^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Achterberg, O. A. Capurro, G. V. Marti	NDS 110, 1473 (2009)	31-May-2008

1969Fa01: Studied primary γ rays in ^{178}Hf following resonant neutron capture in a 91.7% enriched ^{177}Hf target, using a neutron beam monochromator. Ge(Li) detector. Determined energies and J^π values for states populated in the resonance capture energy range of 0.06 to 8.8 eV. Estimated energy uncertainties were ≈1.5 keV.

1974Co02: Neutron capture reaction on ^{177}Hf, enriched to 74%, using the Geel electron linac facility. Neutron energy determined by time-of-flight over a 13 min flight distance, using a pulsed beam. Used a Ge(Li) detector to obtain secondary γ ray energies below 1.5 MeV. Measurements were performed at the 1.1, 2.4, 5.9 and 6.6 eV neutron capture resonances. Calculated intensity ratios for γ cascades from different resonance states to the same final states, established systematics as function of the final J^π.

1977St10: Resonance capture reaction ^{177}Hf(n,γ), with neutrons from the 90MeV Geel pulsed electron linac, with a ^{177}Hf target enriched to 74%. Neutron energies measured by time-of-flight, using the 35 ns wide bursts of the generator which operated at a 400 Hz repetition rate. Ge(Li) detector for determining primary γ ray properties. Extensive tabulation of primary γ ray intensities observed in the deexcitation of resonant capture states in the range of 1.1 to 163 eV.

^{178}Hf Levels

Band assignments are from 1974Co02 and Adopted Levels.

E(level)[†]	J^π[#]	Comments
0.0[&]	0^+	
93.2[&]	2^+	
306.6[&]	4^+	
632.1[&]	6^+	
1058.7[&]	8^+	
1174.7[a]	2^+	
1260.3[c]	2^-	
1268.7[a]	3^+	
1276.7[b]	2^+	
1310.0[d]	1^-	
1322.5[c]	3^-	
1362.5[d]	2^-	
1384.5[a]	4^+	
1409.5[c]	4^-	
1433.6[d]	3^-	
1450.5[b]	4^+	
1496.2[e]	2^+	
1512.0[d]	(4^-)	
1513.6[c]	5^-	
1513.7[f]	2^+	
1513.9[g]	4^+	
1533.3[a]	5^+	
1554.1	6^+	
1561.5	2^+	
1636.4[g]	4^+	J^π: From 1977St10. 1974Co02 had proposed a 5^+ assignment, but this disagrees with other results (see Adopted Levels).
1640.5[e]	5^+	J^π: From 1977St10. 1974Co02 had proposed a 4^+ assignment, but this disagrees with other results (see Adopted Levels).
1691.5[a]	6^+	

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^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01 (continued)

^{178}Hf Levels (continued)

E(level)[†]	Jπ[#]	Comments
1757.8[‡]	(3,4)+[@]	
1782.2[g]	6+	
1801.1?[‡]		This level is not confirmed by either 1969Fa01 or 1974Co02, nor is it reported in other datasets for this nuclide (see Adopted Levels).
1808.1[‡i]	(3,4)+[@]	
1818.6[‡h]	2+[@]	
1860.3[i]	3+	
1913.7[‡]	2+[@]	
1941.5[‡]	(2,3,4)+[@]	
1953.7[‡i]	(4+)[@]	
1957.0[‡h]	4+[@]	
1987.4[‡]	2+[@]	
1997.6[‡]	(3,4,5+)[@]	
2016.5[‡]	(2,3,4)+[@]	
2050.8[‡]	(3,4)+[@]	
7624.81 *22*		E(level): Estimate for S(n) obtained from least-squares adjustment to primary γ ray energies in this dataset. The neutron separation energy determined by 1969Fa01 was S(n)=7625 *1* keV. 1977St10 obtained S(n)=7624.4 *15* keV. The estimate from the 2003 atomic mass evaluation (AME2003) is S(n)=7625.96 *18* (2003Au03).

[†] Level energies are from 1974Co02, unless specified otherwise.
[‡] Level energies from 1977St10.
[#] From population ratios measured in 1974Co02, except where indicated otherwise.
[@] From reduced γ-ray intensities obtained in 1977St10.
[&] Band(A): $K^\pi=0^+$ g.s. rotational band.
[a] Band(B): $K^\pi=2^+$ γ vibrational band based on the 1174-keV state.
[b] Band(C): $K^\pi=0^+$ band based on the 1199-keV level.
[c] Band(D): $K^\pi=2^-$ band based on the 1260-keV level.
[d] Band(E): $K^\pi=1^-$ band based on the 1310-keV level.
[e] Band(F): $K^\pi=0^+$ band based on the 1434-keV level.
[f] Band(G): $K^\pi=0^+$ band based on the 1444-keV level.
[g] Band(H): $K^\pi=4^+$ band based on the 1514-keV level.
[h] Band(I): $K^\pi=0^+$ band based on the 1772-keV level.
[i] Band(J): $K^\pi=2^+$ band based on the 1808-keV level.

