Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 195,1 (2024)	19-Sep-2023

Q(β^-)=−9390 *60*; S(n)=10924 *25*; S(p)=3895 *29*; Q(α)=4416 *5* 2021Wa16
S(2n)=19372 *13*, S(2p)=5583 *11*, Q(εp)=1377 *17* (2021Wa16).
Additional information 1.
Data for the excited states are from ^{126}Te(^{40}Ca,4nγ) study (1988Hu05,1988Bi02). Data for ground state are from its ε and α decay.

^{162}Hf Levels

For theoretical calculations see 1986Ra18.

Cross Reference (XREF) Flags

A ^{126}Te(^{40}Ca,4nγ),
B ^{162}Ta ε decay
C ^{166}W α decay

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0[#]	0$^+$	39.4 s *9*	ABC	%ε+%β^+=99.992 *1*; %α=0.008 *1* $T_{1/2}$: weighted average of 37.6 s *8* (1982Sc15), γ(t), and 39.8 s *4* (1995Hi12), γ(t). Others: 38 s *2*, γ(t) (1981LiZM), 41 s *6*, γ(t) (1982Br31 and 1989Br19); 35.5 s *20*, α(t) (1982Sc15); and 38 s *9*, γ(t) (1992HeZV). %α: from 1995Hi12. Other values: 0.0063 *14* (1992Ha10) and 0.0087 +17−37 (1982Sc15). (note that 1992Ha10 quote the value from 1982Sc15 (both papers have many of the same authors) as %α=0.0087 *7*.) However, in none of these studies were the absolute Iγ values measured. 1995Hi12 estimate the absolute Iγ values by requiring the sum of the intensities of the γ's feeding the g.s. to be 100% (K. S. Toth, priv. comm. (Oct., 1996)). 1992Ha10 assume the Iγ value of the strongest γ transition in the spectrum to be 100%. In their paper, 1982Sc15 report Iα/Iγ(174γ)=0.00091 *9* but, in their data tables, they show the value given here for them. Note, also, that all three of these approaches lead to situations in which the Iγ values used may be larger than the actual ones. Consequently, the inferred %α values should perhaps be regarded as upper limits for the correct value. Nonetheless, the listed value agrees well with the result expected on the basis of systematics. %α: note that a simple weighted average of the three values listed gives %α=0.0076 *7*.
285.0[#]	2$^+$	103 ps *8*	AB	μ=0.58 *14* $T_{1/2}$: from 1998We02, recoil-distance method in heavy-ion-induced reaction studies. μ: from measured $T_{1/2}$ value and precession of this state as determined in transient-field techniques in ^{126,128}Te(^{40}Ca,xnγ) (1998We02).
729.5[#]	4$^+$		AB	
1292.8[#]	6$^+$		A	
1649.3[@]	5$^-$		A	
1735.1[&]	4$^-$		A	
1940.1[#]	8$^+$		A	
2038.7[@]	7$^-$		A	
2117.7[&]	6$^-$		A	
2439.0[&]	8$^-$		A	
2488.5	9$^-$		A	J$^\pi$: either this level or the one at 2576 might be assigned as member of the negative-parity, odd-spin band.

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Adopted Levels, Gammas (continued)

^{162}Hf Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
2575.8	9⁻	A	Jπ: either this level or the one at 2489 might be assigned as member of the negative-parity, odd-spin band.
2623.2[&]	10⁻	A	
2635.4[#]	10⁺	A	
2818.6[@]	11⁻	A	
3030.6[&]	12⁻	A	
3185.4[#]	12⁺	A	
3247.5[@]	13⁻	A	
3386.2?[a]	(12⁺)	A	
3566.8[#]	14⁺	A	
3580.4[&]	14⁻	A	
3811.5[@]	15⁻	A	
3996.7?[a]	(14⁺)	A	
4067.5[#]	16⁺	A	
4237.8[&]	16⁻	A	
4489.4[@]	17⁻	A	
4554.7?[a]	(16⁺)	A	
4652.5[#]	18⁺	A	
4973.8[&]	18⁻	A	
5167.8?[a]	(18⁺)	A	
5250.9[@]	19⁻	A	
5310.3[#]	20⁺	A	
5775.8[&]	20⁻	A	
5806.6?[a]	(20⁺)	A	
6035.3[#]	22⁺	A	
6064.8[@]	21⁻	A	
6594.3[&]	(22⁻)	A	
6827.7[#]	24⁺	A	
6834.3[@]	23⁻	A	
7421.8[&]	(24⁻)	A	
7583.0[@]	25⁻	A	
7688.8[#]	26⁺	A	
7793.9		A	
8357.4[@]	(27⁻)	A	
8482.8[#]	28⁺	A	
8665.4		A	
9184.8?[@]	(29⁻)	A	
9279.3[#]	30⁺	A	
10143.0[#]	32⁺	A	
11073.7[#]	34⁺	A	
12058.0[#]	36⁺	A	
13101.6?[#]	(38⁺)	A	
14178.0?[#]	(40⁺)	A	

