^{109}Mo β^- decay 2012Ku28

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

Parent: ^{109}Mo: E=0.0; $J^\pi=(5/2^+)$; $T_{1/2}$=0.61 s *+3–4*; Q(β^-)=7608 *15*; %β^- decay=100.0

2012Ku28: Monoisotopic ^{109}Mo produced in deuteron-induced fissions on natural uranium target using 25 MeV beam at the University of Jyvaskyla IGISOL3 facility. Penning trap isotopic purification. Detectors: two 120% Ge detectors, a LEPS spectrometer and a 2 mm-thick plastic scintillator detector. Measured: Eγ, Iγ, ce, $\gamma\gamma$-coin, γ(x-ray)-coin., $\gamma\beta$-coin.

^{109}Tc Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0[#]	$(5/2^+)$	0.91 s *3*	
7.0[@] *3*	$(5/2^-)$		
18.36 *23*	$(3/2^-)$		configuration: Likely the $K^\pi=3/2^-$, π3/2[301] state. The assignment is tentative.
50.62 *21*	$(3/2^+)$		configuration: Likely a member of the $K^\pi=1/2^+$, π1/2[431] band. The assignment is tentative.
69.12[#] *15*	$(7/2^+)$		
172.0[@] *5*	$(7/2^-)$		
206.2[#] *3*	$(9/2^+)$		
333.14[&] *13*	$(3/2^+)$		
358.59[&] *13*	$(7/2^+)$		
423.78[&] *12*	$(5/2^+)$		
489.31 *25*	(3/2,5/2)		
702.8 *3*	$(3/2,5/2,7/2^+)$		
745.00 *13*	$(7/2^+)$		configuration: Likely the $K^\pi=7/2^+$, π7/2[413] state. The assignment is tentative.
1756.0 *4*	(3/2,5/2,7/2)		
2022.85 *18*	$(3/2^+,5/2,7/2^+)$		
2068.4 *5*	(3/2,5/2,7/2)		
2286.3 *4*	$(3/2,5/2,7/2^+)$		

[†] From a least-squares fit to Eγ.
[‡] From Adopted Levels.
[#] Band(A): $K^\pi=5/2^+$, π5/2[422] band.
[@] Band(B): $K^\pi=5/2^-$, π5/2[503] band.
[&] Band(C): Likely $K^\pi=1/2^+$, π5/2[422]$\otimes 2^+$ band.

^{109}Mo β^- decay 2012Ku28 (continued)

$\gamma(^{109}Tc)$

Decay scheme is incomplete (pandemonium and presence of low-energy transitions with not well established properties) and no values are given for %Iβ, %Iγ and log *ft*. The authors in 2012Ku28 reported ^{109}Mo ground-state to ground-state β^--decay intensity of 53% 5, which should also include feedings to the 7.0- and 18.0-keV levels. Using this information and the present decay scheme, a normalization factor of 0.100 13 can be deduced. The strongest-fed levels are 333-, 358-, 423- and 745-keV, associated with $\pi g_{9/2}$ orbital, as well as the 2022-keV level, which would support $\nu g_{7/2}$ assignment for the ^{109}Mo parent state.