γ(^{178}Hf)

Measured primary γ ray intensities per 10000 neutron captures for each resonance observed in 1977St10. The results together with the respective final level energy are listed in the tables below. Intensity uncertainties quoted by 1977St10 are twice the standard deviations. The respective resonance energy, in eV, is shown as heading for each column in the tables. Measurements were performed for the following neutron resonance energies (in eV, with capture state J shown in parentheses): 1.1 (3), 2.4 (4), 5.9 (3), 6.6 (4), 8.9 (4), 10.9 (3), 13.7 (4), 14.0 (3), 22.0 (4), 22.3 (3), 23.4 (4), 27.0 (3), 32.8 (4), 36.1 (3), 37.0 (4), 43.1 (4), 45.1 (4), 46.2 (4), 48.8 (3), 49.6 (4), 54.8 (4), 56.4 (3), 59.3 (3), 63.5 (4), 66.8 (3,4), 71.4 (4), 76.0 (4), 84.7 (4), 88.6 (3), 93.2 (3), 97.1 (4), 103.1 (3), 123.8 (3), 131.7 (3), 137.6 (4), 141.2 (4), 148.6 (3), 163.1 (3).

NOTE: Data for γ rays for which only upper limits for the capture intensities have been determined in 1977St10 are omitted in the

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01 (continued)

γ(^{178}Hf) (continued)

tables below. See that reference for the estimated upper limits in those cases.
For primary γ ray intensities see tables above. See table caption there for more details.

Gamma-ray intensity (at indicated resonance energies in eV)

Eγ	E(lev)	1.1	2.4	5.9	6.6	8.9	10.9	13.7	14.0	22.0	22.3
7531.1	93.2	59 *10*	<8	135 *19*	<3	<3	<11		<15	11 *6*	<8
7316.7	306.6	<1	<3	126 *6*	<2	6 *2*	7 *5*		29 *9*	31 *5*	23 *7*
6449.3	1174.7	15 *4*	<8	71 *10*	<4	<6	55 *15*		<15	16 *9*	<19
6356.2	1268.7	15 *5*	372 *14*	115 *12*	66 *6*	<5			34 *18*	336 *39*	24 *11*
6348.0	1276.7	23 *7*	<24	<33	<7	<8	88 *26*		<37	<24	<18
6302.2	1322.5	14 *4*	21 *6*	21 *13*	<9	14 *6*		<13	<22	<21	<40
6240.0	1384.5	19 *4*	69 *8*	39 *10*	61 *6*	400 *13*			<22	78 *24*	105 *13*
6214.9	1409.5	10 *4*	24 *7*	<9	<10	15 *6*		<27		<28	<21
6191.1	1433.6	8 *4*	20 *7*	<19	7 *5*		12 *6*		<14	<18	<20
6174.3	1450.5	13 *4*	25 *7*	48 *9*	<5		13 *6*		<22	<19	77 *12*
6128.1	1496.2	18 *5*	<7	15 *9*	<5	<8	199 *24*		<20	<14	<21
6110.7	1512	186 *7*	<15	<9	74 *6*	249 *11*			55 *18*	47 *24*	<22
6091.0	1533.3	<7	56 *11*	<20	<10	85 *10*		<41		157 *34*	<11
6062.5	1561.5	39 *5*	<16	<23	<7	<16	62 *20*		<40	<10	<34
5988.7	1636.4	20 *6*	29 *11*	<12	25 *8*		42 *13*		47 *24*	<67	73 *17*
5983.4	1640.5	<10	<21	<24	<16	34 *13*		<24	<30	<20	<20
5866.5	1757.8	<11	<19	27 *10*	13 *6*		<17		65 *22*	63 *29*	26 *13*
5823.2	1801.1	<8	26 *12*	<28	23 *8*		<11		<23	<54	<17
5806.2	1818.6	111 *8*	<27	33 *12*	<12	<11		<27		<48	<14
5761.3	1860.3	29 *8*	30 *12*	47 *13*	<15		32 *13*			<25	<70
5710.6	1913.7	31 *8*	<12	22 *14*	<16	<19		<26		<44	<37
5683.2	1941.1	32 *9*	<14	<28	<9	<13		61 *29*		<48	107 *20*
5669.1	1954	56 *8*	<13	<39	21 *8*		<22		<56	<52	96 *25*
5636.9	1987.4	36 *7*	<24	54 *11*	<8	<16		105 *36*		<29	<34
5626.7	1997.6	<7	42 *11*	<17	14 *7*		20 *10*		<26	<29	<13
5607.8	2016.5	37 *11*	23 *13*	43 *20*	<37		<30		<49	<69	46 *19*
5573.5	2050.8	19 *7*	130 *18*	<11	13 *8*		<15		<23	<38	<31