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Adopted Levels, Gammas (continued)

^{162}Hf Levels (continued)

† From in-beam study.
‡ From in-beam study (1988Hu05 and agree with those of 1988Bi02) and based on expected structure of bands and interpretation of $\gamma(\theta)$ data.
# Band(A): $K^\pi=0^+$ ground-state band.
@ Band(B): Negative-parity, odd-spin band; signature=1.
& Band(C): Negative-parity, even-spin band; signature=0.
a Band(D): Positive-parity, even-spin band; signature=0.

$\gamma(^{162}Hf)$

E_i(level)	J_i^π	E_γ †‡	I_γ #	E_f	J_f^π	Mult. @	α &	Comments
285.0	2^+	285.0	100	0.0	0^+	[E2]	0.0925	B(E2)(W.u.)=51.0 *+43−37* α(K)=0.0630 *9*; α(L)=0.0226 *4*; α(M)=0.00545 *8* α(N)=0.001273 *18*; α(O)=0.0001723 *25*; α(P)=4.46×10^{-6} *7*
729.5	4^+	444.5	100	285.0	2^+			
1292.8	6^+	563.4	100	729.5	4^+			
1649.3	5^-	919.8	100	729.5	4^+			
1735.1	4^-	1005.4	100	729.5	4^+			
1940.1	8^+	647.0	100	1292.8	6^+			
2038.7	7^-	389.7	11	1649.3	5^-			
		745.8	100	1292.8	6^+			
2117.7	6^-	382.4	75	1735.1	4^-			
		468.2	100	1649.3	5^-			
		825.5		1292.8	6^+			
2439.0	8^-	321.5	100	2117.7	6^-			
		400.3	72	2038.7	7^-			
		498.6	36	1940.1	8^+			
2488.5	9^-	449.6	100	2038.7	7^-			
		548.6	79	1940.1	8^+			
2575.8	9^-	537.4	100	2038.7	7^-			
		635.4	69	1940.1	8^+			
2623.2	10^-	134.9		2488.5	9^-			
		184.1		2439.0	8^-			
2635.4	10^+	695.3	100	1940.1	8^+			
2818.6	11^-	195.6		2623.2	10^-			
		242.9	66	2575.8	9^-			
		330.0	100	2488.5	9^-			
3030.6	12^-	407.4	100	2623.2	10^-			
3185.4	12^+	550.0	100	2635.4	10^+			
3247.5	13^-	428.9	100	2818.6	11^-			
3386.2?	(12^+)	750.8	100	2635.4	10^+			
3566.8	14^+	381.4	100	3185.4	12^+			
3580.4	14^-	549.8	100	3030.6	12^-			
3811.5	15^-	564.0	100	3247.5	13^-			
3996.7?	(14^+)	610.5	100	3386.2?	(12^+)			
4067.5	16^+	500.7	100	3566.8	14^+			
4237.8	16^-	657.4	100	3580.4	14^-			
4489.4	17^-	677.9	100	3811.5	15^-			
4554.7?	(16^+)	558.0	100	3996.7?	(14^+)			
4652.5	18^+	585.0	100	4067.5	16^+			
4973.8	18^-	736.0	100	4237.8	16^-			
5167.8?	(18^+)	613.1	100	4554.7?	(16^+)			
5250.9	19^-	761.5	100	4489.4	17^-			
5310.3	20^+	657.8	100	4652.5	18^+			

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Adopted Levels, Gammas (continued)

