Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Kumar(a), J. Chen(b) and F. G. Kondev	NDS 137, 1 (2016)	31-May-2016

Q(β^-)=7608 *15*; S(n)=3981 *14*; S(p)=14415 *14*; Q(α)=−7626 *16* 2012Wa38

^{109}Mo Levels

Cross Reference (XREF) Flags

- A ^{248}Cm SF decay
- B ^{252}Cf SF decay
- C Be(^{238}U,Fγ)

E(level)†	J$^\pi$‡	$T_{1/2}$	XREF	Comments
0.0#	(5/2$^+$)	0.61 s *+3−4*	ABC	%β^-=100; %β^-n=1.3 *6* (2009Pe06) J$^\pi$: 222.2γ E1 from (7/2$^-$) and γ(110.8)γ(222.2)(θ) (2006Ur01) in ^{248}Cm SF decay; direct β^- decay feeding to the ^{109}Tc ground state (J$^\pi$=5/2$^+$) (2012Ku28). Note, that 1997Hw03 (^{252}Cf SF decay) proposed J^π=(7/2$^-$), based on their interpretation, but no experimental evidences were presented by the authors. $T_{1/2}$: weighted average of 0.70 s *+4−6*, using implant-$\beta\gamma$(t) in 2015Lo04, 0.66 s *5*, using β(t) and the maximum likelihood method in 2009Pe06 and 0.53 s *6* using β-Kαx(t) in 1992Ay02, and 1992PeZX. configuration: ν5/2$^+$[402] ($g_{7/2}$) orbital. The assignment is tentative. The strong β^- feedings to the $\pi g_{9/2}$-dominated levels in the daughter ^{109}Tc nuclide would support $\nu g_{7/2}$ over $\nu d_{5/2}$ assignment.
69.7 *5*	(1/2$^+$)	0.194 μs *+76−49*	C	J$^\pi$: Tentative assignment proposed in 2012Ka36 (Be(^{238}U,Fγ)), based on expectations from the Nilsson model. Similarity to known isomers in neighboring odd-N nuclei. $T_{1/2}$: using 69.7γ(t) in 2012Ka36 (Be(^{238}U,Fγ)). configuration: ν1/2$^+$[411] expected from the Nilsson model and similarities to known isomers in neighboring odd-N nuclei. The assignment is tentative.
144.01# *25*	(7/2$^+$)		A	
222.19@ *25*	(7/2$^-$)		AB	J$^\pi$: 78.2γ E1 to (7/2$^+$); proposed configuration. configuration: ν7/2$^-$[523] orbital. The assignment is tentative.
333.0@ *3*	(9/2$^-$)		AB	J$^\pi$: 110.8γ M1+E2 to (7/2$^-$) and 189.0γ to (7/2$^+$); band assignment.
336.4# *6*	(9/2$^+$)		A	J$^\pi$: 192.4γ to (7/2$^+$) and 336γ to (5/2$^+$); band assignment.
472.0@ *4*	(11/2$^-$)		AB	J$^\pi$: 138.9γ M1(+E2) to (9/2$^-$) and 250.0γ to (7/2$^-$); band assignment.
553.3# *4*	(11/2$^+$)		A	J$^\pi$: 216.8γ to (11/2$^+$) and 409.3γ to (7/2$^+$); band assignment.
730.3@ *5*	(13/2$^-$)		AB	J$^\pi$: 258.3γ to (11/2$^-$) and 397.2γ to (9/2$^-$); band assignment.
810.6# *8*	(13/2$^+$)		A	J$^\pi$: 474.2γ to (9/2$^+$); band assignment.
885.7@ *5*	(15/2$^-$)		AB	J$^\pi$: 155.4γ to (13/2$^-$) and 413.7γ E2 to (11/2$^-$); band assignment.
1095.4# *7*	(15/2$^+$)		A	J$^\pi$: 542.1γ to (11/2$^+$); band assignment.
1286.7@ *11*	(17/2$^-$)		A	J$^\pi$: 401γ to (15/2$^-$) and 556γ to (13/2$^-$); band assignment.
1442.7@ *6*	(19/2$^-$)		AB	J$^\pi$: 557.0γ to (15/2$^-$); band assignment.
2137.7@ *12*	(23/2$^-$)		A	J$^\pi$: 695γ to (19/2$^-$); band assignment.