Eγ	E(lev)	23.4	27.0	32.8	36.1	37.0	43.1	45.1	46.2	48.8	49.6
7531.1	93.2	<11	<12	<16	<33	<12	<15	<28	<11	326 *70*	<49
7316.7	306.6	80 *11*	<6	<18	41 *10*	38 *7*	<8		45 *11*	<11	19 *8*
6356.2	1268.7	<26	<22	42 *26*	<20	<12	<14	130 *36*	<23	<42	<42
6302.2	1322.5	<38	27 *14*	<55	<23	<25	<29	<25	<15	<22	<47
6240.0	1384.5	<22	150 *21*	<31	<30	45 *14*		23 *15*	<37	64 *20*	<20
6174.3	1450.5	<21	<21	<29	<40	<15	<36	<28	<38	47 *21*	<22
6128.1	1496.2	<14	25 *14*	<33	<29	<11	<32	<24	<15	<20	<38
6110.7	1512	<28	<24	112 *30*	<34	<11	39 *18*		<25	<34	56 *22*
6091.0	1533.3	<46	<34	<37	<31	49 *16*	<27	<53	<41	<26	<27
6062.5	1561.5	<20	<28	<40	<20	<15	<27	<33	<38	163 *27*	<36
5988.7	1636.4	<35	90 *26*	<43	60 *31*	<26	<41		<77	39 *26*	52 *26*
5866.5	1757.8	<16	<19	<52	<22	<31	44 *20*		<50	<46	<21
5816.2	1808.1	<33	35 *21*	<51	<29	<24	<46	<59	<47	<46	<29
5806.2	1818.6	<26	55 *22*	<54	<53	<26	<20	<46	<22	<31	<37

5761.3	1860.3	<46	59 *25*	<35	94 *36*	78 *20*		42 *25*	<32	107 *30*	<60
<56											
5710.6	1913.7	<36	<52	<34	<30	<17	<24	<32	<42	61 *35*	<53
5683.2	1941.1	<23	83 *27*	<35	<49	<18	<25	<61	<60	<31	<42
5669.1	1954	<34	54 *23*	<53	<26	104 *19*	54 *24*	51 *33*	49 *25*	86 *28*	<40
5636.9	1987.4	<23	<25	<26	55 *28*	<14	<28	<33	<48	124 *38*	<29
5626.7	1997.6	38 *20*	<19	<54	<40	<24	<49	<52	<54	<26	<28
5573.5	2050.8	<30	<30	86 *36*	<26	<17	<33	<40	<46	54 *26*	<30

Eγ	E(lev)	54.8	56.4	59.3	63.5	66.8	71.4	76.0	84.7	88.6	93.2
7531.1	93.2	<20	64 *30*	<34	<10	<36	<14		43 *17*	37 *22*	255 *86*
<36											
7316.7	306.6	292 *18*	199 *20*	<21	89 *10*	74 *11*			72 *12*	24 *7*	72 *13*
<26											
105 *29*											
6449.3	1174.7	<28	135 *34*	<33	<13	<34	<16	<16	<36	<58	<55
6356.2	1268.7	75 *26*	<78	510 *80*	<25	<48	43 *23*		33 *19*	<27	<122
<88											
6348.0	1276.7	<43	<65	<140	<20	<26	<46	<34	64 *35*	<94	<136
6302.0	1322.5	<44	<41	<74	<21	<34	<39	<33	60 *33*	<60	<87
6240.0	1384.5	<20	<60	304 *59*	88 *18*	164 *25*	<39		<18	<55	<76
<58											
6191.1	1433.6	<19	<31	<69	27 *15*	<20	<41	<23	<20	<75	<80
6174.3	1450.5	46 *21*	101 *33*	<89	28 *15*	36 *18*			<40	64 *20*	62 *25*
<121											
<53											
6128.1	1496.2	<20	85 *33*	<81	<15	<18	<36	<16	<22	<55	<55
6110.7	1512	67 *23*	<29	<48	<33	<47	<19	<43	<40	<160	<100
6091.0	1533.3	<23	<39	<59	55 *20*	<41	<22		63 *22*	66 *30*	<96
<71											
5988.7	1636.4	<68	<49	<97	<41	46 *28*	<27	<52	<44	<97	<72
5983.4	1640.5	<48	<34	<78	<34	<38	46 *28*		<44	<44	<100
<109											
5866.5	1757.8	<32	<30	92 *59*	59 *19*	87 *25*	<22		<27	<48	<100
<98											
5816.2	1808.1	<33	<34	184 *73*	<27	<38	85 *30*		<40	50 *31*	<102
<119											
5806.2	1818.6	<34	77 *39*	135 *71*	<22	<55	<35		<36	<53	197 *86*
<130											
5761.3	1860.3	<37	<56	164 *73*	48 *24*	87 *31*			40 *30*	<30	<61
<206	<103										
5683.2	1941.1	<28	<42	<130	<34	75 *33*	<42		68 *29*	<34	<147
<78											
5669.1	1954	68 *28*	<79	<165	<46	<37	82 *28*		<32	<39	<70
<171											
5626.7	1997.6	<21	<33	<60	<37	41 *24*	<55	<20	<27	<109	<59

