb*	—		$a^2D_{1\frac{1}{2}}-y^2P_{1\frac{1}{2}}^0$
	.548					$a^2D_{1\frac{1}{2}}-y^2P_{\frac{1}{2}}^0$
1929.194	.191		1	—		$a^2D_{2\frac{1}{2}}-w^4F_{3\frac{1}{2}}^0$?
1932.477	.483		15	2		$a^2D_{1\frac{1}{2}}-x^2F_{2\frac{1}{2}}^0$
1935.296	.297		15	2		$a^2G_{4\frac{1}{2}}-y^2H_{5\frac{1}{2}}^0$
1936.781	.805		20*b*	1*b*		$a^2G_{3\frac{1}{2}}-y^2H_{4\frac{1}{2}}^0$
1938.899	.899		8*b*	25*b*		$b^4F_{1\frac{1}{2}}-x^2D_{2\frac{1}{2}}^0$?
1948.372	.383		10*b*	5		$a^2H_{4\frac{1}{2}}-x^2H_{4\frac{1}{2}}^0$
1958.121	.086		5	—		$a^4H_{4\frac{1}{2}}-w^4D_{3\frac{1}{2}}^0$?
	.135					$a^4H_{4\frac{1}{2}}-w^4F_{4\frac{1}{2}}^0$?
1963.110	.093		25*b*	—		$a^4H_{3\frac{1}{2}}-w^4D_{3\frac{1}{2}}^0$?
	.142					$a^4H_{3\frac{1}{2}}-w^4F_{4\frac{1}{2}}^0$?
1964.330	.339		12	—		$a^4H_{3\frac{1}{2}}-w^4D_{2\frac{1}{2}}^0$?
1975.542	.547		1	1		$a^2G_{4\frac{1}{2}}-y^4H_{5\frac{1}{2}}^0$
1993.289	.298		8*b*	15*b*		$a^2G_{4\frac{1}{2}}-x^4F_{4\frac{1}{2}}^0$
1994.857	.908		20	1*h*		$b^2P_{1\frac{1}{2}}-w^2F_{2\frac{1}{2}}^0$?
1999.430	.411		10	25		$b^4F_{4\frac{1}{2}}-w^4D_{3\frac{1}{2}}^0$
	.462					$b^4F_{4\frac{1}{2}}-w^4F_{4\frac{1}{2}}^0$
1999.727	.681		1	1		$a^2G_{3\frac{1}{2}}-x^4F_{3\frac{1}{2}}^0$?
	.730					$a^2D_{2\frac{1}{2}}-x^2G_{3\frac{1}{2}}^0$
2001.019	.025		30	30	s	$a^2H_{5\frac{1}{2}}-x^2G_{4\frac{1}{2}}^0$
2004.533	.556		2	—	s	$a^4P_{1\frac{1}{2}}-x^4D_{\frac{1}{2}}^0$
2007.665	.658		12	5		$b^4F_{3\frac{1}{2}}-w^4D_{2\frac{1}{2}}^0$
2008.105	.088		15*b*	2		$a^1P_{2\frac{1}{2}}-x^4D_{2\frac{1}{2}}^0$
2008.364	.356		12	5	s	$a^4P_{1\frac{1}{2}}-x^4D_{1\frac{1}{2}}^0$
2011.341	.348		25	30	s	$a^2H_{4\frac{1}{2}}-x^2G_{3\frac{1}{2}}^0$
2011.635	.602		0	1		$a^2G_{4\frac{1}{2}}-z^2H_{4\frac{1}{2}}^0$
2013.921	.908		15	5	s	$a^4P_{\frac{1}{2}}-x^4D_{\frac{1}{2}}^0$
2014.318	.365		1*b*	1		$a^2G_{3\frac{1}{2}}-x^4F_{4\frac{1}{2}}^0$?
2016.154	.136		20	20	s	$a^4P_{1\frac{1}{2}}-x^4D_{2\frac{1}{2}}^0$
2016.746	.728		10	1	s	$b^4F_{2\frac{1}{2}}-w^4D_{1\frac{1}{2}}^0$
2017.744	.743		15	5	s	$a^4P_{\frac{1}{2}}-x^4D_{1\frac{1}{2}}^0$
2018.509	.496		2	1	s	$b^4F_{3\frac{1}{2}}-w^4F_{3\frac{1}{2}}^0$
2019.427	.429		25	25		$a^2G_{4\frac{1}{2}}-z^2H_{5\frac{1}{2}}^0$
2021.394	.399		25	25	s	$a^4P_{2\frac{1}{2}}-x^4D_{3\frac{1}{2}}^0$
2024.370	.355		1	—		$b^4F_{1\frac{1}{2}}-w^4D_{\frac{1}{2}}^0$
2028.434	.427		5	1	s	$b^4F_{2\frac{1}{2}}-w^4F_{2\frac{1}{2}}^0$
2029.838	.839		8	2		$a^2G_{4\frac{1}{2}}-y^2G_{3\frac{1}{2}}^0$
2033.064	.060		25	25		$a^2G_{3\frac{1}{2}}-z^2H_{4\frac{1}{2}}^0$
2035.118	.091		1	—		$b^4F_{1\frac{1}{2}}-w^4F_{1\frac{1}{2}}^0$
2037.093	.089		20	25	s	$a^2D_{2\frac{1}{2}}-y^2F_{3\frac{1}{2}}^0$