γ(^{162}Hf) (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π
5775.8	20^-	802.0	100	4973.8	18^-	8357.4	(27^-)	774.4	100	7583.0	25^-
5806.6?	(20^+)	638.8	100	5167.8?	(18^+)	8482.8	28^+	794.0	100	7688.8	26^+
6035.3	22^+	725.0	100	5310.3	20^+	8665.4		872.0	60	7793.9	
6064.8	21^-	813.9	100	5250.9	19^-			976.1	100	7688.8	26^+
6594.3	(22^-)	818.5		5775.8	20^-	9184.8?	(29^-)	827.4[a]		8357.4	(27^-)
6827.7	24^+	792.4	100	6035.3	22^+	9279.3	30^+	796.5	100	8482.8	28^+
6834.3	23^-	769.5	100	6064.8	21^-	10143.0	32^+	863.7	100	9279.3	30^+
7421.8	(24^-)	827.5		6594.3	(22^-)	11073.7	34^+	930.7	100	10143.0	32^+
7583.0	25^-	748.7	100	6834.3	23^-	12058.0	36^+	984.3	100	11073.7	34^+
7688.8	26^+	861.1	100	6827.7	24^+	13101.6?	(38^+)	1043.6[a]	100	12058.0	36^+
7793.9		966.2	100	6827.7	24^+	14178.0?	(40^+)	1076.4[a]	100	13101.6?	(38^+)

† From in-beam study (1988Hu05). From general comment, uncertainties are 0.3 keV increasing to 1.0 keV for weak transitions and doublets. Values of 1988Bi02 are systematically slightly higher.

‡ Unplaced γ's from the in-beam study (1988Hu05) are not included here.

From in-beam study (1988Hu05). From general comment, uncertainties are 5% to 20%.

@ 1988Hu05 give Iγ(30°)/Iγ(80°) results which are suggestive of the multipolarity, but these authors do not give the multipolarities deduced.

& Additional information 2.

a Placement of transition in the level scheme is uncertain.

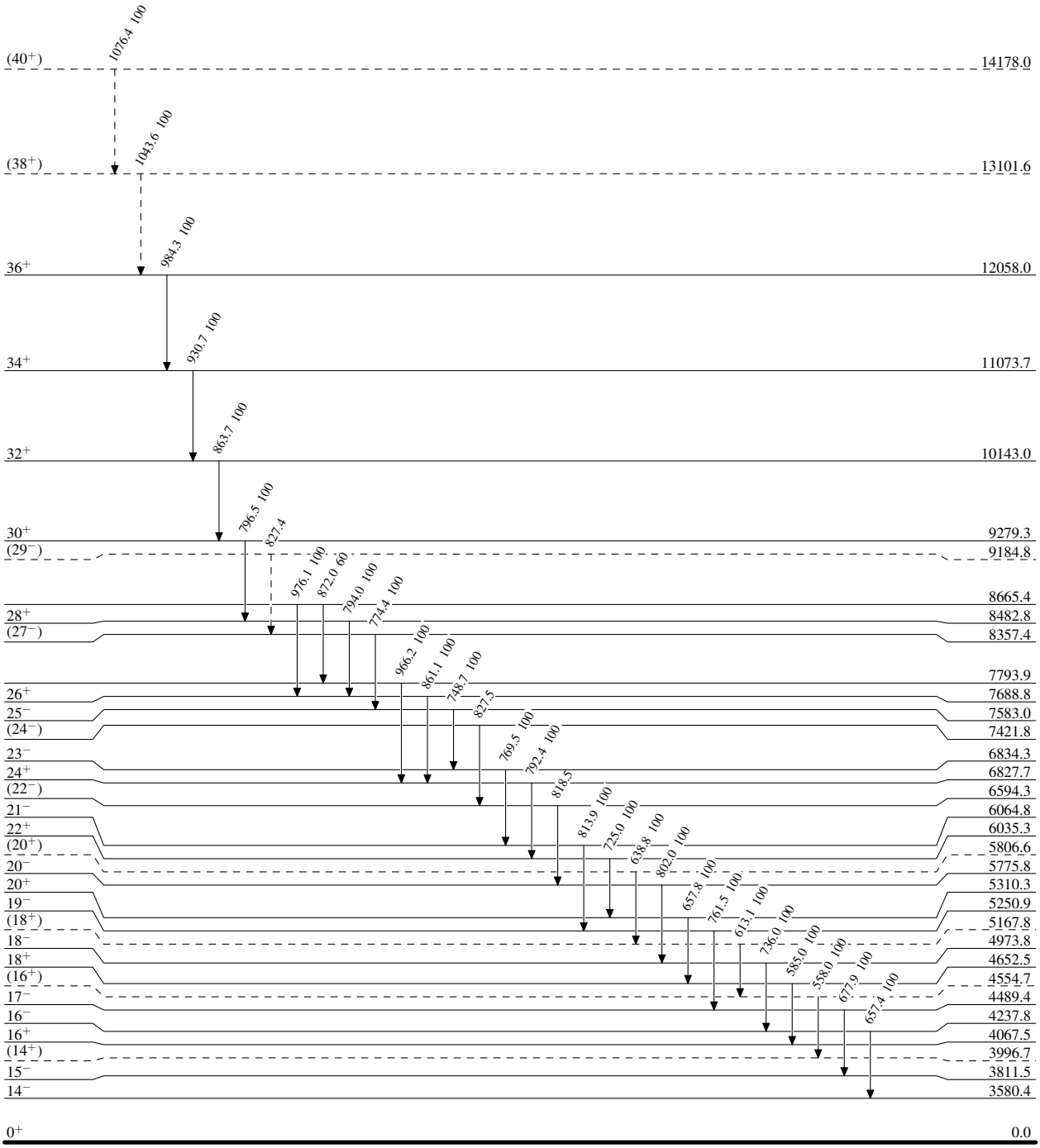
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