Eγ	E(lev)	97.1	103.1	123.8	131.7	137.6	141.2	148.6	163.1
7531.1	93.2	<21	<20	118 *75*	<42	<34	<29	<31	<26
7316.7	I306.6	259 *26*	<11	387 *48*	30 *10*	37 *20*			57 *17*
56 *22*	<13								
6449.3	1174.7	<28	117 *26*	<110	<62	<44	<40	<120	<32
6356.2	1268.7	<68	161 *33*	<105	112 *33*	<85	72 *45*		<88
<38									
6240.0	1384.5	64 *35*	104 *29*	141 *78*	<47	<84	<75		<68
<39									
6174.3	1450.5	<78	60 *28*	<106	<40	<125	<79	<75	<44
6128.1	1496.2	<29	90 *30*	<113	<35	<49	<50	<100	<72
6110.7	1512	57 *35*	58 *29*	<120	<51	<73	<93		<73
<111									
6091.0	1533.3	123 *43*	<32	<79	<31	<106	141 *54*		<85
<91									
5988.7	1636.4	143 *54*	<51	<168	58 *39*	<128	<131		<118
<74									
5983.4	1640.5	88 *53*	<32	<85	<36	<74	<51	<126	<81
5866.5	1757.8	58 *36*	92 *35*	<106	<28	<57	<40		<82
<63									
5806.2	1818.6	<75	<54	156 *89*	<49	<65	<73	<153	<100
5761.3	1860.3	<76	<90	<92	78 *40*	<176	<95	<125	<110
5683.2	1941.1	<47	72 *45*	<178	<52	<102	<66	<151	<127
5669.1	1954	<48	<37	<158	<63	<110	<57	<116	99 *54*
5626.7	1997.6	71 *37*	<34	<116	<76	<136	<41	<59	<41

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
85.6 *3*	1260.3	2^-	1174.7	2^+	

93.2 *4*	93.2	2^+	0.0	0^+	
213.4 *6*	306.6	4^+	93.2	2^+	
[x]244.1 *3*					
245.1 *2*	1513.7	2^+	1268.7	3^+	Unresolved composite line (1974Co02). γ ray reported for the $J^\pi=2^+$ level only in 1974Co02; not placed as deexciting this state in other experiments.
256.0 *2*	1640.5	5^+	1384.5	4^+	This line is a member of a doublet, the other component is at Eγ=256.6 keV, not placed in this dataset (1974Co02).
[x]256.6 *3*					Unplaced component of the 256.3 *2* keV doublet; the other member with Eγ=256.0 is placed from the 1640 keV level (1974Co02).
[x]273.1 *2*					
[x]277.0 *2*					This is an unresolved doublet with members at 276.9 and 277.3 keV (1974Co02), neither of which is placed in the level scheme.
[x]289.5 *2*					
[x]313.1 *2*					
325.5 *2*	632.1	6^+	306.6	4^+	
339.1[‡#] *2*	1513.7	2^+	1174.7	2^+	Unresolved composite line (1974Co02). Multiply placed γ ray reported for the $J^\pi=2^+$ level only in 1974Co02. Placed as deexciting the 1513.9 keV $J^\pi=4^+$ state in 1977St10.
339.1[‡] *2*	1513.9	4^+	1174.7	2^+	Additional information 3.
348.3 *2*	1860.3	3^+	1512.0	(4^-)	
[x]356.9 *2*					
[x]383.2 *2*					
[x]424.5 *3*					
426.6[‡] *3*	1058.7	8^+	632.1	6^+	Unresolved doublet. Doubly placed, other position is from the 1860 keV level (1974Co02).
426.6[‡#] *3*	1860.3	3^+	1433.6	3^-	Additional information 6.
497.9 *2*	1757.8	$(3,4)^+$	1260.3	2^-	Placement from adopted gammas. Placed by 1974Co02 as deexciting the 3^+ state at 1860 keV.
[x]522.5 *2*					
[x]547.4 *2*					
[x]882.1 *5*					
922.1 *2*	1554.1	6^+	632.1	6^+	
[x]938.7 *4*					
962.1 *2*	1268.7	3^+	306.6	4^+	
970.0 *5*	1276.7	2^+	306.6	4^+	
[x]985.4 *2*					
1008.4 *3*	1640.5	5^+	632.1	6^+	
1015.8 *3*	1322.5	3^-	306.6	4^+	Part of multiplet. The other member is Eγ=1016.6 *4* keV, which is not placed in the level scheme.
[x]1016.6 *3*					
1059.5 *3*	1691.5	6^+	632.1	6^+	
1077.9 *2*	1384.5	4^+	306.6	4^+	
1081.6 *2*	1174.7	2^+	93.2	2^+	
1102.9 *3*	1409.5	4^-	306.6	4^+	
1127.0 *5*	1433.6	3^-	306.6	4^+	
1143.9 *2*	1450.5	4^+	306.6	4^+	
1150.1 *6*	1782.2	6^+	632.1	6^+	
[x]1156.9 *2*					
1167.1 *2*	1260.3	2^-	93.2	2^+	
1174.0 *10*	1174.7	2^+	0.0	0^+	Part of multiplet, with the other member at 1175.4 keV (1268 keV level).
1175.4 *5*	1268.7	3^+	93.2	2^+	Part of multiplet, with the other member at 1174.0 keV (1174 keV level),
1183.5 *2*	1276.7	2^+	93.2	2^+	
1205.4 *3*	1512.0	(4^-)	306.6	4^+	
1207.1[‡] *3*	1513.6	5^-	306.6	4^+	Unresolved composite line (1974Co02), multiply placed (see levels at 1513.7 and 1513.9 keV).