† From a least-squares fit to γ-ray energies.

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Adopted Levels, Gammas (continued)

^{109}Mo Levels (continued)

‡ From 2006Ur01 in ^{248}Cm SF decay, based on deduced transition multipolarities, using α(exp) and $\gamma\gamma(\theta)$, and the proposed band structures, unless otherwise stated.
# Band(A): ν5/2[402] band. The assignment is tentative.
@ Band(B): ν7/2[523] band. The assignment is tentative.

$\gamma(^{109}Mo)$

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.‡	δ@	α#	Comments
69.7	(1/2$^+$)	69.7 *5*	100	0.0	(5/2$^+$)	[E2]		4.42 *14*	α(K)=3.35 *10*; α(L)=0.89 *3*; α(M)=0.162 *6* α(N)=0.0223 *8*; α(O)=0.000453 *13* B(E2)(W.u.)=11 *+4−3*
144.01	(7/2$^+$)	144.0 *3*	100	0.0	(5/2$^+$)				
222.19	(7/2$^-$)	78.2 *5*	23 *2*	144.01	(7/2$^+$)	E1		0.257 *6*	α(K)=0.226 *6*; α(L)=0.0264 *7*; α(M)=0.00468 *11* α(N)=0.000694 *17*; α(O)=3.37×10^{-5} *8* Mult.: from α(exp) in 2006Ur01 using intensity balance considerations.
		222.2 *3*	100 *5*	0.0	(5/2$^+$)	E1		0.01262	α(K)=0.01110 *17*; α(L)=0.001258 *19*; α(M)=0.000224 *4* α(N)=3.37×10^{-5} *5*; α(O)=1.81×10^{-6} *3* Mult.: from α(exp) in 2006Ur01 using intensity balance considerations; A_2/A_0=+0.11 *2*, A_4/A_0=−0.03 *2* for (110.8γ)(222.2γ)(θ), gives ΔJ=1 for 222.2γ (2006Ur01). E_γ: Other: 222.5 keV in 1997Hw03.
333.0	(9/2$^-$)	110.8 *3*	100 *4*	222.19	(7/2$^-$)	M1+E2	0.55 *20*	0.34 *9*	α(K)=0.29 *7*; α(L)=0.044 *14*; α(M)=0.0079 *25* α(N)=0.00115 *34*; α(O)=4.6×10^{-5} *9* Mult.: from α(exp) = 0.34 *8*, deduced by the evaluators from the intensity balances and Iγ in 2006Ur01; A_2/A_0=+0.11 *2*, A_4/A_0=−0.03 *2* for (110.8γ)(222.2γ)(θ), gives ΔJ=1 for 110.8γ, in-band transition (2006Ur01). δ: calculated by evaluators from α(exp) and the BrIccMixing program. E_γ: Other: 111.3 keV in 1997Hw03.
		189.0 *3*	34 *3*	144.01	(7/2$^+$)				
336.4	(9/2$^+$)	192.4 *5*	100	144.01	(7/2$^+$)				
472.0	(11/2$^-$)	138.9 *3*	100 *4*	333.0	(9/2$^-$)	M1(+E2)		0.1016 *16*	α(K)=0.0889 *14*; α(L)=0.01047 *16*; α(M)=0.00188 *3* α(N)=0.000285 *5*; α(O)=1.581×10^{-5} *24* Mult.: A_2/A_0=+0.07 *1*, A_4/A_0=−0.0 *2* for (110.8γ)(138.9γ)(θ), gives

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Adopted Levels, Gammas (continued)

