^{42}Ca(α,nγ) 1984Ka05,1973Sa12,1973Ko21

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	T. W. Burrows	NDS 109, 171 (2008)	30-Oct-2007

1973Ko21,1973Sa12: E=10.2-14.2 MeV. See ^{45}Sc ^{42}Ca(α,pγ) for details.
1977Br15: E=6.4 MeV. Measured 40$\gamma(\theta$,H,t) and 40γ(t).
1977St12: E=6.5 MeV. Measured 40$\gamma(\theta)$, 40$\gamma(\theta$,H,t), and 40γ(t).
1984Ka05: E=9.5 MeV. Measured γ's, $\gamma\gamma$-coincidences, $\gamma(\theta)$ and nγ-coincidences and n$\gamma(\theta)$ (scin, Ge(Li)). DSAM.

^{45}Ti Levels

E(level)†	J$^\pi$‡	$T_{1/2}$#	Comments
0.0	$7/2^-$		
36.53@ *15*	$3/2^-$		
39.39@ *23*	$5/2^-$	11.29 ns *9*	g=−0.053 *4* (1977Br15) J$^\pi$: 5/2 from $\gamma(\theta)$ and D(+Q) to $7/2^-$; π=− from D,E2 γ from $9/2^-$. $T_{1/2}$: from 1977Br15. Others: 11.9 ns *7* (1970Ly02; see (p,nγ)) and 11.85 ns *42* (1977St12). g: other: −0.03 *1* (1977St12).
329.31& *20*	$3/2^+$		g=+0.70 *16* (1975Ha47) g: from $\omega\tau$=−0.073 *17* (1975Ha47. E=9.0 MeV; IPAD) if $T_{1/2}$=1.099 ns *13* (1977Bu10).
744.14& *21*	$5/2^+$		J$^\pi$: from $\gamma(\Theta)$ and M1+E2 γ to $3/2^+$.
1226.96& *22*	$7/2^+$[a]		
1353.62 *20*	$9/2^-$[a]		
1468.63 *20*	$11/2^-$[a]		
(1521.0@ *10*)	$3/2^-$ to $9/2^-$		
1565.6[b] *7*	$1/2^+$	>2.8 ps	
(1799.2@ *25*)	($1/2^-$ to $7/2^-$)		
1882.15& *25*	$9/2^+$	0.69 ps *14*	J$^\pi$: from $\gamma(\theta)$ and E2 γ to $5/2^+$.
1958.4[b] *4*	$3/2^+$	0.83 ps *14*	J$^\pi$: 3/2,5/2 from anisotropy of 1214γ; ≠ 5/2 from $\gamma(\theta)$ and n$\gamma(\theta)$. M1+E2 γ to $5/2^+$.
(2016.0@ *10*)	$3/2^-$ to $9/2^-$		
2258.4[b] *6*	$5/2^+$	0.194 ps *35*	J$^\pi$: 5/2 from n$\gamma(\theta)$; M1+E2 γ to $5/2^+$.
2474.8& *4*	$11/2^+$	0.45 ps *9*	J$^\pi$: 7/2,11/2 from $\gamma(\theta)$ and n$\gamma(\theta)$; E2(+M3) γ to $7/2^+$; band assignment.
2531.4 *12*	$1/2,3/2,5/2^{(+)}$		
2656.5 *4*	$13/2^-$		J$^\pi$: from I$\gamma(0°)$/I$\gamma(90°)$<1 for 1188γ and γ excit.
2849.4 *12*	$1/2,3/2,5/2^{(+)}$		
2911.9[b] *6*	$7/2^+$	0.36 ps *8*	J$^\pi$: 5/2,7/2 from γ's to $3/2^+$ and $9/2^+$; ≠ 5/2 from n$\gamma(\theta)$; D,E2 γ to $3/2^+$.
3016.0 *7*	$15/2^-$		J$^\pi$: ($13/2^-$,$15/2^-$) from γ excit.
3156.2 *11*			
3938.1?& *11*	(11/2 to 15/2)		J$^\pi$: from γ excit.

† From least-squares fit to Eγ's, except As noted.
‡ From the Adopted Levels. Contributing arguments from these data are given In comments or footnotes.
# From DSAM (1984Ka05), except for $T_{1/2}$(40).
@ From the Adopted Levels; held fixed In least-squares analysis.
& Band(A): K$^\pi$=$3/2^+$ band.
[a] From $\gamma(\theta)$, γ excitation function, and linear polarization.
[b] Band(B): K$^\pi$=$1/2^+$ band (1984Ka05).