Continued on next page (footnotes at end of table)

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01 (continued)

γ(^{178}Hf) (continued)

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
1207.1‡# *3*	1513.7	2^+	306.6	4^+	Additional information 1.
1207.1‡ *3*	1513.9	4^+	306.6	4^+	Additional information 4.
1226.7 *2*	1533.3	5^+	306.6	4^+	
1229.4 *2*	1322.5	3^-	93.2	2^+	
x1232.3 *2*					
1247.4 *2*	1554.1	6^+	306.6	4^+	
1254.9 *3*	1561.5	2^+	306.6	4^+	
1269.4 *2*	1362.5	2^-	93.2	2^+	
1276.8 *4*	1276.7	2^+	0.0	0^+	
1291.3 *2*	1384.5	4^+	93.2	2^+	
1310.1 *3*	1310.0	1^-	0.0	0^+	
1329.8 *2*	1636.4	4^+	306.6	4^+	
1333.8 *4*	1640.5	5^+	306.6	4^+	
1340.4 *2*	1433.6	3^-	93.2	2^+	
x1344.9 *3*					
x1383.7 *4*					
1384.8 *4*	1691.5	6^+	306.6	4^+	
1403.1 *3*	1496.2	2^+	93.2	2^+	
1420.6‡# *2*	1513.7	2^+	93.2	2^+	Unresolved composite line (1974Co02), multiply placed. Additional information 2.
1420.6‡ *2*	1513.9	4^+	93.2	2^+	Additional information 5.
5573.5	7624.81		2050.8	$(3,4)^+$	
5607.8	7624.81		2016.5	$(2,3,4)^+$	
5626.7	7624.81		1997.6	$(3,4,5^+)$	
5636.9	7624.81		1987.4	2^+	
5669.1	7624.81		1957.0	4^+	This γ is an unresolved doublet, the members connecting to levels at 1953.7 and 1957.0 keV (1977St10).
5683.2	7624.81		1941.5	$(2,3,4)^+$	
5710.6	7624.81		1913.7	2^+	
5761.3	7624.81		1860.3	3^+	E_γ: Very poor energy fit for the placement assigned in 1974Co02.
5806.3 *8*	7624.81		1818.6	2^+	
5816.2 *25*	7624.81		1808.1	$(3,4)^+$	Additional information 7.
5823.2	7624.81		1801.1?		
5866.5	7624.81		1757.8	$(3,4)^+$	
5983.4	7624.81		1640.5	5^+	
5988.8 *8*	7624.81		1636.4	4^+	
6063.0 *8*	7624.81		1561.5	2^+	
6091.3 *8*	7624.81		1533.3	5^+	
6110.7 *25*	7624.81		1513.9	4^+	This γ is an unresolved triplet, connecting to levels at 1512.0 (K^π J=2^- 4), 1513.6 (K^π J^π=2^- 5) and 1513.9 keV (K^π J=4^+ 4) (1977St10).
6128.1	7624.81		1496.2	2^+	
6174.2 *8*	7624.81		1450.5	4^+	
6191.1 *8*	7624.81		1433.6	3^-	
6214.9 *8*	7624.81		1409.5	4^-	
6240.0 *8*	7624.81		1384.5	4^+	
6302.3 *8*	7624.81		1322.5	3^-	
6348.3 *8*	7624.81		1276.7	2^+	
6356.4 *8*	7624.81		1268.7	3^+	
6449.8 *8*	7624.81		1174.7	2^+	
7317.4 *11*	7624.81		306.6	4^+	
7531.4 *8*	7624.81		93.2	2^+	

† a) Primary γ ray energies (i.e., transitions with Eγ>5 MeV) are either from 1977St10, or averages from data in 1974Co02 and

Continued on next page (footnotes at end of table)

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01 (continued)

$\gamma(^{178}Hf)$ (continued)

1977St10 when both are available. Uncertainties for primary γ ray energies are ≈1.5 keV for data from 1974Co02. No uncertainties are quoted by 1977St10, evaluators have estimated a 1.0 keV uncertainty for those values. b) Secondary transition energies (i.e., γ rays with Eγ<2 MeV) and uncertainties are from 1974Co02.

‡ Multiply placed.

Placement of transition in the level scheme is uncertain.

