Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. R. Bhat	NDS 85,415 (1998)	24-Sep-1998

Q(β^-)=2695.0 *16*; S(n)=8646.6 *16*; S(p)=9493.9 *24*; Q(α)=−8061 *4* 2012Wa38
Note: Current evaluation has used the following Q record 2691 3 *8651* 3 *9485* 10 −8065 *4* 1995Au04.
For states below 2740 keV, all data are from ^{57}Cr β^- decay and all states were observed in β^- decay, (α,p), (α,pγ), and (t,p), except as noted. States above 2740 keV were observed in (α,p) only, except as noted. See also (n,pγ) for suggested states at 1061.3 and 1680.4 and associated gammas observed.
Other reactions:
^{59}Co(μ^-,pn) E=0 MeV: 1978Wy01 measured the production. 1978Wy02 measured $T_{1/2}$.
Additional information 1.

^{57}Mn Levels

Cross Reference (XREF) Flags

A	^{57}Cr β^- decay	E	^{57}Fe(n,pγ) E=3-21 MeV:?
B	^{48}Ca(^{13}C,3npγ), (^{15}N,2n$\alpha\gamma$)	F	^{58}Fe(d,^{3}He) E=80 MeV
C	^{54}Cr(α,p), (α,pγ) E=15-26 MeV	G	^{62}Ni(p,Xγ) E=164 MeV:?
D	^{55}Mn(t,p) E=17 MeV		

E(level)†	J$^\pi$‡	$T_{1/2}$#	XREF	Comments
0.0	5/2$^-$	85.4 s *18*	ABCDEFG	%β^-=100 J$^\pi$: predominantly L=0 transfer in (t,p). $T_{1/2}$: from 1978Wy02; unweighted average of $T_{1/2}$(122γ)=87.2 s *9* and $T_{1/2}$(136γ)=83.7 s *18* (Ge(Li), ≈6 $T_{1/2}$'s). Others: 92.4 s *30* from 1969Wa12 ($\beta\gamma$(t)(122γ,136γ),scin,Ge(Li); 122γ,136γ,692γ(t), Ge(Li)). See also 1977Au04.
83.19 *11*	5/2$^-$,7/2$^-$		ABCD FG	
850.07 *23*	3/2$^-$		A CDEFG	J$^\pi$: L=1 in (d,^{3}He). J=1/2 ruled out by p$\gamma(\theta)$ in (α,pγ).
1055.83 *23*	1/2$^-$,3/2$^-$,5/2$^-$		A CDE G	J$^\pi$: L=2 in (t,p). J=7/2, 9/2 ruled out by p$\gamma(\theta)$ in (α,pγ).
1072.9 *17*	−@		BCD G	E(level): weighted average from (α,p) and (t,p).
1227.5 *11*	−@	>0.35 ps	BCD	
1375.0 *4*	−@		A CD	
1477 *3*	−@		cD	
1492.67 *20*	−@		A cD	
1534.83 *25*	−@		A CD	
≥1618?			B	E(level): energy of state could not be determined. From $\gamma\gamma$ data in (^{13}C,3npγ) and (^{15}n,2n$\alpha\gamma$), a state with E≥1228 should be fed.
1630 *10*			C	
1725.4 *6*	−@		A cD	
1753 *25*	1/2$^+$		c F	
1835.4 *4*	−		A CD	J$^\pi$: L=0,2,4 in (t,p).
1916 *3*	−@		cD	
1928 *3*	−@		cD	
1962 *3*	3/2$^+$,5/2$^+$		D F	Note that L=2,4 in (t,p) suggesting the possibility of two distinct states. However, this was the weakest group observed in (t,p) and, therefore, assumption of relative s-state for transferred neutrons may not be valid.
2008 *3*	−@		CD	
2146.7 *8*			A D	
2185.8 *4*			A CD	
2232.9 *6*	5/2$^-$,7/2$^-$		A CD F	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{57}Mn Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
2340.6 *4*	5/2+,3/2+		A CD F	
2422 *5*			CD	E(level): unweighted average from (α,p) and (t,p).
2493.2 *5*			A D	
2503 *3*			D	
2520 *3*			CD f	
2559 *3*			D f	
2607 *3*			CD f	
2640 *3*			CD f	
2702.1 *3*	1/2− to 7/2−		A C	Jπ: 1/2− to 9/2− from allowed β decay of ^{57}Cr g.s. ≠9/2 from strong 1852γ to 850, 3/2−, state.
2741 *7*			C E	
2758.4 *4*		<1.4 ps	B	
2772? *12*			C	May be the same as the state observed in (^{13}C,3npγ) and (^{15}n,2nαγ).
2848 *14*			C	
2928 *14*			C	
3087 *12*			C f	
3123 *10*			C f	
3164 *12*			C	
3212 *10*			C f	L=(3), 3.23-MeV, state may correspond to this or the following state.
3254 *13*			C f	
3287.3 *4*		0.49 ps *14*	B	
3371 *11*			C	
3458 *11*			C f	
3482 *10*			C f	L=3, 3.49-MeV, state in (d,^{3}He) may correspond to the 3458, 3482, or 3542 states.
3542 *10*			C f	
3608 *14*			C	
3674 *13*			C f	
3715 *9*			C f	
3757 *9*			C f	
3796 *7*			C	
3838 *10*			C	
3870 *9*			C f	
3911 *10*			C f	
3947 *9*			C	
≥3959?			B	E(level): energy of state could not be determined. From γγ data in (^{13}C,3npγ) and (^{15}n,2nαγ), a state with E≥3287 should be fed.
4001 *11*			C	
4029 *4*			C	
≥4073?			B	Energy of state could not be determined. From γγ data in (^{13}C,3npγ) and (^{15}n,2nαγ), a state with E≥3287 should be fed.
4168 *10*			C	
4211 *10*			C	
4292 *15*			C	
4363 *11*			C	
4472 *9*			C	
4523 *23*			C	
4626 *15*			C	
4710.3 *10*		<0.28 ps	B	
4748 *15*			C	
4841 *19*			C F	
5009 *13*			C F	
5060 *19*			C F	
5167 *13*			C	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{57}Mn Levels (continued)