^{42}Ca(α,nγ) 1984Ka05,1973Sa12,1973Ko21 (continued)

$\gamma(^{45}Ti)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†‡]	E_f	J_f^π	Mult.[#]	δ[@]	Comments
39.39	5/2$^-$	40		0.0	7/2$^-$	D(+Q)	0.000 *25*	E_γ: from 1977St12. Mult.,δ: from $\gamma(\theta)$ and comparison to RUL (1977St12).
329.31	3/2$^+$	289.5 *3*		39.39	5/2$^-$			observed In (p,nγ); placement confirmed by $\gamma\gamma$-coin (1980Ch13. Eα=8 MeV; Ge(Li),scin).
		292.9[a] *2*	100	36.53	3/2$^-$	E1(+M2)[b]	0.0[b] *2*	
744.14	5/2$^+$	414.9[a] *2*	90 *2*	329.31	3/2$^+$	M1+E2[b]	+0.40 *3*	
		707.5[a] *2*	10 *2*	36.53	3/2$^-$	D+Q[@]	+0.06 *+5−4*	δ: weighted av of +0.09 *+7−4* and +0.03 *6* from $\gamma(\theta)$ (1984Ka05,1973Ko21).
1226.96	7/2$^+$	482.9[a] *2*	40 *2*	744.14	5/2$^+$	M1+E2[c]	+0.28[c] *3*	
		897.5[a] *2*	42 *2*	329.31	3/2$^+$	E2(+M3)[c]	0.00 *2*	^{45}Sc, 897γ contaminant (1973Ko21).
		1187.9[ga] *3*	8.5[g] *10*	39.39	5/2$^-$	D(+Q)[@]	0.00 *6*	
		1227 *1*	9.5 *10*	0.0	7/2$^-$	D+Q[@]	−0.34 *6*	
1353.62	9/2$^-$	1314[dh] *1*		39.39	5/2$^-$			
		1353.6[a] *2*		0.0	7/2$^-$	M1+E2[c]	−0.51[c] *+8−18*	
1468.63	11/2$^-$	1468.6[a] *2*	100[a]	0.0	7/2$^-$	E2(+M3)[c]	0.00[c] *1*	Mult.,δ: −0.4≤linear pol(exp)≤+0.4 disagrees somewhat with +0.57≤linear pol(theory)≤+0.64.
(1521.0)	3/2$^-$ to 9/2$^-$	1484[edh] *1*		39.39	5/2$^-$			
		1484[edh] *1*		36.53	3/2$^-$			
		1521[dh] *1*		0.0	7/2$^-$			
1565.6	1/2$^+$	1236 *1*	87 *2*	329.31	3/2$^+$			
		1528[fh] *1*	13[f] *2*	39.39	5/2$^-$			
		1528[fh] *1*	13[f] *2*	36.53	3/2$^-$			
(1799.2)	(1/2$^-$ to 7/2$^-$)	1761[edh] *1*		39.39	5/2$^-$			
		1761[edh] *1*		36.53	3/2$^-$			
1882.15	9/2$^+$	655.2[a] *2*	25 *2*	1226.96	7/2$^+$	M1+E2	+0.27 *+12−7*	
		1137.9[a] *2*	75 *2*	744.14	5/2$^+$	E2(+M3)	0.00 *2*	
1958.4	3/2$^+$	1214.3[a] *3*	85 *4*	744.14	5/2$^+$	M1+E2		δ: +0.47 *+29−14* or +3.7 *+77−16*.
		1920 *1*	15 *4*	39.39	5/2$^-$	D,E2[&]		
(2016.0)	3/2$^-$ to 9/2$^-$	1976[edh] *1*		39.39	5/2$^-$			
		1976[edh] *1*		36.53	3/2$^-$			
		2016[dh] *1*		0.0	7/2$^-$			
2258.4	5/2$^+$	301 *1*	3.1 *18*	1958.4	3/2$^+$	D[&]		
		691.0 *15*	2.2 *15*	1565.6	1/2$^+$	D,E2[&]		unresolved from ^{45}Sc, 691γ, In singles. Iγ obtained by studying the yield dependence of the 691-keV peak In the nγ coincidence spectrum on the pulse shape discrimination method and subtracting the contribution of the ^{45}Sc 691γ.
		1514 *1*	40.2 *40*	744.14	5/2$^+$	M1+E2	+1.4 *+3−5*	

^{42}Ca(α,nγ) 1984Ka05,1973Sa12,1973Ko21 (continued)