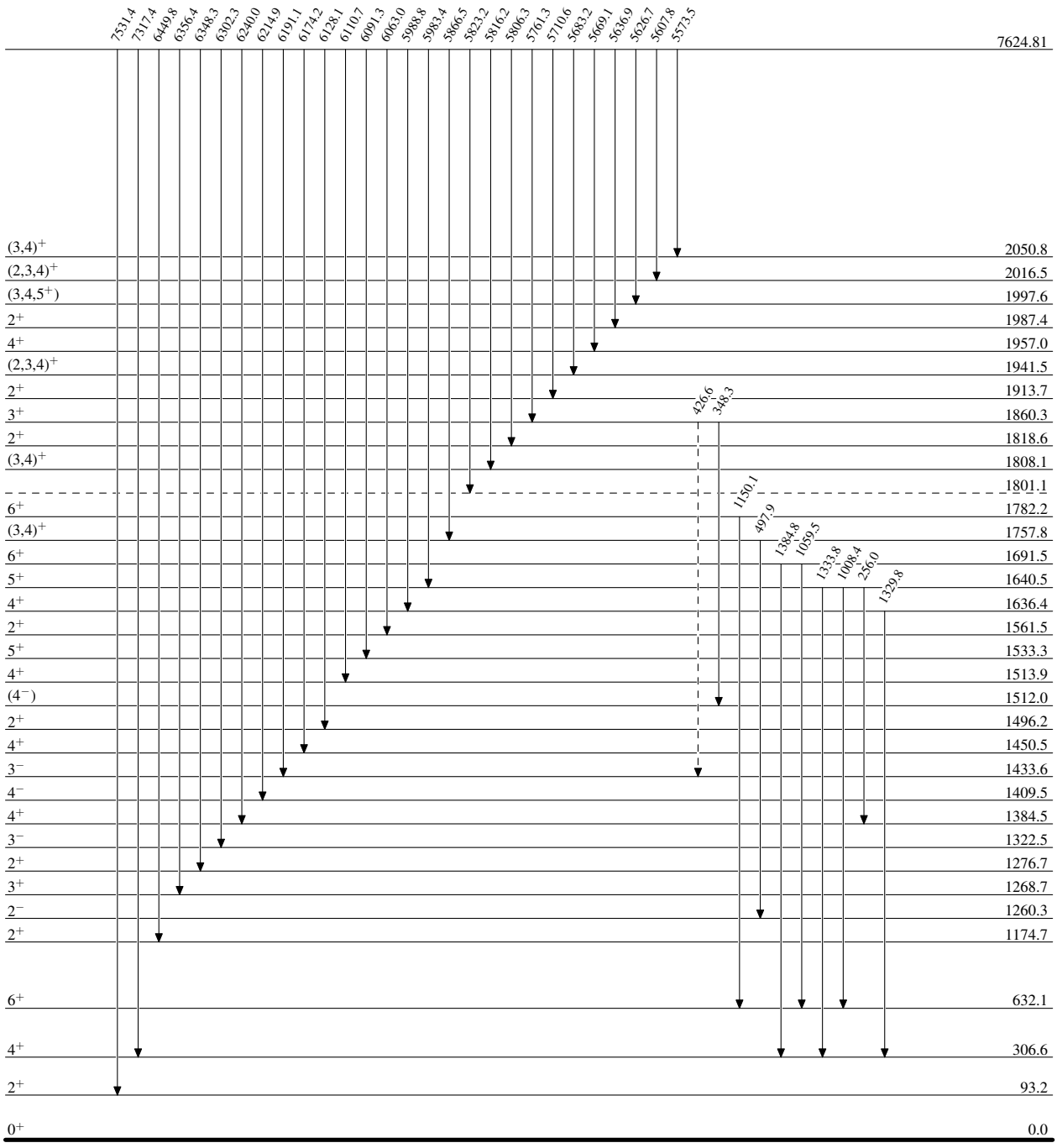
x γ ray not placed in level scheme.

Legend

γ Decay (Uncertain)