E_γ [†]	I_γ [†b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[#]	α[a]	Comments
(7.0)		7.0	(5/2$^-$)	0.0	(5/2$^+$)				
(18.3)		18.36	(3/2$^-$)	0.0	(5/2$^+$)				
32.2 *2*	11 *3*	50.62	(3/2$^+$)	18.36	(3/2$^-$)	(E1)		3.28 *8*	α(K)=2.83 *7*; α(L)=0.374 *9*; α(M)=0.0668 *16* α(N)=0.01008 *23*; α(O)=0.000474 *11* Mult.: α(K)exp=4.7 *4* for 32.2γ+43.6γ in 2012Ku28.
43.6 *2*	28.2 *16*	50.62	(3/2$^+$)	7.0	(5/2$^-$)	(E1)		1.42 *3*	α(K)=1.234 *24*; α(L)=0.155 *3*; α(M)=0.0277 *6* α(N)=0.00423 *9*; α(O)=0.000216 *4* Mult.: α(K)exp=4.7 *4* for 32.2γ+43.6γ in 2012Ku28.
65.2 *2*	34.8 *27*	423.78	(5/2$^+$)	358.59	(7/2$^+$)	M1+E2	0.30 *6*	1.34 *16*	α(K)=1.10 *12*; α(L)=0.20 *4*; α(M)=0.036 *8* α(N)=0.0055 *11*; α(O)=0.000229 *18* Mult.,δ: from α(K)exp=1.1 *1* in 2012Ku28. Also α(K)exp=1.12 *25* for 65.2γ+69.1γ in 2012Ku28.
69.1[@&] *2*	44 *15*	69.12	(7/2$^+$)	0.0	(5/2$^+$)	M1+E2	0.11 *10*	0.84 *12*	α(K)=0.73 *9*; α(L)=0.095 *28*; α(M)=0.0173 *52* α(N)=0.00271 *75*; α(O)=0.000162 *14* Mult.,δ: α(K)exp=0.90 *20* and α(exp)=0.90 *20* in 2012Ku28. Also α(K)exp = 1.12 *25* for 65.2γ+69.1γ in 2012Ku28.
90.7 *2*	36 *5*	423.78	(5/2$^+$)	333.14	(3/2$^+$)	M1+E2	0.37 *+10−11*	0.54 *9*	α(K)=0.45 *7*; α(L)=0.071 *17*; α(M)=0.013 *3* α(N)=0.0020 *5*; α(O)=9.4×10^{-5} *11* Mult.,δ: α(K)exp=0.45 *6* in 2012Ku28.
[x]128.7[@] *2*	51 *9*								
137.0[@] *3*	4 *1*	206.2	(9/2$^+$)	69.12	(7/2$^+$)	M1(+E2)	0.6 *6*	0.193 *93*	α(K)=0.164 *76*; α(L)=0.024 *15*; α(M)=0.0044 *27* α(N)=6.7×10^{-4} *40*; α(O)=3.4×10^{-5} *13*
152.1 *5*	1.4 *3*	358.59	(7/2$^+$)	206.2	(9/2$^+$)	[M1]		0.0880 *15*	α(K)=0.0770 *13*; α(L)=0.00913 *16*; α(M)=0.00166 *3* α(N)=0.000263 *5*; α(O)=1.74×10^{-5} *3*
165.0 *3*	4.1 *4*	172.0	(7/2$^-$)	7.0	(5/2$^-$)	[M1+E2]		0.0707 *11*	α(K)=0.0618 *10*; α(L)=0.00731 *11*; α(M)=0.001328 *20* α(N)=0.000211 *4*; α(O)=1.396×10^{-5} *21*
206.1 *2*	0.076 *25*	206.2	(9/2$^+$)	0.0	(5/2$^+$)	[E2]		0.0934	α(K)=0.0796 *12*; α(L)=0.01145 *17*; α(M)=0.00209 *3* α(N)=0.000320 *5*; α(O)=1.577×10^{-5} *23* E_γ,I_γ: From Adopted Levels.

$^{109}_{43}Tc_{66}$-2

^{109}Mo β^- decay 2012Ku28 (continued)

$\gamma(^{109}Tc)$ (continued)