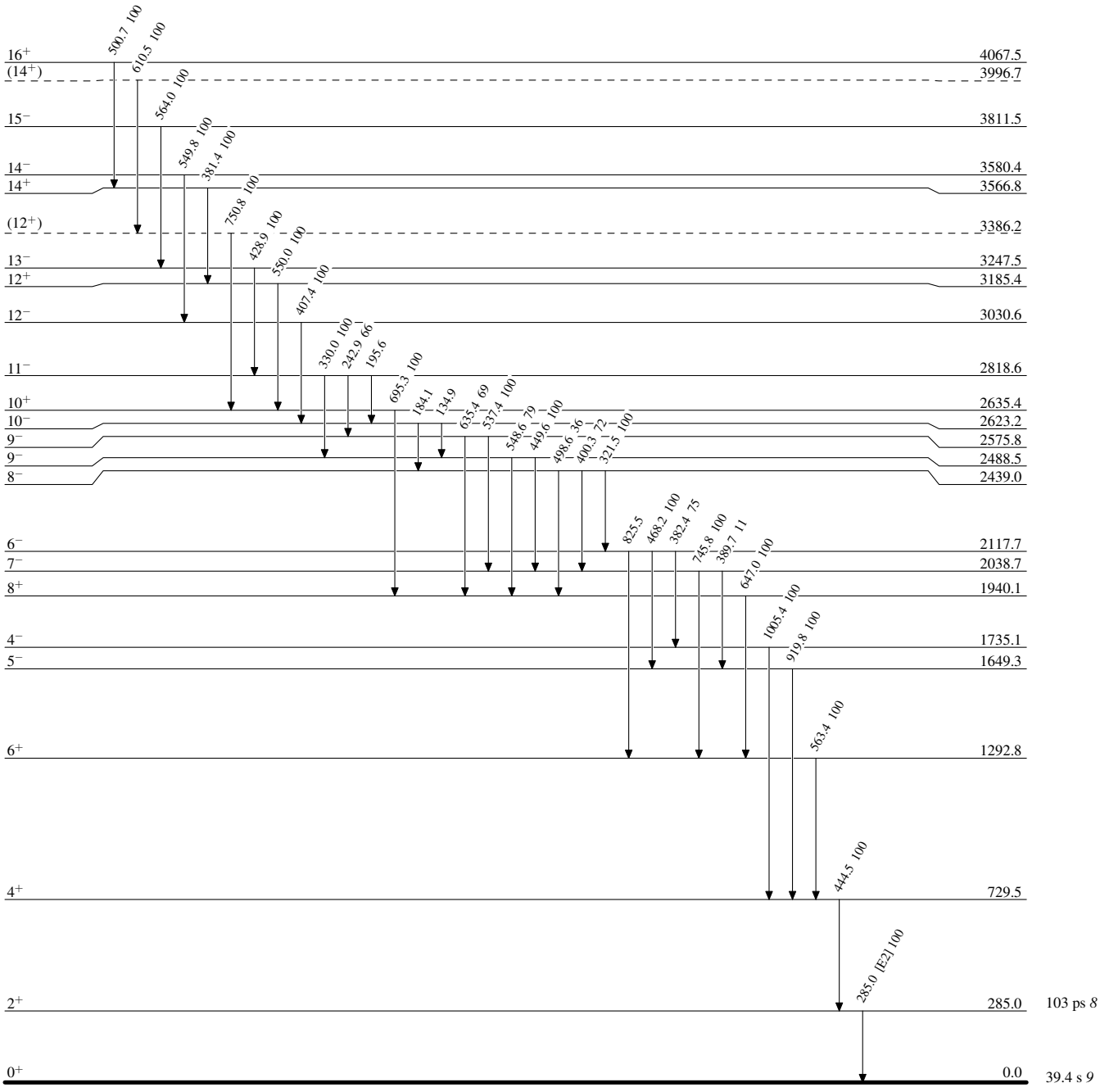


$^{162}_{72}Hf_{90}$

Adopted Levels, Gammas

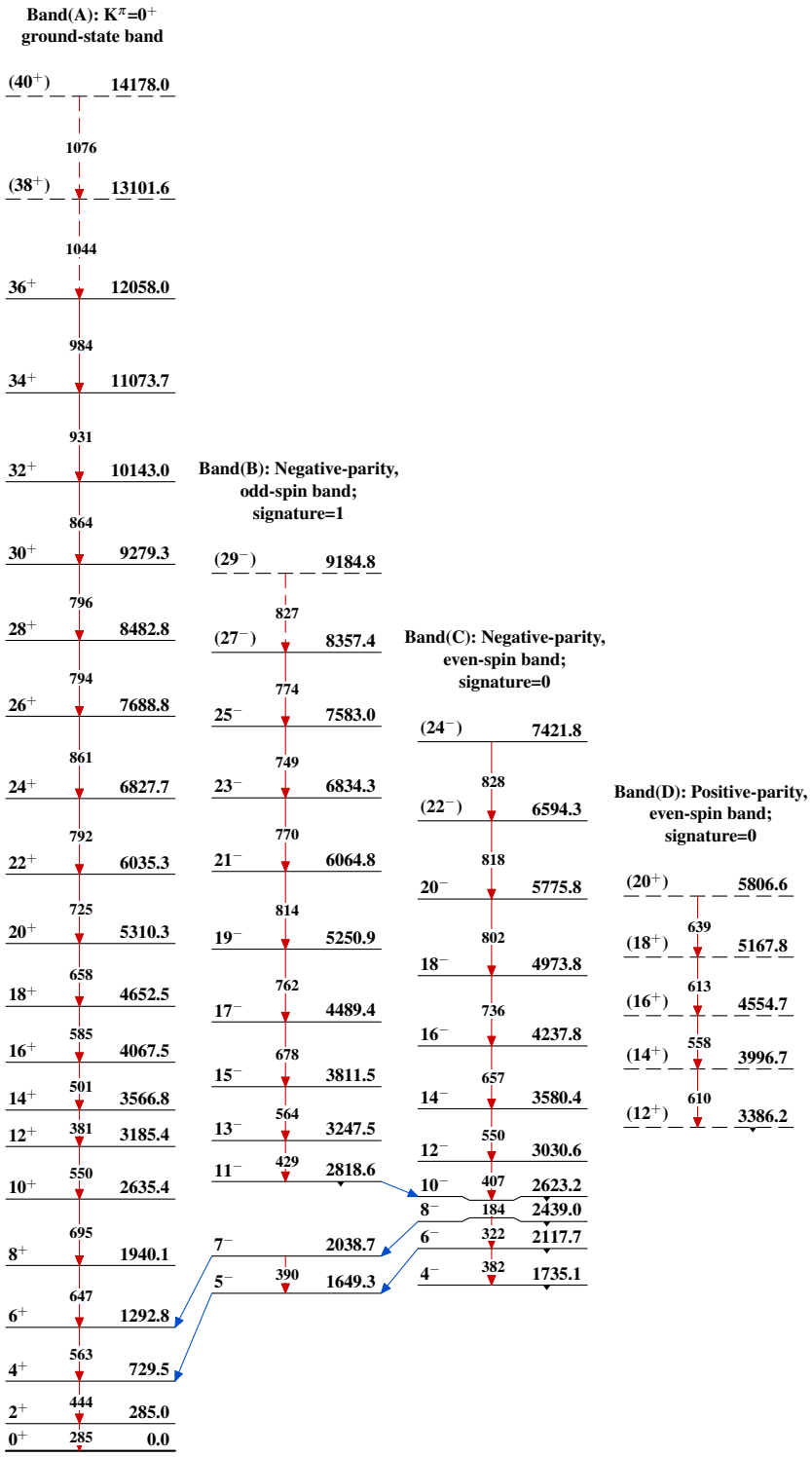
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{162}_{72}Hf_{90}$

Adopted Levels, Gammas



$^{162}_{72}Hf_{90}$