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01

Level Scheme



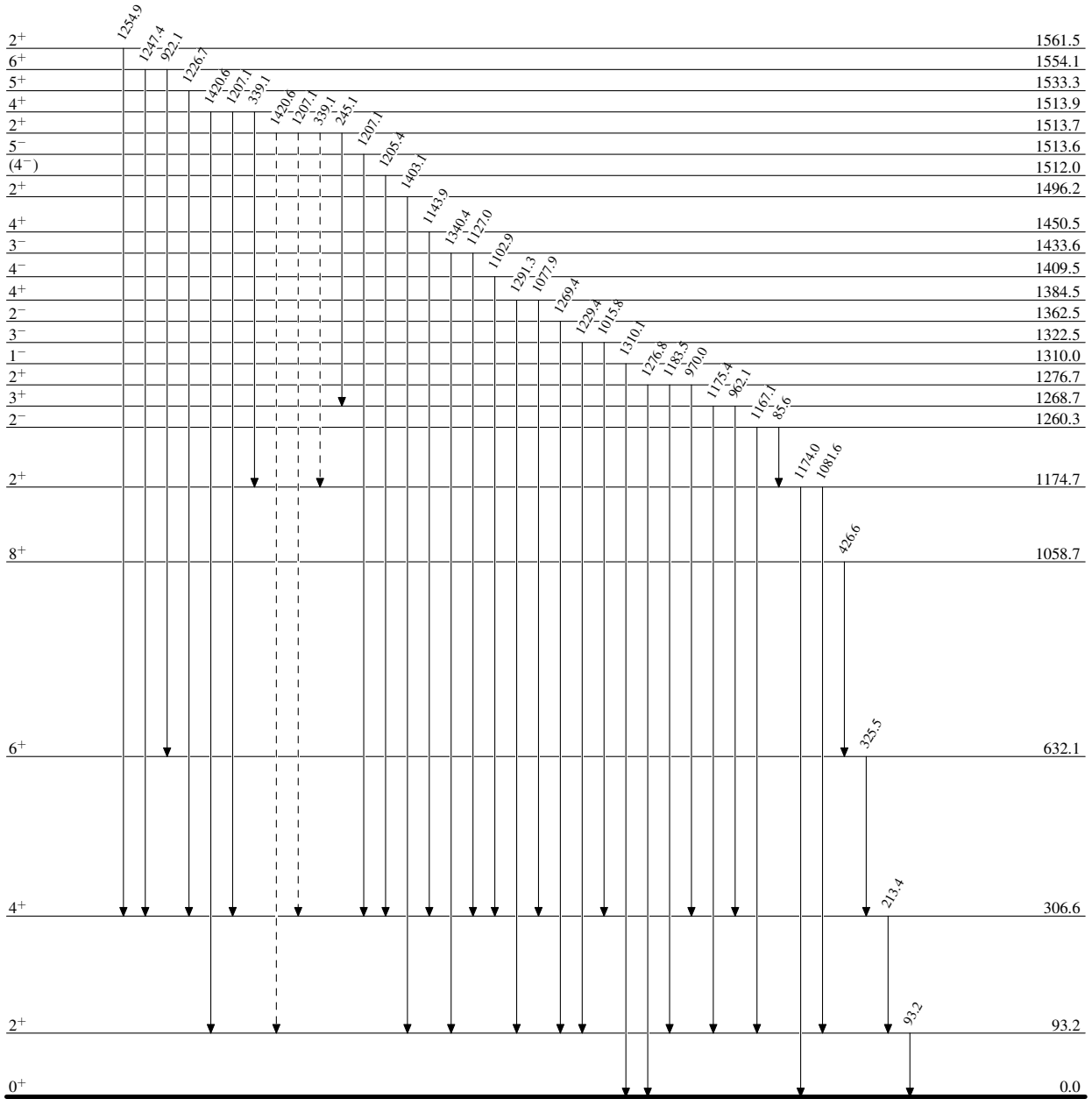
$^{178}_{72}Hf_{106}$

Legend

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01

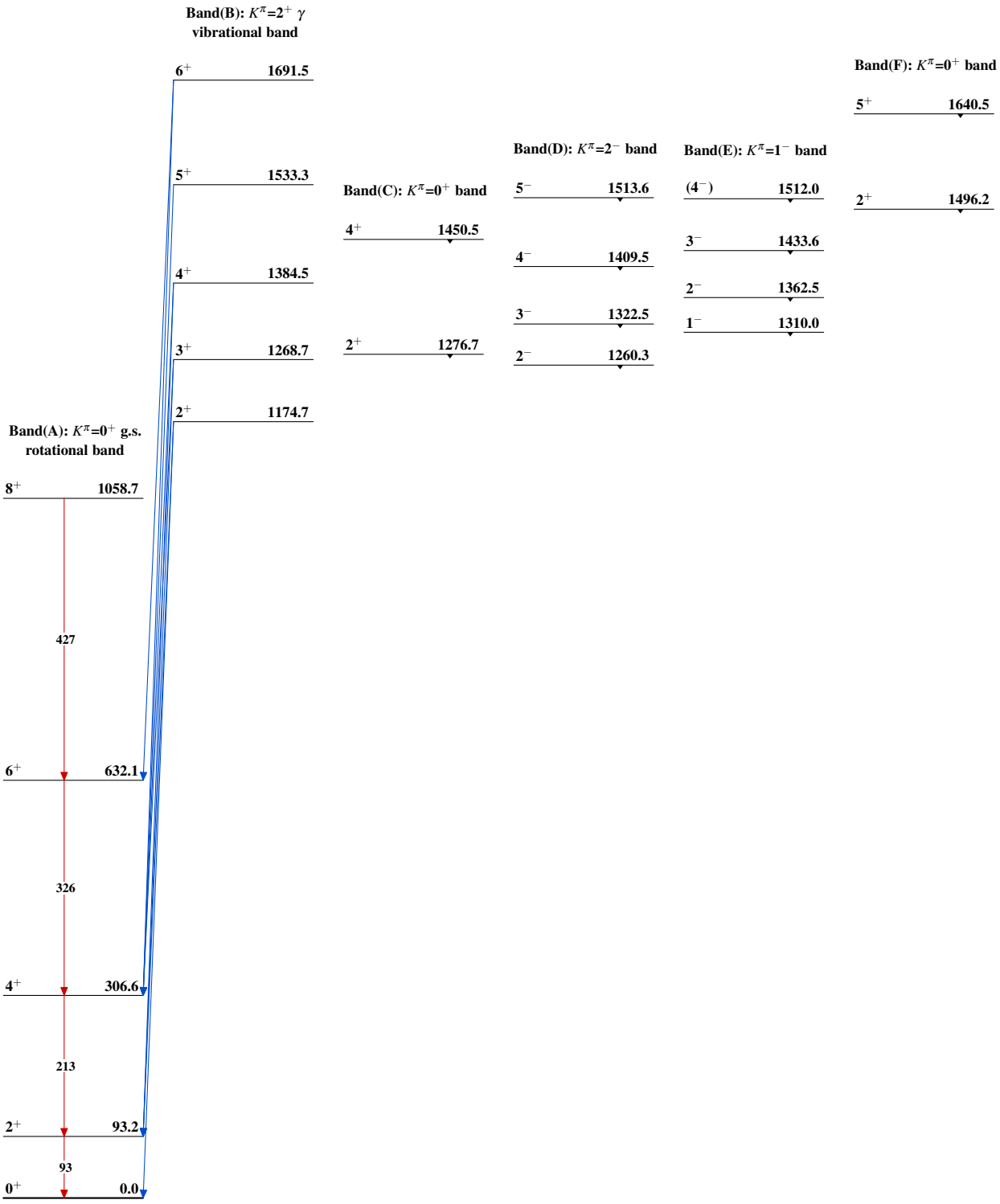
Level Scheme (continued)