E_γ[†]	I_γ[†b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[a]	Comments
213.5 *2*	37.9 *14*	702.8	(3/2,5/2,7/2$^+$)	489.31	(3/2,5/2)			
282.5 *2*	17.4 *18*	333.14	(3/2$^+$)	50.62	(3/2$^+$)	[M1]	0.01732	α(K)=0.01518 *22*; α(L)=0.001767 *25*; α(M)=0.000320 *5* α(N)=5.10×10^{-5} *8*; α(O)=3.41×10^{-6} *5*
289.5 *2*	100 *6*	358.59	(7/2$^+$)	69.12	(7/2$^+$)	[M1]	0.01628	α(K)=0.01427 *21*; α(L)=0.001659 *24*; α(M)=0.000301 *5* α(N)=4.79×10^{-5} *7*; α(O)=3.20×10^{-6} *5*
314.8 *3*	9.6 *12*	333.14	(3/2$^+$)	18.36	(3/2$^-$)	[E1]	0.00513	α(K)=0.00451 *7*; α(L)=0.000513 *8*; α(M)=9.26×10^{-5} *14* α(N)=1.465×10^{-5} *21*; α(O)=9.50×10^{-7} *14*
321.4 *2*	17.9 *9*	745.00	(7/2$^+$)	423.78	(5/2$^+$)	[M1]	0.01250	α(K)=0.01096 *16*; α(L)=0.001271 *18*; α(M)=0.000230 *4* α(N)=3.67×10^{-5} *6*; α(O)=2.46×10^{-6} *4*
333.3 *2*	200 *9*	333.14	(3/2$^+$)	0.0	(5/2$^+$)	[M1]	0.01142	α(K)=0.01001 *14*; α(L)=0.001159 *17*; α(M)=0.000210 *3* α(N)=3.34×10^{-5} *5*; α(O)=2.24×10^{-6} *4*
354.6 *4*	12.2 *10*	423.78	(5/2$^+$)	69.12	(7/2$^+$)	[M1]	0.00978	α(K)=0.00858 *13*; α(L)=0.000992 *15*; α(M)=0.000180 *3* α(N)=2.86×10^{-5} *4*; α(O)=1.92×10^{-6} *3*
358.7[&] *2*	56 *6*	358.59	(7/2$^+$)	0.0	(5/2$^+$)	[M1]	0.00951	α(K)=0.00834 *12*; α(L)=0.000964 *14*; α(M)=0.0001746 *25* α(N)=2.78×10^{-5} *4*; α(O)=1.87×10^{-6} *3*
386.6 *3*	11.2 *15*	745.00	(7/2$^+$)	358.59	(7/2$^+$)	[M1]	0.00791	α(K)=0.00694 *10*; α(L)=0.000799 *12*; α(M)=0.0001448 *21* α(N)=2.31×10^{-5} *4*; α(O)=1.551×10^{-6} *22*
412.0 *2*	60 *9*	745.00	(7/2$^+$)	333.14	(3/2$^+$)	[E2]	0.00908	α(K)=0.00789 *12*; α(L)=0.000983 *14*; α(M)=0.000178 *3* α(N)=2.79×10^{-5} *4*; α(O)=1.662×10^{-6} *24*
423.9 *2*	77 *8*	423.78	(5/2$^+$)	0.0	(5/2$^+$)	[M1]	0.00631	α(K)=0.00554 *8*; α(L)=0.000637 *9*; α(M)=0.0001154 *17* α(N)=1.84×10^{-5} *3*; α(O)=1.238×10^{-6} *18*
438.6 *2*	43 *4*	489.31	(3/2,5/2)	50.62	(3/2$^+$)			
471.0 *2*	33 *3*	489.31	(3/2,5/2)	18.36	(3/2$^-$)			
652.3 *3*	8.9 *16*	702.8	(3/2,5/2,7/2$^+$)	50.62	(3/2$^+$)			
744.6[&] *2*	42 *5*	745.00	(7/2$^+$)	0.0	(5/2$^+$)	[M1]	1.68×10^{-3}	α(K)=0.001480 *21*; α(L)=0.0001675 *24*; α(M)=3.03×10^{-5} *5* α(N)=4.83×10^{-6} *7*; α(O)=3.29×10^{-7} *5*
1332.2 *3*	20.2 *17*	1756.0	(3/2,5/2,7/2)	423.78	(5/2$^+$)			
1365.5 *4*	6.6 *8*	2068.4	(3/2,5/2,7/2)	702.8	(3/2,5/2,7/2$^+$)			
1599.1 *3*	13.1 *7*	2022.85	(3/2$^+$,5/2,7/2$^+$)	423.78	(5/2$^+$)			
1664.2 *4*	5.2 *6*	2022.85	(3/2$^+$,5/2,7/2$^+$)	358.59	(7/2$^+$)			
1689.6 *3*	41.5 *25*	2022.85	(3/2$^+$,5/2,7/2$^+$)	333.14	(3/2$^+$)			
2022.9 *3*	8.5 *7*	2022.85	(3/2$^+$,5/2,7/2$^+$)	0.0	(5/2$^+$)			
2235.7 *3*	15.4 *8*	2286.3	(3/2,5/2,7/2$^+$)	50.62	(3/2$^+$)			

[†] From 2012Ku28.
[‡] From experimental conversion coefficient in 2012Ku28, unless otherwise specified.
[#] Deduced by evaluators using experimental conversion coefficient and BrIccMixing v2.3 program. 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.