$\gamma(^{45}Ti)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†‡]	E_f	J_f^π	Mult.[#]	δ[@]	Comments
2258.4	5/2$^+$	1929 *1*	54.5 *40*	329.31	3/2$^+$	M1+E2	+0.42 *+6−10*	
2474.8	11/2$^+$	592.0[a] *5*	31 *3*	1882.15	9/2$^+$	M1+E2	+0.09 *5*	
		1248.2[a] *4*	69 *3*	1226.96	7/2$^+$	E2(+M3)	0.00 *2*	
2531.4	1/2,3/2,5/2$^{(+)}$	966 *1*	100	1565.6	1/2$^+$			
2656.5	13/2$^-$	1187.9[ga] *3*	100[ga]	1468.63	11/2$^-$			
2849.4	1/2,3/2,5/2$^{(+)}$	1284 *1*	100	1565.6	1/2$^+$			
2911.9	7/2$^+$	954 *1*	23 *9*	1958.4	3/2$^+$	D,E2[&]		
		1030 *1*	31 *6*	1882.15	9/2$^+$	M1+E2		δ: +0.32 *+21−11* or >4.9.
		2167 *1*	46 *10*	744.14	5/2$^+$	M1+E2		δ: +0.52 *+29−16* or +2.8 *10*.
3016.0	15/2$^-$	1547.3[a] *6*	100[a]	1468.63	11/2$^-$			
3156.2		2412 *1*	100	744.14	5/2$^+$			
3938.1?	(11/2 to 15/2)	1463[ah] *1*	100[a]	2474.8	11/2$^+$			

[†] From 1984Ka05, except As noted. Unplaced transitions were observed In nγ-coincidences.
[‡] % photon branching from each level.
[#] From $\gamma(\theta)$ and nγ(Q) (1984Ka05) and comparison to RUL, except As noted.
[@] From $\gamma(\theta)$ and n$\gamma(\theta)$ (1984Ka05), except As noted.
[&] From comparison to RUL.
[a] From 1973Ko21 (K$^\pi$=3/2$^+$ states) and 1973Sa12 (π=− states). Iγ(1188γ)/Iγ(1469γ)<0.40; Iγ(1547γ)/Iγ(1469γ)<0.15; and Iγ(1463γ)/Iγ(415γ)<0.07.
[b] From $\gamma(\theta)$ and α(exp) In (HI,xnγ) (1973Ko21).
[c] From $\gamma(\theta)$ and linear polarization (1973Ko21; K$^\pi$=3/2$^+$ states. 1973Sa12; π=− states).
[d] Observed In nγ-coincidences (1984Ka05). Placement suggested by evaluator based on the Adopted Gammas.
[e] Multiply placed.
[f] Multiply placed with undivided intensity.
[g] Multiply placed with intensity suitably divided.
[h] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{45}_{22}Ti_{23}$-3

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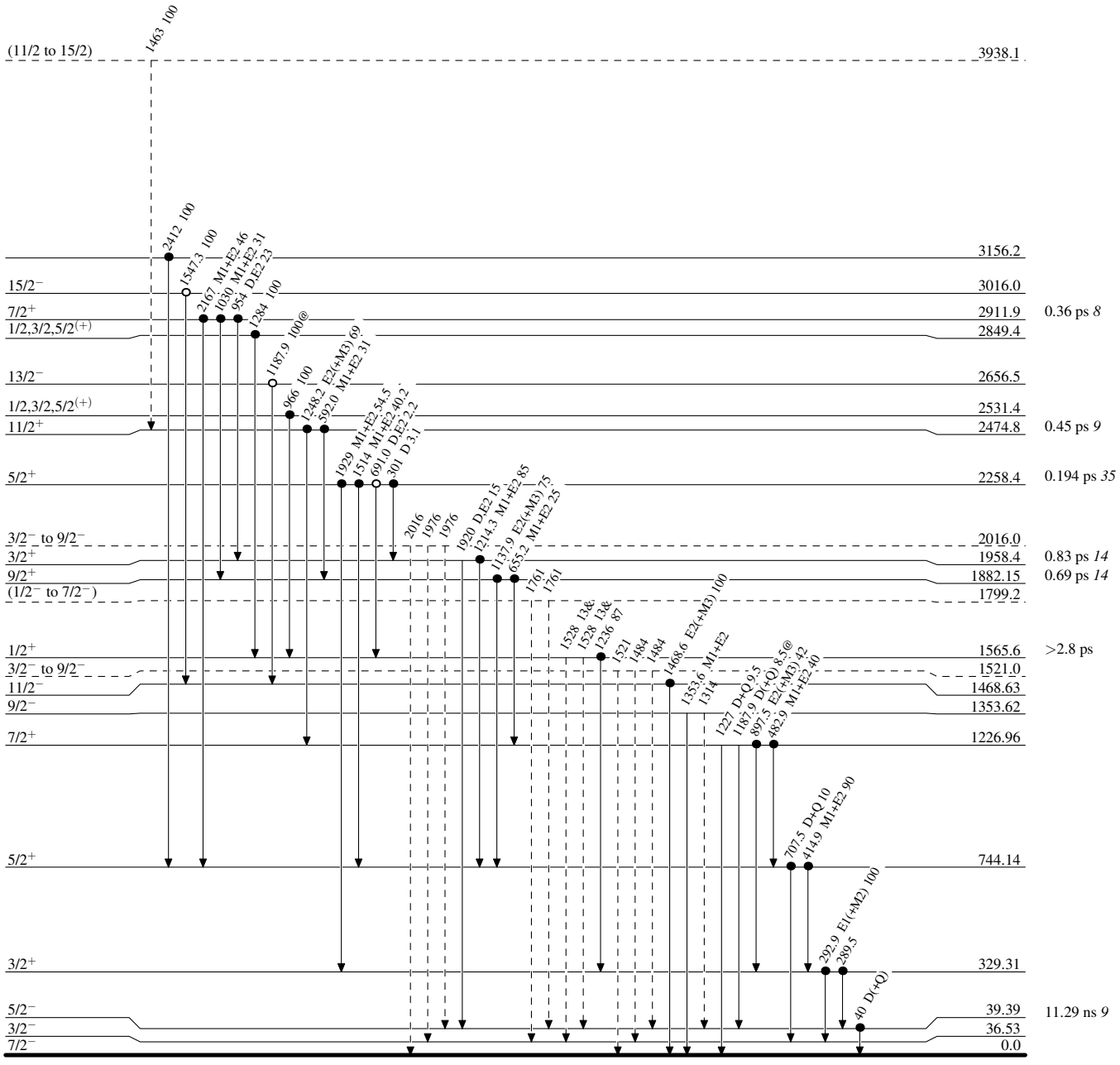
Legend