2038.506	.429		0	—		$a^4P_{\frac{1}{2}}-y^4D_{1\frac{1}{2}}^0$?
2040.164	.119		2	*m*		$a^4P_{1\frac{1}{2}}-y^4D_{2\frac{1}{2}}^0$
2041.345	.346		25	35		$a^2G_{4\frac{1}{2}}-y^2G_{4\frac{1}{2}}^0$
2049.152	.146		5	1		$a^2H_{4\frac{1}{2}}-y^2F_{3\frac{1}{2}}^0$
2051.688	.689		25	30		$a^2G_{3\frac{1}{2}}-y^2G_{3\frac{1}{2}}^0$
2055.931	.922		20	20	s	$a^2P_{1\frac{1}{2}}-y^2D_{2\frac{1}{2}}^0$
2057.993	.988		12	2	s	$a^4P_{2\frac{1}{2}}-y^4F_{3\frac{1}{2}}^0$
2058.762	.826		0	—		$a^1P_{1\frac{1}{2}}-y^4F_{1\frac{1}{2}}^0$?
2062.747*p*	.774		0	—		$a^4P_{1\frac{1}{2}}-y^4F_{2\frac{1}{2}}^0$
2064.335	.336		25*hb*	20		$a^2G_{4\frac{1}{2}}-z^2F_{3\frac{1}{2}}^0$
2066.668	.666		15	8		$a^2P_{\frac{1}{2}}-y^2D_{1\frac{1}{2}}^0$
2068.580	.575		20	20		$a^2D_{1\frac{1}{2}}-y^2F_{2\frac{1}{2}}^0$
2070.616	.615		10*b*	1		$a^2F_{2\frac{1}{2}}-w^2F_{2\frac{1}{2}}^0$
2070.994	.994		8	2	s	$a^2F_{3\frac{1}{2}}-w^2F_{3\frac{1}{2}}^0$
2072.485	.449		10	2		$a^2P_{1\frac{1}{2}}-x^4F_{1\frac{1}{2}}^0$
	.468					$a^4P_{2\frac{1}{2}}-y^4D_{3\frac{1}{2}}^0$
2074.860	.850		8*b*	2		$a^2G_{4\frac{1}{2}}-y^4G_{3\frac{1}{2}}^0$
2076.348	.340		5	1	s	$a^2P_{1\frac{1}{2}}-x^4F_{2\frac{1}{2}}^0$
2078.829	.824		8	5		$a^2G_{4\frac{1}{2}}-y^4G_{4\frac{1}{2}}^0$
2080.912	.902		20	20		$a^2G_{3\frac{1}{2}}-z^2F_{2\frac{1}{2}}^0$
2084.178	.178		0*b*	10*b*		$a^2F_{2\frac{1}{2}}-w^2F_{3\frac{1}{2}}^0$
2086.939	.940		0	—		$a^2G_{3\frac{1}{2}}-z^2F_{3\frac{1}{2}}^0$
2088.194	.205		25	25		$a^2P_{1\frac{1}{2}}-z^2S_{\frac{1}{2}}^0$
2095.310	.294		1	1		$a^2P_{\frac{1}{2}}-x^4F_{1\frac{1}{2}}^0$
2095.654	.640		2	1		$a^2G_{3\frac{1}{2}}-y^4G_{2\frac{1}{2}}^0$
	.659					$a^2P_{1\frac{1}{2}}-x^4G_{2\frac{1}{2}}^0$
2097.659	.686		0*b*	0*b*		$a^2G_{3\frac{1}{2}}-y^4G_{3\frac{1}{2}}^0$
2098.181	.175		25*b*	25*b*		$a^2H_{5\frac{1}{2}}-y^2H_{4\frac{1}{2}}^0$
	.213					$a^4P_{1\frac{1}{2}}-y^4P_{1\frac{1}{2}}^0$
2101.633	.673		5*h*	5		$b^2H_{5\frac{1}{2}}-w^2H_{4\frac{1}{2}}^0$
2102.363	.368		1	—	s	$b^2P_{\frac{1}{2}}-x^2D_{1\frac{1}{2}}^0$
2108.226	.222		10	10		$b^2H_{5\frac{1}{2}}-w^2H_{5\frac{1}{2}}^0$
2108.529	.461		1	—		$a^4P_{\frac{1}{2}}-y^4P_{1\frac{1}{2}}^0$?
2109.613	.635		25	—		$b^2P_{1\frac{1}{2}}-y^2P_{1\frac{1}{2}}^0$
2109.768	.711		10	15		$b^2P_{1\frac{1}{2}}-y^2P_{\frac{1}{2}}^0$
	.770					$b^2H_{4\frac{1}{2}}-w^2H_{4\frac{1}{2}}^0$
2111.396	.401		15	20		$a^2P_{\frac{1}{2}}-z^2S_{\frac{1}{2}}^0$
2117.633	.665		25*b*	15		$a^4G_{5\frac{1}{2}}-w^4F_{4\frac{1}{2}}^0$
2118.868	.869		8	2	s	$a^2H_{4\frac{1}{2}}-y^2H_{4\frac{1}{2}}^0$
2119.723	.721		12	8	s	$a^2H_{5\frac{1}{2}}-y^2H_{5\frac{1}{2}}^0$