γ Decay (Uncertain)



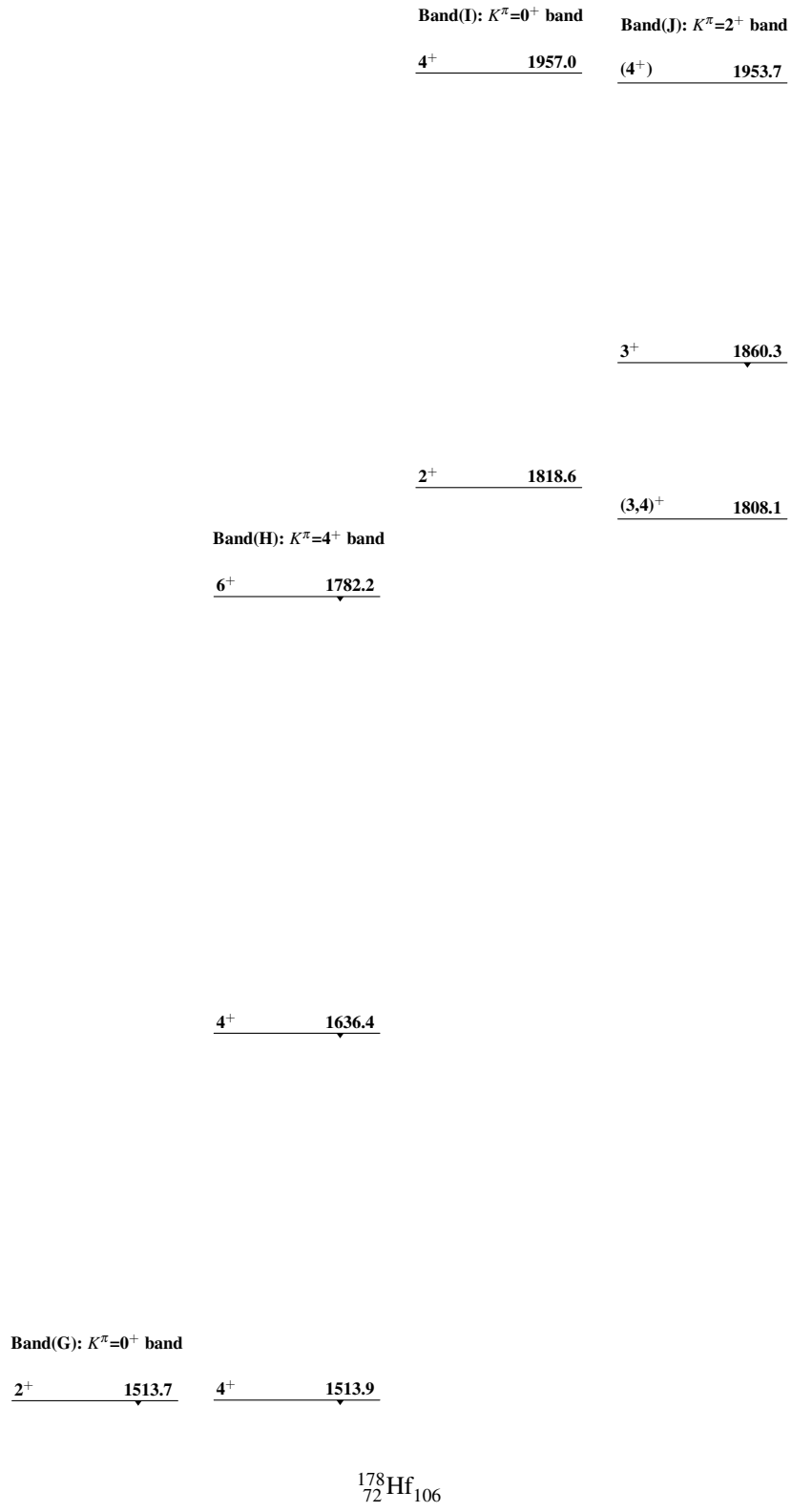
$^{178}_{72}Hf_{106}$

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01



$^{178}_{72}Hf_{106}$

^{177}Hf(n,γ) E=1-163 eV res 1977St10,1974Co02,1969Fa01 (continued)



$^{178}_{72}Hf_{106}$