$^{109}_{43}Tc_{66}$-3

^{109}Mo β^- decay 2012Ku28 (continued)

$\gamma(^{109}Tc)$ (continued)

@ Observed also in ^{109}Tc β^- decay.
& Observed also in ^{109}Ru β^- decay.
[a] Additional information 1.
[b] For absolute intensity per 100 decays, multiply by ≈0.100.
[x] γ ray not placed in level scheme.

^{109}Mo β^- decay 2012Ku28

Decay Scheme

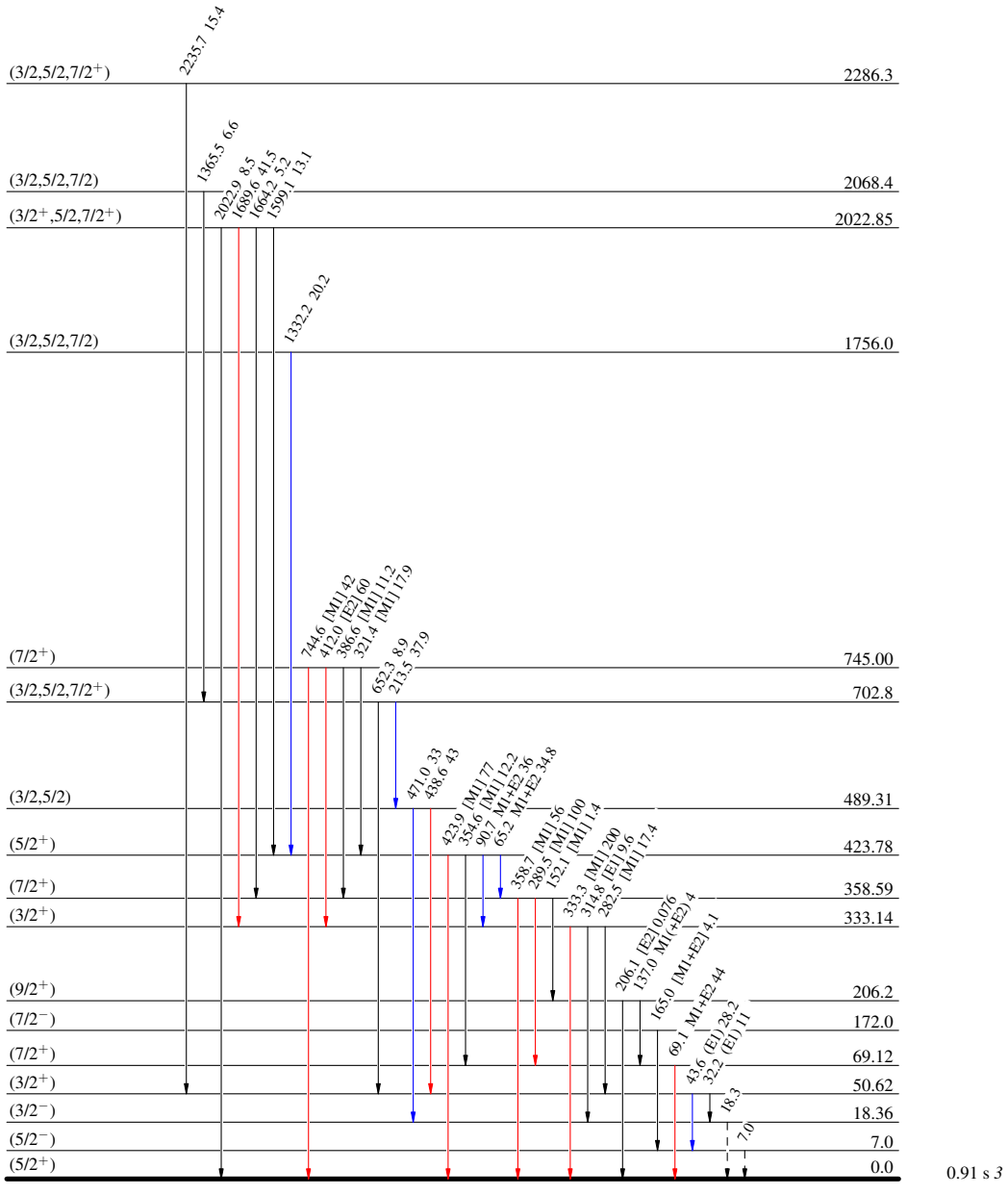
Intensities: Relative I_γ

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)