TABLE VII.—*Continued.*

λ vac		Intensities				
obs	calc	Ne S.T.	He S.T.	Spark	st	Identification
2123.126	.124		0*b*	—		$a^2G_{4\frac12}-x^4D_{3\frac12}^0$
2130.934	.926		15	5	*s*	$a^4P_{2\frac12}-y^4P_{2\frac12}^0$
2133.213	.208		2	—		$a^2F_{2\frac12}-x^2D_{1\frac12}^0$?
2134.666	.685		8*b*	1*h*		$a^4G_{4\frac12}-w^4F_{4\frac12}^0$
2135.268	.245		2	—		$a^4G_{5\frac12}-x^2H_{5\frac12}^0$
	.292					$b^2P_{1\frac12}-w^4D_{2\frac12}^0$
2138.412	.419		15*b*	—		$a^6D_{1\frac12}-z^4P_{\frac12}^0$
2138.780	.723		20	0		$a^2D_{2\frac12}-y^2D_{1\frac12}^0$?
2140.353	.311		25*b*	1		$a^6D_{2\frac12}-z^4P_{1\frac12}^0$
2141.289	.252		1	—		$a^4G_{5\frac12}-x^2H_{4\frac12}^0$
2146.736	.720		10*b*	2*b*		$a^6D_{3\frac12}-z^4P_{2\frac12}^0$
2147.049	.041		1	1	.	$a^2G_{3\frac12}-x^4D_{3\frac12}^0$
2148.398	.373		15	20		$a^4G_{4\frac12}-w^4F_{3\frac12}^0$
2151.297	.294		20*b*	25		$a^2D_{2\frac12}-y^2D_{2\frac12}^0$
2151.441	.443		10	1		$b^2H_{5\frac12}-w^4F_{4\frac12}^0$
2151.774	.765		25	8	*s*	$a^2P_{1\frac12}-z^2P_{1\frac12}^0$
2153.053	.044		12	10	*s*	$a^2P_{1\frac12}-z^2P_{\frac12}^0$
2154.554	.578		1	—		$a^6D_{\frac12}-z^4P_{1\frac12}^0$?
2156.519	.542		12	1	*s*	$a^4G_{3\frac12}-w^4F_{3\frac12}^0$
2159.199	.198		25	—		$a^2G_{4\frac12}-y^4F_{4\frac12}^0$
2159.833	.835		10*b*	—		$a^6D_{2\frac12}-z^4P_{2\frac12}^0$
2161.453	.470		12	—		$a^4H_{6\frac12}-y^2H_{5\frac12}^0$?
2161.842	.836		15*b*	15*b*		$a^4G_{3\frac12}-w^4F_{2\frac12}^0$
	.862					$b^2P_{\frac12}-y^2P_{1\frac12}^0$
2161.994	1.942		20*b*	—		$b^2P_{\frac12}-y^2P_{\frac12}^0$
	2.084					$z^6D_{4\frac12}^0-e^6G_{3\frac12}$?
2162.263	.218		20	—		$a^2H_{5\frac12}-y^4H_{4\frac12}^0$?
2162.704	.702		20	30		$a^2G_{4\frac12}-z^2G_{4\frac12}^0$
2164.052	3.996		20	—		$z^6D_{3\frac12}^0-f^4D_{2\frac12}$
2165.021	4.990		20	20		$z^6D_{2\frac12}^0-f^4D_{1\frac12}$
2165.240	.216		25	1		$z^6D_{3\frac12}^0-e^6G_{2\frac12}$?
	.288					$a^4G_{2\frac12}-w^4F_{2\frac12}^0$
2168.084	.105		12	1		$a^2H_{5\frac12}-y^4H_{5\frac12}^0$?
2168.563	.550		12	10	*s*	$a^4G_{2\frac12}-w^4F_{1\frac12}^0$
2169.608	.591		8	1		$b^2H_{5\frac12}-x^2H_{5\frac12}^0$
