^{169}W ε decay 1990Me12

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 109, 2033 (2008)	15-Jun-2008

Parent: ^{169}W: E=0.0; J^{π}=(5/2$^-$); $T_{1/2}$=74 s *6*; Q(ε)=5370 *30*; %ε+%β^+ decay=100.0
Others: 1987Es08, 1992HeZV (sources from Gd(Ne,xn)).
1990Me12: ^{169}W sources from ^{138}Ba(^{36}Ar,xn), E=191 MeV. Measured Eγ, Iγ, $\gamma\gamma$ coin, γ-K x ray coin.

The decay scheme is that of 1990Me12 with the addition of unplaced 107.5γ, 153.4γ and 169.5γ from 1990Me12; the latter were tentatively placed by the evaluator as in Adopted Levels, Gammas. Band assignments are taken from Adopted Levels, Gammas. The decay scheme cannot be normalized; several placed gammas of unknown multipolarity are low enough in energy for significant internal conversion to occur, and the unknown deexcitations of the 11 and 27 levels probably take place via transitions which are almost entirely converted. $\varepsilon+\beta^+$ feeding to the g.s. is unknown; it would be expected to be <5% were this feeding first forbidden (as might be expected given that many N=95 isotones have 5/2[523] g.s. configurations). However, allowed $\varepsilon+\beta^+$ feeding to the ^{169}Ta g.s. cannot be ruled out entirely given that the pairing selfconsistent cranking model calculations of 1985Re06 indicate 3/2[651] and 5/2[642] bandheads only 15 and 30 keV above a 5/2[523] bandhead In W. the apparent ε feeding to (5/2$^+$) 181, (9/2$^-$) 220 and (7/2$^-$) 469 levels seems inconsistent with a 5/2$^-$ parent but might simply result from a very incomplete decay scheme. Alternatively, placements suggested by analogy with Adopted Levels, Gammas May not Be correct. The expected ν 5/2[523] to π 7/2[523] allowed unhindered decay has yet to Be identified. More experimental work on ^{169}W ε decay is required.

^{169}Ta Levels

Band(Aa) 1/2[541] band.
Band(Dd) 5/2[402] band.
Band(Ff) 1/2[411] band.
Band(Hh) 7/2[404] band.

E(level)[†]	J^{π}[‡]	Comments
0.0	(5/2$^+$)	
11.3 *4*	(1/2$^+$)	
27.5 *3*	(3/2$^+$)	E(level): from Adopted Levels; E held fixed for least-squares fit.
96.64 *18*	(7/2$^+$)	
135.95 *24*	(7/2$^+$)	
180.8 *3*	(5/2$^+$)	
192.1 *3*	(5/2$^-$)	
220.2[#] *3*	(9/2$^-$)	
245.2 *5*	(9/2$^+$)	
298.4 *5*	(9/2$^+$)	
299.7 *4*	(9/2$^-$)	
349.1 *4*	(3/2$^-$)	
358.72 *23*	(5/2$^-$,7/2,9/2$^+$)	
469.2 *4*	(7/2$^-$)	
556.0 *4*		
795.8 *4*		

[†] From least-squares fit to Eγ.
[‡] From Adopted Levels.
[#] Band(A): 9/2[514] band.