$(5/2^+)$ 0.0 — 0.61 s *+3−4*

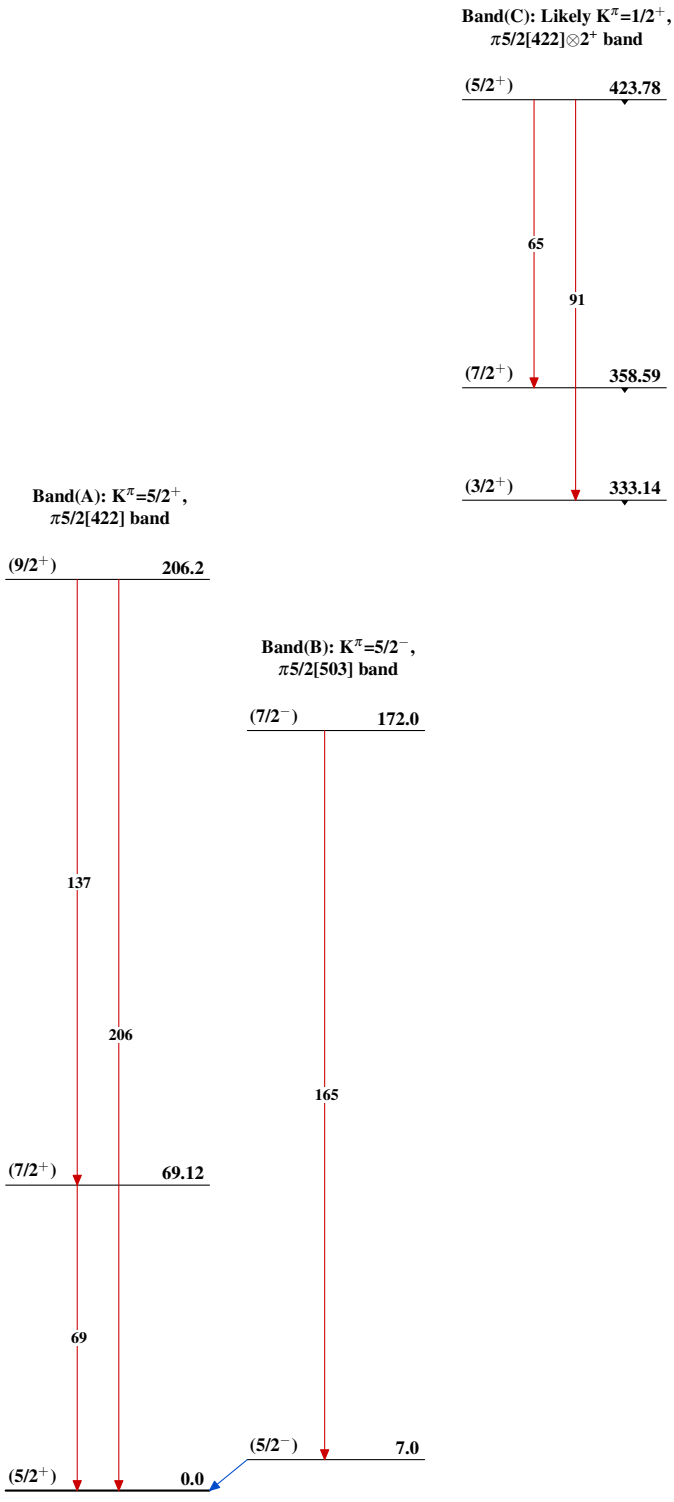
Q_{β^-}=7608 *15* ; $\%\beta^-$=100.0

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



$^{109}_{43}Tc_{66}$

^{109}Mo β^- decay 2012Ku28



$^{109}_{43}Tc_{66}$