2170.114	.178		10	—		$z^6D_{2\frac12}^0-e^6G_{1\frac12}$?
2170.633	.662		12	—		$z^6D_{4\frac12}^0-e^6G_{4\frac12}$?
2170.876	.854		5	—		$a^2P_{1\frac12}-z^2F_{2\frac12}^0$
	.920					$z^6D_{\frac12}^0-f^4D_{\frac12}$
2172.233	.247		1	—		$z^6D_{1\frac12}^0-f^4D_{1\frac12}$
2172.739	.726		1	—		$z^6D_{3\frac12}^0-f^4D_{3\frac12}$
2173.363	.352		8	—		$z^6D_{2\frac12}^0-f^4D_{2\frac12}$
2173.673	.661		15	8		$a^2D_{2\frac12}-x^4F_{2\frac12}^0$
2173.904	.943		20*b*	0		$b^2H_{4\frac12}-w^4F_{3\frac12}^0$?
2175.533	.531		8	10		$a^2D_{1\frac12}-y^2D_{1\frac12}^0$
2176.129	.131		25	30		$a^2G_{3\frac12}-z^2G_{3\frac12}^0$
2176.708	.789		1	—		$z^6D_{\frac12}^0-f^4D_{1\frac12}$?
2177.048	.002		5*hh*	—		$a^4H_{4\frac12}-y^2H_{5\frac12}^0$?
2177.510	.470		20	—		$z^6D_{1\frac12}^0-e^6G_{1\frac12}$?
2177.709	.711		10	5		$a^2P_{\frac12}-z^2P_{\frac12}^0$
2180.940	.944		12	—		$z^6D_{2\frac12}^0-e^6G_{3\frac12}$?
2181.555	.610		12	—		$z^6D_{4\frac12}^0-e^6G_{5\frac12}$?
2181.822	.904		8	—		$z^6D_{1\frac12}^0-e^6G_{2\frac12}$?
2182.092	.034		5*b*	—		$z^6D_{\frac12}^0-e^6G_{1\frac12}$?
2183.987	.940		12	—		$a^2G_{3\frac12}-y^4F_{4\frac12}^0$
2184.154	.201		8	—		$a^2H_{4\frac12}-y^4H_{4\frac12}^0$?
2184.489	.472		10*h*	—		$b^2H_{4\frac12}-x^2H_{4\frac12}^0$
2186.308	.268		8*h*	—		$a^2F_{3\frac12}-x^2F_{2\frac12}^0$?
2188.131	.117		12	2		$a^2F_{3\frac12}-x^2F_{3\frac12}^0$
2188.365	.367		10	2		$a^2G_{3\frac12}-y^4F_{3\frac12}^0$
2188.555	.540		15	1		$a^2D_{1\frac12}-y^2D_{2\frac12}^0$
2189.512	.503		1	—		$a^2H_{5\frac12}-x^4F_{4\frac12}^0$
2192.622			10	5*h*		$z^6D_{3\frac12}^0-35_{2\frac12}$
2193.362	.373		5	—	*s*	$b^2P_{\frac12}-w^4D_{1\frac12}^0$
2197.961	.947		5*h*	—		$b^2P_{\frac12}-w^4D_{\frac12}^0$
2199.349			4	2*h*		$z^6D_{2\frac12}^0-36_{2\frac12}$
2202.284			5	5*h*		$z^6D_{2\frac12}^0-35_{2\frac12}$
2206.843			8	15*h*		$z^6D_{1\frac12}^0-36_{2\frac12}$
2207.272	.277		2	1		$a^2F_{3\frac12}-w^4D_{2\frac12}^0$?
	.278					$a^2D_{1\frac12}-x^4F_{1\frac12}^0$
2209.110			30	15*h*		$z^6D_{4\frac12}^0-31_{4\frac12}$
2209.740			20	10*h*		$z^6D_{4\frac12}^0-30_{3\frac12}$
						$z^6D_{1\frac12}^0-35_{2\frac12}$