γ(^{169}Ta)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	δ	α @	$I_{(\gamma+ce)}$	Comments
(11.2 *4*)		192.1	(5/2$^-$)	180.8	(5/2$^+$)	[E1]			1.5×10^2 *12*	E_γ: from level energy difference; transition not observed. $I_{(\gamma+ce)}$: At least 33 *12* and No more than 267 *30* to avoid negative ε feeding to 192 and 180 levels, respectively.
(11.3 *4*)		11.3	(1/2$^+$)	0.0	(5/2$^+$)	[E2]			≥308	E_γ: from level energy difference; transition not observed. $I_{(\gamma+ce)}$: lower limit required to avoid negative ε feeding to 11 level.
(16.1 *5*)		27.5	(3/2$^+$)	11.3	(1/2$^+$)	[M1]		159 *16*	≥184	ce(L)/(γ+ce)=0.77 *6*; ce(M)/(γ+ce)=0.175 *23*; ce(N+)/(γ+ce)=0.049 *7* E_γ: from level energy difference; transition not observed. $I_{(\gamma+ce)}$: lower limit required to avoid negative ε feeding to 27 level.
96.6# *2*	40 *4*	96.64	(7/2$^+$)	0.0	(5/2$^+$)	M1		4.82		α(K)=4.00 *6*; α(L)=0.632 *10*; α(M)=0.1433 *22*; α(N+..)=0.0401 *7* α(N)=0.0343 *6*; α(O)=0.00543 *9*; α(P)=0.000375 *6* Mult.: M1,E2 from α(exp)=7 *4*; M1 from Adopted Gammas.
107.5 *3*	6 *3*	299.7	(9/2$^-$)	192.1	(5/2$^-$)	[E2]		2.79 *5*		α(K)=0.797 *12*; α(L)=1.52 *3*; α(M)=0.380 *8*; α(N+..)=0.1007 *20* α(N)=0.0889 *17*; α(O)=0.01174 *23*; α(P)=5.53×10^{-5} *9* Placed by evaluator, consistent with Adopted Levels, Gammas and with reported coincidences with 170γ, 153γ and possibly 165γ.
x109.0 *3*	9 *3*									Coincident with 153γ, 165γ, 170γ. Eγ matches that for known γ deexciting the 245 level but γγ coin data are inconsistent with, and Iγ is too large, for that placement.
120.1 *3*	8 *3*	469.2	(7/2$^-$)	349.1	(3/2$^-$)	[E2]		1.83		α(K)=0.626 *10*; α(L)=0.912 *17*; α(M)=0.229 *5*; α(N+..)=0.0606 *11* α(N)=0.0535 *10*; α(O)=0.00709 *13*; α(P)=4.27×10^{-5} *7* Coincident with 153γ, 170γ.
123.4 *4*	167 *28*	220.2	(9/2$^-$)	96.64	(7/2$^+$)	E1		0.212 *4*		α(K)=0.175 *3*; α(L)=0.0291 *5*; α(M)=0.00660 *11*; α(N+..)=0.00179 *3* α(N)=0.00155 *3*; α(O)=0.000230 *4*; α(P)=1.194×10^{-5} *20* Mult.: from α(exp)=0.5 *2*.
136.0# *3*	29 *3*	135.95	(7/2$^+$)	0.0	(5/2$^+$)	M1(+E2)	<0.68	1.71 *11*		α(K)=1.34 *17*; α(L)=0.28 *5*; α(M)=0.066 *13*; α(N+..)=0.018 *4* α(N)=0.016 *3*; α(O)=0.0024 *4*; α(P)=0.000123 *18* Mult.: from α(exp)=2.1 *5*.

$^{169}_{73}Ta_{96}$-2

^{169}W ε decay 1990Me12 (continued)

