nearly as large as the differences to be accounted for.

It is interesting to note that Tilton[17] claims some success in finding a correlation between the values for the index of refraction of air and the sunspot cycle.

It seems clear that no adequate explanation can be given of the various discrepancies, but that one can only attempt to eliminate systematic errors by careful attention to every detail.

In conclusion I wish to acknowledge the assistance and helpful guidance of Professor W. V. Houston and the many valuable suggestions of Professor I. S. Bowen in carrying out this research.

[17] Tilton, Nat. Bur. Stand. J. Research **13**, 11 (1934).

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The Spectrum of Neutral Iridium, Ir I

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A new description of the arc spectrum of iridium has been made. The present data include 3100 wave-lengths of which 1937 have been accounted for as combinations between 214 energy levels. The normal electron configuration of the Ir I is $5d^76s^2$ and the I.P. is approximately 9.2 volts. Tables of the most intense lines and of all of the energy levels are presented.

THE existing wave-length data for the arc spectrum of iridium have been improved and extended. Exposures from a 110-volt 2-ampere arc between rods of extremely pure iridium were taken in the first and second orders of the 35 foot, 30,000 line per inch grating at M.I.T., dispersion 0.4A/mm in the second order. Superimposed spectra from a standard iron arc permitted measurement of the iridium spectrum in terms of internationally adopted secondary standards.

New data are recorded from 4627A to 2159A, supplementing the excellent data of Meggers[1] (8426A to 4500A). Intensity estimates are on a scale of 100 to 1. The present list contains more than 3100 wave-lengths which have been assigned to Ir I by comparison with spark spectra. The earlier analysis[2] has been extended on the basis of new data until now 1937 lines are accounted for as combinations between 214 energy levels.

The complete list of classified lines is not published at this time since it is probable that most of the wave-lengths will be published elsewhere at a later date. A list of the most intense lines is presented in Table I. Column 1 gives the wave-length in international angstroms in air; column 2, estimated intensities (r signifies partial reversal); column 3, the term types of the two energy levels that give rise to the line.

All energy levels are presented in Table II. Column 1 gives the symbol which identifies the level; column 2, the term type; column 3, the energy value expressed in wave number units; column 4, the J value.

The electron configuration interactions are so great that the assignment of terms to definite configurations is nearly without meaning. However, the custom of assigning terms to the configuration which seems to play the most impor-

TABLE I. *Most intense iridium arc lines.*

λ I.A.	INT.	COMBINATION	λ I.A.	INT.	COMBINATION
5449.50	80	$z^6G_{6\frac{1}{2}}^0-e^6F_{5\frac{1}{2}}$	3212.121	60	$b^4F_{3\frac{1}{2}}-z^4G_{4\frac{1}{2}}^0$
4399.473	60	$z^6F_{5\frac{1}{2}}^0-e^6F_{5\frac{1}{2}}$	3198.917	60	$b^4F_{3\frac{1}{2}}-z^4D_{2\frac{1}{2}}^0$
4268.096	80	$b^4F_{3\frac{1}{2}}-z^6D_{3\frac{1}{2}}^0$	3068.897	60	$b^4F_{4\frac{1}{2}}-z^6G_{3\frac{1}{2}}^0$
3992.114	80	$b^4F_{2\frac{1}{2}}-z^6F_{2\frac{1}{2}}^0$	2924.783	100r	$a^4F_{4\frac{1}{2}}-z^6G_{5\frac{1}{2}}^0$
3915.384	60	$b^4F_{2\frac{1}{2}}-z^6G_{3\frac{1}{2}}^0$	2916.357	60	$a^4F_{1\frac{1}{2}}-z^4D_{2\frac{1}{2}}^0$
3800.122	60r	$a^4F_{4\frac{1}{2}}-z^6D_{4\frac{1}{2}}^0$	2882.624	60	$b^4F_{4\frac{1}{2}}-z^4D_{3\frac{1}{2}}^0$
3513.638	80r	$a^4F_{4\frac{1}{2}}-z^6F_{5\frac{1}{2}}^0$	2849.724	80r	$a^4F_{4\frac{1}{2}}-z^6G_{4\frac{1}{2}}^0$
3448.967	60	$a^4F_{1\frac{1}{2}}-z^6D_{2\frac{1}{2}}^0$	2836.394	60	$a^4F_{1\frac{1}{2}}-z^4F_{2\frac{1}{2}}^0$
3437.006	60	$a^4F_{3\frac{1}{2}}-z^6G_{3\frac{1}{2}}^0$	2824.444	60r	$b^4F_{4\frac{1}{2}}-z^4G_{4\frac{1}{2}}^0$
3368.472	60	$b^4F_{4\frac{1}{2}}-z^6F_{4\frac{1}{2}}^0$	2664.783	50r	$a^4F_{4\frac{1}{2}}-z^4D_{3\frac{1}{2}}^0$
3266.446	60	$a^4F_{2\frac{1}{2}}-z^6F_{1\frac{1}{2}}^0$	2639.698	60r	$a^4F_{4\frac{1}{2}}-z^4F_{4\frac{1}{2}}^0$
3220.772	100r	$b^4F_{4\frac{1}{2}}-z^6F_{3\frac{1}{2}}^0$			