λ vac		Intensities				
obs	calc	Ne S.T.	He S.T.	Spark	st	Identification
2211.643	.607		5	—		$a^2H_{5\frac12}-z^2H_{4\frac12}^0$
	.692					$a^2D_{1\frac12}-x^4F_{2\frac12}^0$?
2211.803	.784		5	1		$b^2G_{4\frac12}-w^2F_{3\frac12}^0$
	.800					$a^4H_{6\frac12}-y^4H_{5\frac12}^0$
2214.371	.342		20	25		$a^4H_{6\frac12}-y^4H_{6\frac12}^0$
	.409					$a^4H_{5\frac12}-y^4H_{4\frac12}^0$
2214.751			20	10*h*		$z^6D_{3\frac12}^0-32_{2\frac12}$
2215.786			10	2*h*		$z^6D_{2\frac12}^0-33_{1\frac12}$
2216.420			4	1*h*		$z^6D_{1\frac12}^0-34_{\frac12}$
2218.982			30	10*h*		$z^6D_{3\frac12}^0-31_{4\frac12}$
2220.582	.584		20	15	*s*	$a^4H_{5\frac12}-y^4H_{5\frac12}^0$
2221.081	.072		25	25	*s*	$a^2H_{5\frac12}-z^2H_{5\frac12}^0$
2221.146			6	—		$z^6D_{\frac12}^0-34_{\frac12}$
2223.373			1	—		$z^6D_{1\frac12}^0-33_{1\frac12}$
2224.560			2			$z^6D_{2\frac12}^0-32_{2\frac12}$
2228.164			4			$z^6D_{\frac12}^0-33_{1\frac12}$
2229.456			30			$z^6D_{2\frac12}^0-30_{3\frac12}$
2232.208			10			$z^6D_{1\frac12}^0-32_{2\frac12}$
2238.283			20			$z^6D_{4\frac12}^0-e^6F_{3\frac12}$
2239.752			25			$z^6D_{3\frac12}^0-e^6F_{2\frac12}$
2242.132			20			$z^6D_{2\frac12}^0-e^6F_{1\frac12}$
2244.886			8			$z^6D_{1\frac12}^0-e^6F_{\frac12}$
2246.171			45			$z^6D_{4\frac12}^0-e^6F_{4\frac12}$
2248.388			35			$z^6D_{3\frac12}^0-e^6F_{3\frac12}$
2249.754			30			$z^6D_{2\frac12}^0-e^6F_{2\frac12}$
						$z^6D_{\frac12}^0-e^6F_{\frac12}$
2249.891			25			$z^6D_{1\frac12}^0-e^6F_{1\frac12}$
						$a^6D_{4\frac12}-z^4D_{3\frac12}^0$?
2252.531			80			$z^6D_{4\frac12}^0-e^6F_{5\frac12}$
2254.766			8			$z^6D_{\frac12}^0-e^6F_{1\frac12}$
2256.369			50			$z^6D_{3\frac12}^0-e^6F_{4\frac12}$
2257.576			10			$z^6D_{1\frac12}^0-e^6F_{2\frac12}$
2258.468			25			$z^6D_{2\frac12}^0-e^6F_{3\frac12}$
2375.906			10			$a^4F_{1\frac12}-z^4D_{\frac12}^0$