γ(^{169}Ta) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
138.5 *3*	16 *3*	358.72	(5/2$^-$,7/2,9/2$^+$)	220.2	(9/2$^-$)			
148.6 *4*	8 *3*	245.2	(9/2$^+$)	96.64	(7/2$^+$)	[M1]	1.410 *23*	α(K)=1.172 *19*; α(L)=0.184 *3*; α(M)=0.0417 *7*; α(N+..)=0.01167 *19* α(N)=0.00998 *16*; α(O)=0.00158 *3*; α(P)=0.0001094 *18* coincident with 97γ.
153.4 *3*	79 *8*	180.8	(5/2$^+$)	27.5	(3/2$^+$)	[M1+E2]	1.0 *3*	α(K)=0.7 *4*; α(L)=0.24 *7*; α(M)=0.057 *20*; α(N+..)=0.015 *5* α(N)=0.013 *5*; α(O)=0.0019 *5*; α(P)=6.E−5 *4*
162.4 *4*	9 *3*	298.4	(9/2$^+$)	135.95	(7/2$^+$)	(M1)	1.097 *18*	α(K)=0.913 *15*; α(L)=0.1430 *23*; α(M)=0.0324 *5*; α(N+..)=0.00907 *15* α(N)=0.00776 *13*; α(O)=0.001228 *20*; α(P)=8.51×10^{-5} *14*
164.7 *3*	24 *3*	192.1	(5/2$^-$)	27.5	(3/2$^+$)	[E1]	0.1002	α(K)=0.0830 *13*; α(L)=0.01332 *20*; α(M)=0.00302 *5*; α(N+..)=0.000824 *13* α(N)=0.000711 *11*; α(O)=0.0001070 *16*; α(P)=5.91×10^{-6} *9* Coincident with 109γ, 168γ, 277γ and possibly 108γ.
168.3 *4*	12 *2*	349.1	(3/2$^-$)	180.8	(5/2$^+$)	[E1]	0.0947 *15*	α(K)=0.0785 *12*; α(L)=0.01257 *20*; α(M)=0.00285 *5*; α(N+..)=0.000778 *12* α(N)=0.000671 *11*; α(O)=0.0001011 *16*; α(P)=5.61×10^{-6} *9* Coincident with 109γ, 153γ, 165γ, 170γ.
169.5[&#] *3*	≈81[&]	180.8	(5/2$^+$)	11.3	(1/2$^+$)	[E2]	0.524	α(K)=0.263 *4*; α(L)=0.198 *4*; α(M)=0.0493 *8*; α(N+..)=0.01313 *21* α(N)=0.01155 *19*; α(O)=0.001558 *25*; α(P)=1.85×10^{-5} *3* I_γ: 100 for doubly-placed γ; intensity divided based on adopted branching from 180.1 level.
169.5[&] *3*	19[&]	469.2	(7/2$^-$)	299.7	(9/2$^-$)	[M1]	0.973	α(K)=0.809 *12*; α(L)=0.1267 *19*; α(M)=0.0287 *5*; α(N+..)=0.00804 *12* α(N)=0.00687 *11*; α(O)=0.001088 *17*; α(P)=7.55×10^{-5} *12* I_γ: 100 for doubly-placed γ; intensity divided based on adopted branching from 180.1 level. Coincident with 109γ, 153γ, 165γ, 170γ.
197.3 *3*	8 *3*	556.0		358.72	(5/2$^-$,7/2,9/2$^+$)			
222.8 *3*	6 *2*	358.72	(5/2$^-$,7/2,9/2$^+$)	135.95	(7/2$^+$)			
262.0 *4*	40 *16*	358.72	(5/2$^-$,7/2,9/2$^+$)	96.64	(7/2$^+$)			
277.3 *4*	29 *3*	469.2	(7/2$^-$)	192.1	(5/2$^-$)	[M1]	0.250	α(K)=0.208 *3*; α(L)=0.0322 *5*; α(M)=0.00730 *11*; α(N+..)=0.00204 *3* α(N)=0.00175 *3*; α(O)=0.000277 *4*; α(P)=1.93×10^{-5} *3* Coincident with 153γ, 165γ, 170γ.
358.8 *4*	6 *3*	358.72	(5/2$^-$,7/2,9/2$^+$)	0.0	(5/2$^+$)			
420.1 *4*	3 *2*	556.0		135.95	(7/2$^+$)			
575.6 *4*	26 *6*	795.8		220.2	(9/2$^-$)			
699.3 *5*	<4	795.8		96.64	(7/2$^+$)			

$^{169}_{73}Ta_{96}$-3

^{169}W ε decay 1990Me12 (continued)

$\gamma(^{169}Ta)$ (continued)

† From 1990Me12.
‡ From Adopted Gammas, except as noted.
# Also reported by 1987Es08.
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
& Multiply placed with intensity suitably divided.
x γ ray not placed in level scheme.