[1] Meggers, Sci. Papers Nat. Bur. Stand. **20**, 19 (1925).
[2] Albertson, Phys. Rev. **42**, 443 (1932).

TABLE II. *Energy levels of* Ir I.

Level	Term Type	Energy	J Value	Level	Term Type	Energy	J Value
		Even Levels					
1	a^4F	0.00	$4\frac{1}{2}$	137	e^6F	52508.89	$4\frac{1}{2}$
2	b^4F	2834.96	$4\frac{1}{2}$	153		54892.63	$4\frac{1}{2}$
3	a^4F	4078.93	$1\frac{1}{2}$	158		55303.64	$2\frac{1}{2}$
4	a^4F	5784.58	$2\frac{1}{2}$	160		55382.00	$3\frac{1}{2}$
5	a^4F	6323.91	$3\frac{1}{2}$	165		55885.44	$1\frac{1}{2}$
6	b^4F	7106.57	$3\frac{1}{2}$	171		56416.08	$4\frac{1}{2}$
7	b^4F	9877.51	$2\frac{1}{2}$	174		56792.60	$3\frac{1}{2}$
8		10578.66	$1\frac{1}{2}$	181		57838.92	$1\frac{1}{2}$
9		11831.07	$1\frac{1}{2}$	189		59525.87	$5\frac{1}{2}$
10		12218.46	$2\frac{1}{2}$	191		59647.72	$3\frac{1}{2}$
11		12951.65	$2\frac{1}{2}$	193		59824.51	$2\frac{1}{2}$
12		13087.88	$3\frac{1}{2}$	194		59878.01	$3\frac{1}{2}$
13		13939.79	$4\frac{1}{2}$	196		60012.24	$4\frac{1}{2}$
14		16103.33	$2\frac{1}{2}$	197		60062.44	$2\frac{1}{2}$
15		16565.35	$1\frac{1}{2}$	199		60663.13	$1\frac{1}{2}$
16		16681.19	$\frac{1}{2}$	200		61431.45	$1\frac{1}{2}$
17		17779.24	$3\frac{1}{2}$	201		61481.36	$1\frac{1}{2}$
18		18547.02	$1\frac{1}{2}$	202		62018.82	$3\frac{1}{2}$
19		19060.62	$2\frac{1}{2}$	203		62164.91	$3\frac{1}{2}$
20		19593.24	$5\frac{1}{2}$	204		62208.64	$5\frac{1}{2}$
21		20236.71	$\frac{1}{2}$	205		62220.91	$3\frac{1}{2}$–$4\frac{1}{2}$
22		22110.24	$1\frac{1}{2}$	206		62284.41	?
23		23310.36	$2\frac{1}{2}$	207		62377.74	$3\frac{1}{2}$
24		23505.91	$4\frac{1}{2}$	208		62475.80	$\frac{1}{2}$
25		26229.48	$1\frac{1}{2}$	209		62757.18	$2\frac{1}{2}$–$3\frac{1}{2}$
27		26365.16	$3\frac{1}{2}$	210		62835.40	$4\frac{1}{2}$
28		26404.17	$2\frac{1}{2}$	211		63391.27	$1\frac{1}{2}$
29		27913.84	$4\frac{1}{2}$	212		63469.72	$4\frac{1}{2}$
30		27970.05	$1\frac{1}{2}$	213		63976.18	$3\frac{1}{2}$
125	e^6F	51175.95	$5\frac{1}{2}$	214		64618.16	$3\frac{1}{2}$
		Odd Levels					
26	z^6D^0	26307.48	$4\frac{1}{2}$	52	z^4G^0	38568.05	$3\frac{1}{2}$
31	z^6F^0	28452.34	$5\frac{1}{2}$	53	z^4D^0	39289.29	$\frac{1}{2}$
32	z^6D^0	30529.66	$3\frac{1}{2}$	54	z^4F^0	39324.56	$2\frac{1}{2}$
33	z^6D^0	32463.57	$1\frac{1}{2}$	55	z^4G^0	39805.97	$2\frac{1}{2}$
34	z^6F^0	32513.42	$4\frac{1}{2}$	56	z^4G^0	39940.28	$5\frac{1}{2}$
35	z^6G^0	32830.78	$6\frac{1}{2}$	57		40291.19	$3\frac{1}{2}$
36	z^6D^0	33064.83	$2\frac{1}{2}$	58		40389.85	$4\frac{1}{2}$