						$z^6F_{3\frac12}^0-36_{2\frac12}$?
2379.264			0			$z^6F_{3\frac12}^0-35_{2\frac12}$
2403.182			8			$z^6F_{4\frac12}^0-31_{4\frac12}$
2403.355			6			$a^4F_{2\frac12}-z^4D_{3\frac12}^0$
						$z^6P_{3\frac12}^0-35_{2\frac12}$
2416.708			0			$z^6F_{2\frac12}^0-30_{3\frac12}$
2429.708			6			$z^6F_{1\frac12}^0-e^6F_{\frac12}$
2429.886			10			$z^6P_{3\frac12}^0-32_{2\frac12}$
2431.614			10			$z^6F_{2\frac12}^0-e^6F_{1\frac12}$
2431.974			3			$z^6F_{\frac12}^0-e^6F_{\frac12}$
2433.789			1			$z^6P_{2\frac12}^0-36_{2\frac12}$
2434.791			15			$z^6F_{3\frac12}^0-e^6F_{2\frac12}$
2434.968			20			$z^6P_{3\frac12}^0-31_{4\frac12}$
2435.561			5			$z^6F_{1\frac12}^0-e^6F_{1\frac12}$
2435.727			25			$z^6P_{3\frac12}^0-30_{3\frac12}$
2437.354			20			$z^6P_{2\frac12}^0-35_{2\frac12}$
2437.726			10			$z^6F_{4\frac12}^0-e^6F_{3\frac12}$
2437.839			5			$z^6F_{\frac12}^0-e^6F_{1\frac12}$
2438.372			20			$z^6F_{5\frac12}^0-e^6F_{4\frac12}$
2440.600			8			$z^6F_{2\frac12}^0-e^6F_{2\frac12}$
2444.583			15*b*			$z^6F_{1\frac12}^0-e^6F_{2\frac12}$
2445.015			10			$z^6F_{3\frac12}^0-e^6F_{3\frac12}$
2445.855			40			$z^6F_{5\frac12}^0-e^6F_{5\frac12}$
2447.147			25			$z^6F_{4\frac12}^0-e^6F_{4\frac12}$
2450.876			5			$z^6F_{2\frac12}^0-e^6F_{3\frac12}$
2454.490			15			$z^6F_{3\frac12}^0-e^6F_{4\frac12}$
2454.678			25			$z^6F_{4\frac12}^0-e^6F_{5\frac12}$
2456.635			10			$z^6P_{1\frac12}^0-36_{2\frac12}$
2459.270			1			$z^6P_{3\frac12}^0-e^6F_{2\frac12}$
2464.645			5			$z^6P_{2\frac12}^0-32_{2\frac12}$
2468.478			6*b*			$z^6P_{1\frac12}^0-34_{\frac12}$
2470.459			8			$z^6P_{3\frac12}^0-e^6F_{3\frac12}$
2477.185			0			$z^6P_{1\frac12}^0-33_{1\frac12}$
2480.134			3			$z^6P_{3\frac12}^0-e^6F_{4\frac12}$
2486.245			0			$z^6P_{2\frac12}^0-e^6F_{1\frac12}$
2488.107			5*b*			$z^6P_{1\frac12}^0-32_{2\frac12}$
2495.645			2			$z^6P_{2\frac12}^0-e^6F_{2\frac12}$