$^{169}_{73}Ta_{96}$-4

^{169}W ε decay 1990Me12

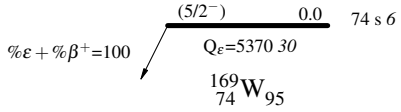
Decay Scheme

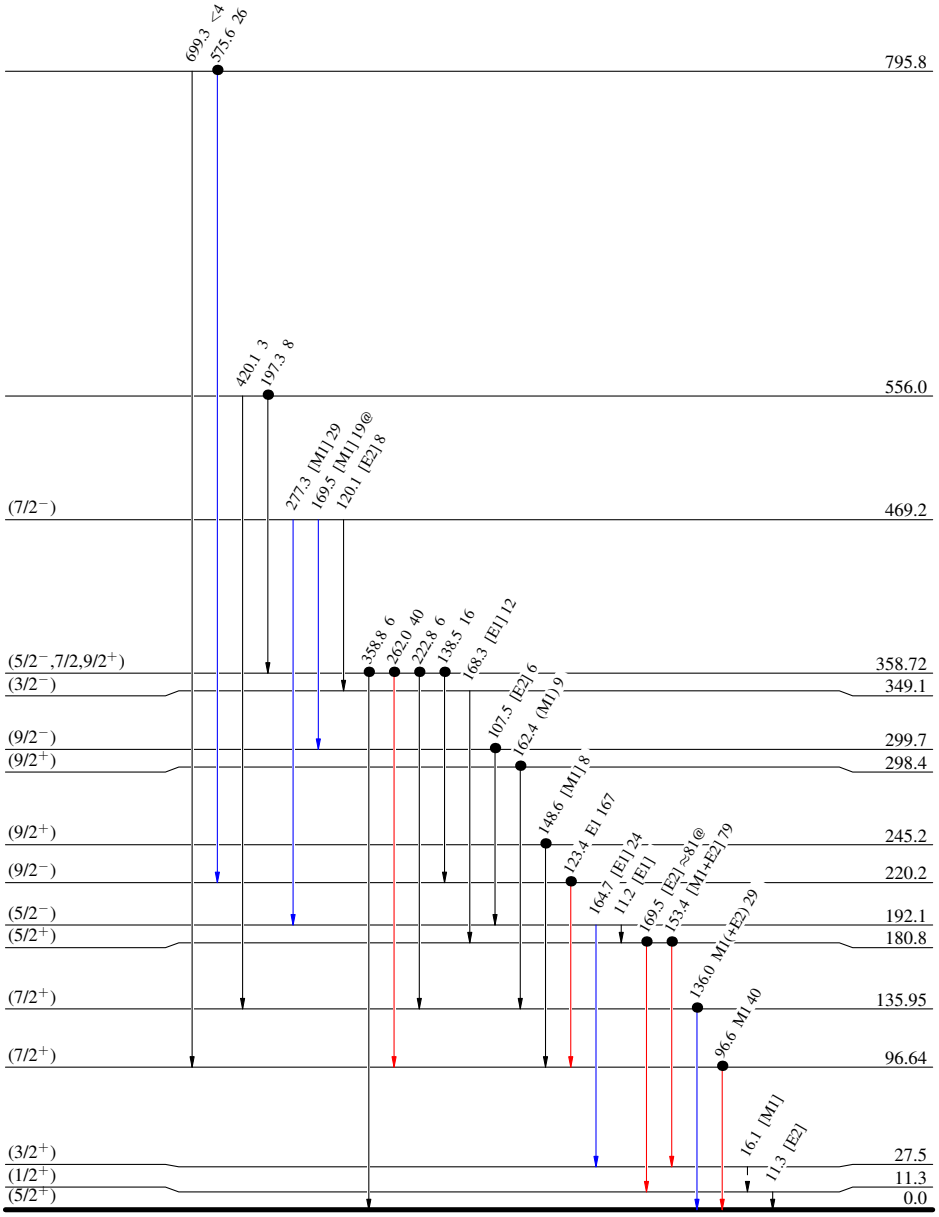
Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence





$^{169}_{73}Ta_{96}$

^{169}W ε decay 1990Me12

Band(A): 9/2[514] band

(9/2$^-$) **220.2**

$^{169}_{73}Ta_{96}$