37	z^6F^0	33874.43	$3\frac{1}{2}$	59	z^4F^0	40524.72	$1\frac{1}{2}$
38	z^6G^0	34180.48	$5\frac{1}{2}$	60		20710.78	$3\frac{1}{2}$
39	z^6F^0	34919.81	$2\frac{1}{2}$	61		41118.74	$4\frac{1}{2}$
40	z^6G^0	35080.71	$4\frac{1}{2}$	62		41210.33	$\frac{1}{2}$
41	z^6G^0	35410.61	$3\frac{1}{2}$	63		41522.22	$2\frac{1}{2}$
42	z^6D^0	35647.93	$\frac{1}{2}$	64		42014.44	$\frac{1}{2}$
43	z^6F^0	36390.15	$1\frac{1}{2}$	65		42029.14	$1\frac{1}{2}$
44	z^6G^0	37446.13	$2\frac{1}{2}$	66		42131.82	$5\frac{1}{2}$
45	z^4D^0	37515.34	$3\frac{1}{2}$	67		42267.86	$2\frac{1}{2}$
46	z^6G^0	37692.74	$1\frac{1}{2}$	68		42279.31	$4\frac{1}{2}$
47	z^4F^0	37871.72	$4\frac{1}{2}$	69		43071.77	$2\frac{1}{2}$
48	z^6F^0	38120.93	$\frac{1}{2}$	70		43176.15	$3\frac{1}{2}$
49	z^4F^0	38158.24	$3\frac{1}{2}$	71		43200.92	$1\frac{1}{2}$
50	z^4G^0	38229.75	$4\frac{1}{2}$	72		43592.23	$3\frac{1}{2}$
51	z^4D^0	38358.13	$2\frac{1}{2}$	73		44569.85	$1\frac{1}{2}$
		Odd Levels					
74		44596.77	$2\frac{1}{2}$	130		51983.90	$\frac{1}{2}$
75		44642.67	$3\frac{1}{2}$	131		52051.75	$2\frac{1}{2}$
76		44652.43	$4\frac{1}{2}$	132		52134.11	$3\frac{1}{2}$
77		44785.45	$1\frac{1}{2}$	133		52224.37	$3\frac{1}{2}$
78		45111.69	$3\frac{1}{2}$	134		52303.65	$1\frac{1}{2}$
79		45185.95	$2\frac{1}{2}$–$3\frac{1}{2}$	135		52327.33	$2\frac{1}{2}$
80		45259.14	$1\frac{1}{2}$	136		52388.36	$\frac{1}{2}$
81		45415.26	$\frac{1}{2}$	138		52605.16	$2\frac{1}{2}$
82		45503.15	$\frac{1}{2}$	139		52806.57	$2\frac{1}{2}$
83		45570.90	$2\frac{1}{2}$	140		53095.26	$3\frac{1}{2}$–$4\frac{1}{2}$
84		45895.83	$3\frac{1}{2}$	141		53552.90	$2\frac{1}{2}$
85		45957.33	$5\frac{1}{2}$	142		53642.06	$4\frac{1}{2}$
86		46093.84	$2\frac{1}{2}$	143		53686.98	$3\frac{1}{2}$
87		46220.33	$4\frac{1}{2}$	144		53771.90	$3\frac{1}{2}$
88		46371.64	$4\frac{1}{2}$	145		54061.30	$5\frac{1}{2}$
89		46471.84	$1\frac{1}{2}$	146		54119.23	$2\frac{1}{2}$
90		46618.13	$1\frac{1}{2}$	147		54140.85	$3\frac{1}{2}$
91		46655.94	$2\frac{1}{2}$	148		54319.92	$1\frac{1}{2}$
92		46978.02	$3\frac{1}{2}$	149		54566.06	$3\frac{1}{2}$
93		47011.09	$2\frac{1}{2}$	150		54639.29	$2\frac{1}{2}$
94		47165.12	$3\frac{1}{2}$	151		54667.53	$4\frac{1}{2}$
95		47203.81	$\frac{1}{2}$	152		54711.08	$3\frac{1}{2}$
96		47205.55	$4\frac{1}{2}$	154		54894.79	$3\frac{1}{2}$
97		47537.29	$2\frac{1}{2}$	155		54985.38	$1\frac{1}{2}$
98		47548.64	$3\frac{1}{2}$	156		55035.99	$4\frac{1}{2}$
99		47824.91	$1\frac{1}{2}$	157		55160.83	$1\frac{1}{2}$