neighborhood of 106,000 wave numbers. The unclassified odd levels tentatively marked ^6D are in about the proper place.

The use of Dobbie's three even ^6D levels as part of e^6F seems amply justified by the intensity diagram given below in Table VI. His $e^6P_{3\frac12}$ has been given a number in place of its name because the $z^6D_{2\frac12}^0-e^6P_{3\frac12}$ line is definitely not present on my plates. Since $z^6D_{4\frac12}^0-e^6P_{3\frac12}$ and $z^6D_{3\frac12}^0-e^6P_{3\frac12}$ are both of intensity 30, it is highly probable that it would appear if it existed. The assignment of $J=2\frac{1}{2}$ instead of $J=1\frac{1}{2}$ to level 36 ($^6P_{1\frac12}$) depends

TABLE VIII, *Terms of* Fe III.

Configuration	Desig.	Level	Approx. Level	Intervals	No. of Comb.	Configuration	Desig.	Level	Approx. Level	Intervals	No. of Comb.
$3d^6$	a^5D_4	0.0		−436.1	2	$3d^5(^6S)4p$	$z^5P_3{}^0$	89083.6		−249.7	4
	a^5D_3	436.1		−302.0	2		$z^5P_2{}^0$	89333.3		−156.0	4
	a^5D_2	738.1		−193.4	3		$z^5P_1{}^0$	89489.3			4
	a^5D_1	931.5		−95.8	2	$3d^5(^4G)4p$	$z^5G_2{}^0$	113584.5		+19.4	2
	a^5D_0	1027.3			1		$z^5G_3{}^0$	113603.9		+29.8	2
$3d^5(^6S)4s$	a^5S_2	40998.7			3		$z^5G_4{}^0$	113633.7		+41.7	3
$3d^5(^4G)4s$	a^5G_6	63423.1		−41.3	5		$z^5G_5{}^0$	113675.4		+62.5	2
	a^5G_5	63464.4		−20.5	6		$z^5G_6{}^0$	113737.9			1
	a^5G_4	63484.9		−7.4	7	$3d^5(^4G)4p$	$z^5H_3{}^0$	114949.2		+160.7	1
	a^5G_3	63492.3		−2.2	6		$z^5H_4{}^0$	115109.9		+178.8	2
	a^5G_2	63494.5			2		$z^5H_5{}^0$	115288.7		+184.1	2
$3d^5(^4P)4s$	a^5P_3	66463.5		−58.2	2		$z^5H_6{}^0$	115472.8		+167.9	2
	a^5P_2	66521.7		−68.8	1		$z^5H_7{}^0$	115640.7			1
	a^5P_1	66590.5			0	$3d^5(^4G)4p$	$z^5F_5{}^0$	116315.6		−150.6	5
$3d^5(^4D)4s$	b^5D_4	69694.4		−141.2	2		$z^5F_4{}^0$	116466.2		−8.0	6
	b^5D_3	69835.6		−1.2	2		$z^5F_3{}^0$	116474.2			5
	b^5D_2	69836.8		+50.3	0	$3d^5(^6S)4s$	a^7S_3	0.0	30000		3
	b^5D_1	69786.5		+40.2	0	$3d^5(^6S)4p$	$z^7P_2{}^0$	51912.8		+332.3	1
	b^5D_0	69746.3			0		$z^7P_3{}^0$	52245.1		+512.3	1
							$z^7P_4{}^0$	52757.4	83000		1

only upon the identification of the line λ2375.906 as $z^6F_{3\frac{1}{2}}{}^0-36_{2\frac{1}{2}}$. Since this line is also assigned to the transition $a^4F_{1\frac{1}{2}}-z^4D_{\frac{1}{2}}{}^0$, the evidence is inconclusive.

It is very surprising that a long search has failed to uncover the third member of the d^6s^6D series. Its position can be predicted fairly accurately, and the analogous transitions in Mn II and Cu II give strong lines. I am, therefore, unable to improve the present value of the ionization potential,[8] 16.16 volts.

A list of identified lines of Fe II is given in Table VII. The list is complete for wave-lengths less than λ2220.582 but beyond this only those lines are given which are of interest in connection with new levels and new assignments of high even terms. The first column contains the wave-length of the line in vacuum. When poorly determined, it is followed by a small "p." If the wave-length of a line below λ2225 can be calculated by means of the combination principle from measures made above λ2300, the calculated decimal is given in the second column. Dobbie's[9] level values were used for the calculations. The next three columns give the intensity as observed in the neon Schüler tube, the helium Schüler tube, and the spark. If the line occurs in a region of the plate which has not been measured, the space for the intensity is left blank. A dash in the intensity column means that the region was measured but the line was not present; "*m*" means that the line is masked; "*h*" that it is somewhat hazy; "*b*" that it is a blend. The great increase in the intensity of the spectrum in the neon relative to the helium Schüler tube in the neighborhood of λ930 is readily apparent from a glance at the first part of the list. This region is within 4000 wave numbers of the limit of excitation of Fe II by collisions of the second kind with neon atoms in the normal state of the ion. The next column of the table contains "*s*" if the line is regarded as especially suitable as a standard. The final column gives the identification, followed by a question mark if uncertain. All wave-

[8] J. C. Dobbie, Phys. Rev. **45**, 76 (1934).

[9] J. C. Dobbie, *Annals of the Solar Physics Observatory, Cambridge* (Cambridge University Press, 1938), Vol. V, Part I.