γ(^{109}Mo) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[#]	Comments
								ΔJ=1 for 138.9γ. Also A_2/A_0=−0.09 *2*, A_4/A_0=−0.0 *2* (138.9γ)(413.7γ)(θ), gives ΔJ=1 for 138.9γ; in-band transition (2006Ur01).
								E_γ: Other: 139.3 keV in 1997Hw03.
472.0	(11/2$^-$)	250.0 *5*	28 *3*	222.19	(7/2$^-$)			
553.3	(11/2$^+$)	216.8[&] *5*		336.4	(9/2$^+$)			
		409.3 *3*	100	144.01	(7/2$^+$)			
730.3	(13/2$^-$)	258.3 *5*	100 *9*	472.0	(11/2$^-$)			E_γ: Other: 258.6 keV in 1997Hw03.
		397.3 *5*	57 *9*	333.0	(9/2$^-$)			E_γ: Other: 397.9 keV in 1997Hw03.
810.6	(13/2$^+$)	474.2 *5*	100	336.4	(9/2$^+$)			
885.7	(15/2$^-$)	155.4 *5*	29 *4*	730.3	(13/2$^-$)			E_γ: Other: 155.5 keV in 1997Hw03.
		413.7 *3*	100 *5*	472.0	(11/2$^-$)	E2	0.00846	α(K)=0.00737 *11*; α(L)=0.000904 *13*; α(M)=0.0001617 *23* α(N)=2.42×10^{-5} *4*; α(O)=1.226×10^{-6} *18* Mult.: A_2/A_0=−0.09 *2*, A_4/A_0=−0.0 *2* (138.9γ)(413.7γ)(θ), gives ΔJ=2 for 413.7γ, in-band transition (2006Ur01).
								E_γ: Other: 413.2 keV in 1997Hw03.
1095.4	(15/2$^+$)	542.1 *5*	100	553.3	(11/2$^+$)			
1286.7	(17/2$^-$)	401 *1*	100	885.7	(15/2$^-$)			
1442.7	(19/2$^-$)	557.0 *3*	100	885.7	(15/2$^-$)			E_γ: Other: 557.4 keV in 1997Hw03.
2137.7	(23/2$^-$)	695 *1*	100	1442.7	(19/2$^-$)			

[†] From 2006Ur01 in ^{248}Cm SF decay. ΔEγ assigned by evaluators.
[‡] From 2006Ur01 in ^{248}Cm SF decay based on α(exp) and γγ(θ).
[#] Additional information 1.
[@] If No value given it was assumed δ=0.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.
[&] Placement of transition in the level scheme is uncertain.