100		47858.47	$5\frac{1}{2}$	159		55332.89	$2\frac{1}{2}$
101		48206.57	$2\frac{1}{2}$	161		55425.88	$1\frac{1}{2}$
102		48299.24	$4\frac{1}{2}$	162		55497.33	$1\frac{1}{2}$
103		48440.83	$1\frac{1}{2}$	163		55619.38	$3\frac{1}{2}$
104		48448.65	$3\frac{1}{2}$	164		55635.34	$\frac{1}{2}$
105		48629.22	$3\frac{1}{2}$	166		55913.57	$2\frac{1}{2}$
106		48801.91	?	167		56016.58	$1\frac{1}{2}$
107		49146.43	$2\frac{1}{2}$	168		56128.84	$\frac{1}{2}$
108		49158.60	$4\frac{1}{2}$	169		56264.76	$2\frac{1}{2}$
109		49342.51	$1\frac{1}{2}$	170		56371.05	$3\frac{1}{2}$
110		49446.21	$1\frac{1}{2}$	172		56538.45	$1\frac{1}{2}$
111		49621.32	$2\frac{1}{2}$	173		56788.21	$1\frac{1}{2}$
112		49719.17	$5\frac{1}{2}$	175		56838.78	$1\frac{1}{2}$–$2\frac{1}{2}$
113		49779.37	$2\frac{1}{2}$	176		57186.61	$3\frac{1}{2}$
114		49823.53	$3\frac{1}{2}$	177		57247.57	$2\frac{1}{2}$
115		50050.69	$4\frac{1}{2}$	178		57697.46	$3\frac{1}{2}$
116		50100.71	$1\frac{1}{2}$	179		57737.04	$1\frac{1}{2}$
117		50169.87	$2\frac{1}{2}$	180		57774.99	$4\frac{1}{2}$
118		50434.46	$4\frac{1}{2}$	182		58026.64	$1\frac{1}{2}$
119		50445.02	$\frac{1}{2}$	183		58042.02	$2\frac{1}{2}$
120		50564.12	$1\frac{1}{2}$	184		58383.13	$1\frac{1}{2}$
121		50580.39	$3\frac{1}{2}$	185		58570.58	$4\frac{1}{2}$
122		50606.36	$5\frac{1}{2}$	186		58625.08	$3\frac{1}{2}$
123		51107.94	$3\frac{1}{2}$	187		58754.35	$2\frac{1}{2}$–$1\frac{1}{2}$
124		51166.52	$1\frac{1}{2}$	188		59354.05	$2\frac{1}{2}$
126		51427.14	$2\frac{1}{2}$	190		59564.11	$1\frac{1}{2}$
127		51470.74	$4\frac{1}{2}$	192		59674.86	$3\frac{1}{2}$
128		51814.75	$2\frac{1}{2}$	195		59946.55	$2\frac{1}{2}$
129		51852.35	$3\frac{1}{2}$	198		60082.68	$1\frac{1}{2}$–$2\frac{1}{2}$

tant part in its origin will be followed here. Accordingly, the term a^4F is from $5d^76s^2$; b^4F from $5d^86s$; z^6DFG° and z^4DFG° from $5d^76s6p$; e^6F from $5d^77s$.

Since the departure from LS coupling is very big for all elements in the lower right corner of the period table, and also, since the interaction of terms having the same parity and J value quite large, the exact assignments of L and S values to the levels are meaningless. In the present case those values of L and S which seem to predominate are assigned to certain of the levels.

A simple series relationship is assumed to exist between $a^4F_{4\frac{1}{2}}$ and $e^6F_{5\frac{1}{2}}$, which yields an approximate value of 9.2 volts for the ionization potential of Ir I.