Level Scheme

Intensities: % photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

γ Decay (Uncertain)
Coincidence
Coincidence (Uncertain)



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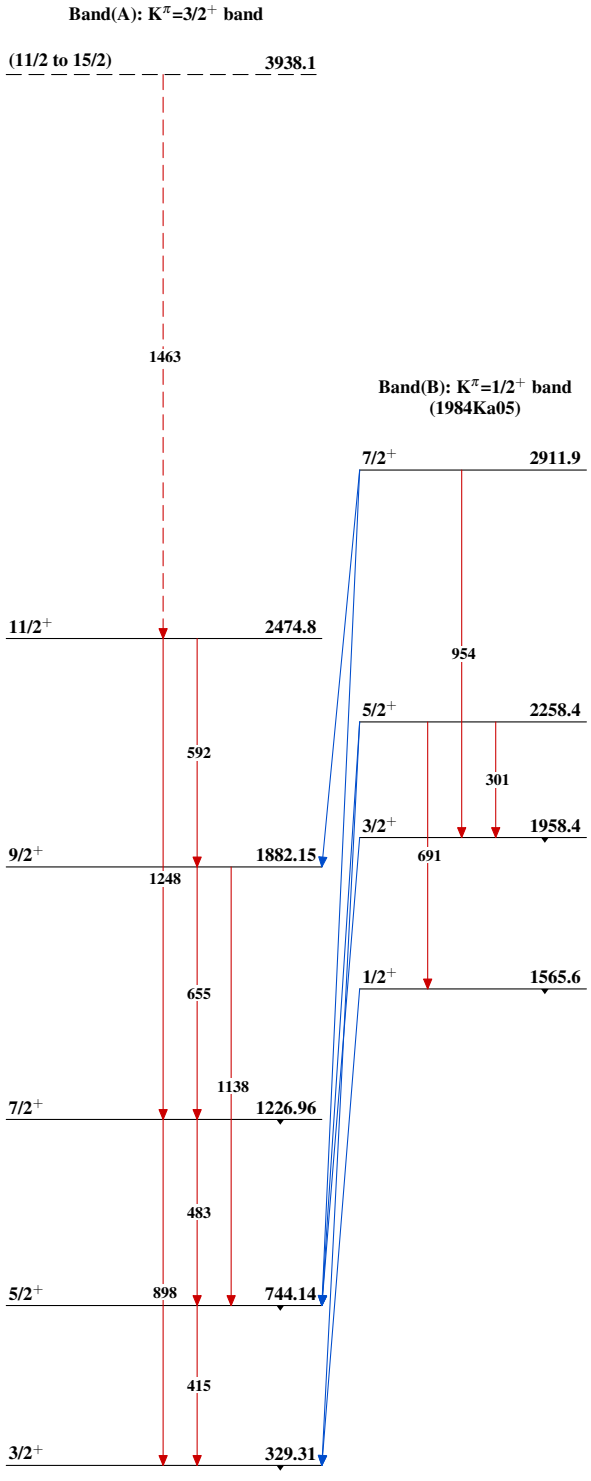

$^{45}_{22}Ti_{23}$