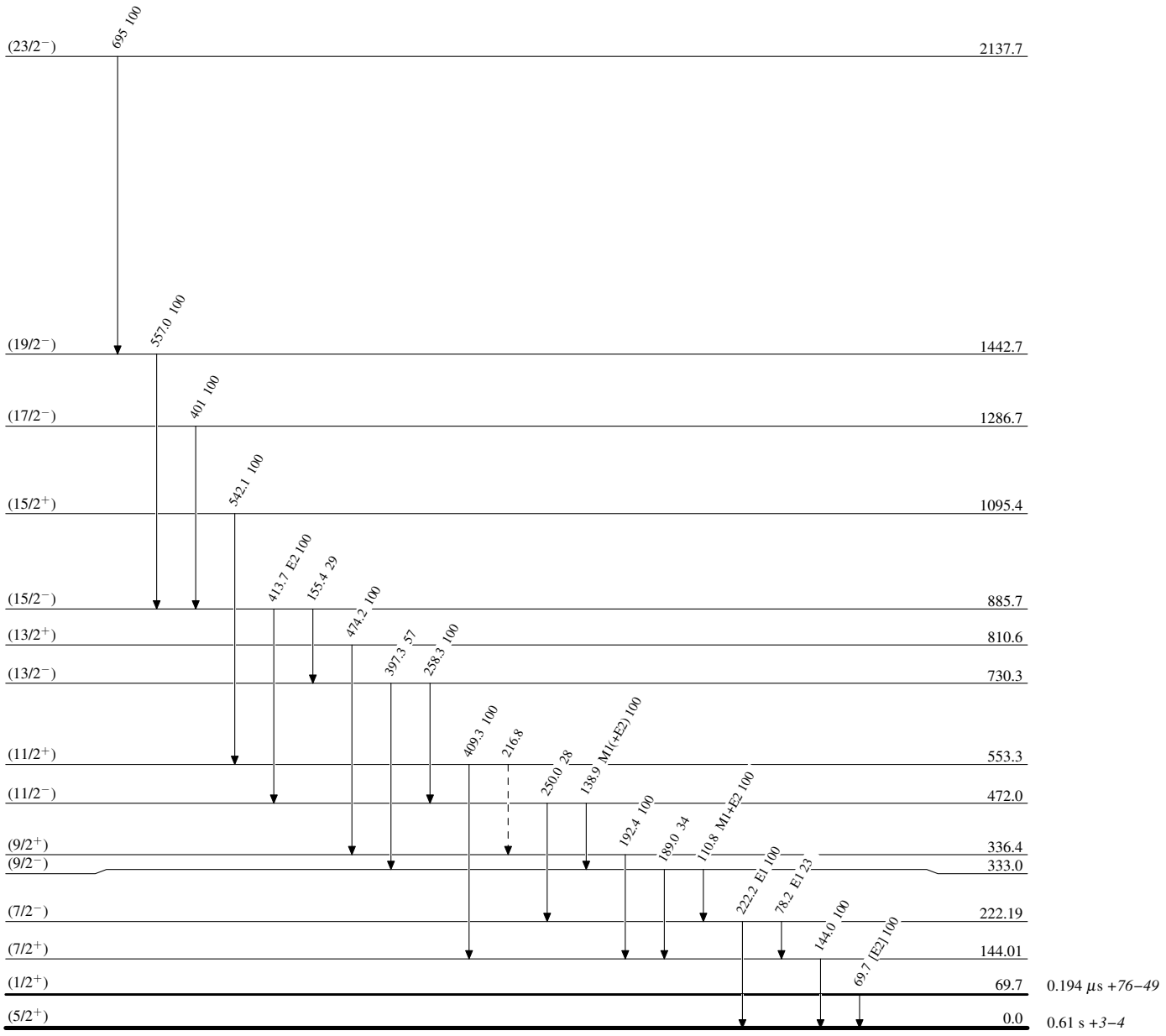
Adopted Levels, Gammas

Legend

Level Scheme

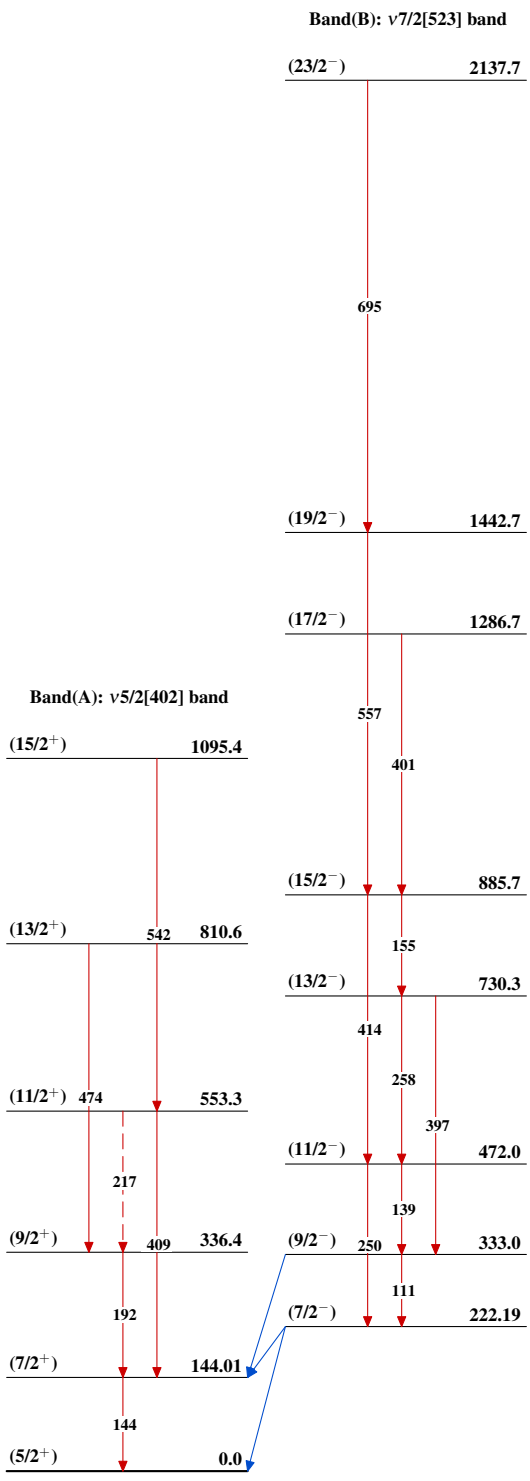
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{109}_{42}Mo_{67}$

Adopted Levels, Gammas



$^{109}_{42}Mo_{67}$