TABLE IX. *Identified* Fe III *lines.*

Wave-length	Int.	Identification	Wave-length	Int.	Identification	Wave-length	Int.	Identification
859.737	15	$a^5D_4-z^5F_5^0$	1892.865	1	$a^5G_4-z^5F_5^0$	1994.355*p*	1*h*	$a^5G_3-z^5G_4^0$
1122.551	25*h*	$a^5D_4-z^5P_3^0$	1895.448	40	$a^7S_3-z^7P_4^0$	1995.249	15	$a^5G_4-z^5G_3^0$
1124.885	25	$a^5D_3-z^5P_2^0$	1914.036	50	$a^7S_3-z^7P_3^0$	1995.549	25	$a^5G_3-z^5G_3^0$
1126.747	8	$a^5D_2-z^5P_1^0$	1915.062	30	$a^5G_6-z^5H_7^0$	1996.408	25*	$a^5G_2-z^5G_2^0$
1128.074	25*b*	$a^5D_3-z^5P_3^0$	1921.182	0	$a^5G_6-z^5H_6^0$			$a^5G_3-z^5G_2^0$
1128.733	20	$a^5D_2-z^5P_2^0$	1922.766	30	$a^5G_5-z^5H_6^0$	1999.570	25	$a^5P_3-z^5F_3^0$
1129.205	20	$a^5D_1-z^5P_1^0$	1926.284	40	$a^7S_3-z^7P_2^0$	1999.872	1	$a^5P_3-z^5F_4^0$
1130.428	25*b*	$a^5D_0-z^5P_1^0$	1929.586	1	$a^5G_5-z^5H_5^0$	2001.904	5	$a^5P_2-z^5F_3^0$
1131.206	10	$a^5D_1-z^5P_2^0$	1930.361	30	$a^5G_4-z^5H_5^0$	2062.203	35	$a^5S_2-z^5P_1^0$
1131.914	8*h*	$a^5D_2-z^5P_3^0$	1937.054	1	$a^5G_4-z^5H_4^0$	2068.899	40	$a^5S_2-z^5P_2^0$
1886.733	25	$a^5G_5-z^5F_4^0$	1937.322	30	$a^5G_3-z^5H_4^0$	2079.642	50	$a^5S_2-z^5P_3^0$
1887.174	10	$a^5G_4-z^5F_3^0$	1943.458	30	$a^5G_2-z^5H_3^0$	2138.038	1	$b^5D_4-z^5F_4^0$
1887.451	8	$a^5G_4-z^5F_4^0$	1987.486	35	$a^5G_6-z^5G_6^0$	2144.151	2	$b^5D_3-z^5F_3^0$
		$a^5G_3-z^5F_3^0$	1989.957	15	$a^5G_6-z^5G_5^0$	2144.504	0	$b^5D_3-z^5F_4^0$
1887.718	2	$a^5G_3-z^5F_4^0$	1991.595	30	$a^5G_5-z^5G_5^0$	2144.960	2	$b^5D_4-z^5F_5^0$
1890.644	30	$a^5G_6-z^5F_5^0$	1993.251	15	$a^5G_5-z^5G_4^0$			
1892.068	5	$a^5G_5-z^5F_5^0$	1994.064	25	$a^5G_4-z^5G_4^0$			

* Measured as double in the Schüler tube.

lengths and intensities in the He Schüler tube are taken from one plate except for lines of wave-length longer than λ2190 arising from transitions between high and middle levels.

Fe III

The known terms of Fe III are collected in Table VIII. The a^5D, a^7S and a^5S, and z^7P^0 and z^5P^0 were found by Bowen.[10] The a^5P and b^5D were found by Swings and Edlén.[11] A search for the multiplet $a^7S-z^5P^0$ has been unsuccessful, and the septet and quintet systems remain unconnected. In the third column of the table the position of z^7P^0 is therefore given with reference to a^7S as zero. An estimate of the probable position of a^5G and a^5S relative to a^7S can be obtained from a plot of the corresponding differences in Cr I and Mn II since the major portion of the change from one spectrum to another along an isoelectronic sequence is linear with atomic number. It is found that a^5S would be expected to be about 11,000 wave numbers above a^7S and a^5G about 34,000 wave numbers above a^7S. The fourth column of the table gives estimated term values for the septets with reference to a^5D as zero. Column six contains the number of times each of the various levels were used in identifying the lines of Table IX.

Table IX contains a list of the identified Fe III lines below λ2200. Column one gives the wave-length. When this is poorly determined, it is followed by a small "*p*." Column two contains the intensity and column three the identification.

If the line is hazy or a blend, the intensity is followed by "*h*" or "*b*," respectively. The $a^5D_4-z^5F_5^0$ line and the $a^5D-z^5P^0$ multiplet were taken from a Schüler tube plate, the remainder of the lines from a plate of the spark in nitrogen.

[10] I. S. Bowen, Phys. Rev. **52**, 1153 (1937).
[11] P. Swings and B. Edlén, Astrophys. J. **88**, 618 (1938).

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