† Energies of states connected by γ's were calculated using least-squares adjustment procedures, excluding uncertain transitions and other energies below 2740 keV from (t,p), except as noted. In addition to the levels labelled with xref=f for (d,^{3}He), there are 14 broad peaks up to 7410 keV.

‡ From angular momentum transfer in (d,^{3}He), except as noted. See β^- decay, (α,p), (α,pγ), (t,p), (d,^{3}He), (^{13}C,3npγ), and (^{15}n,2n$\alpha\gamma$) for other proposed assignments.

From DSAM in (^{13}C,3npγ) and (^{15}n,2n$\alpha\gamma$), except as noted.

@ L=even in (t,p).

Adopted Levels, Gammas (continued)

$\gamma(^{57}Mn)$

E_i(level)	J_i^π	E_γ	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[b]	Comments
83.19	$5/2^-$,$7/2^-$	83.16 *12*	100	0.0	$5/2^-$	(M1)	0.0508	α(K)= 0.0449; α(L)=0.00443 E_γ: weighted av from β^- decay and (^{13}C,3npγ) and (^{15}n,2n$\alpha\gamma$). Mult.: d from α=0.05; M1 from level scheme.
850.07	$3/2^-$	766.5 *5*	4.3 *10*	83.19	$5/2^-$,$7/2^-$			
		850.2 *6*	100.0 *10*	0.0	$5/2^-$	E2(+M1)[@]		δ: +0.1 *+4−1* or ≤−5 from $\gamma(\theta)$ in (α,pγ).
1055.83	$1/2^-$,$3/2^-$,$5/2^-$	205.8 *3*	100[#] *6*	850.07	$3/2^-$	E2(+M1)[@]		δ: $\delta\geq$+0.2 if J=3/2; ≥+1 if J=5/2 from $\gamma(\theta)$ in (α,pγ).
		1055.8 *3*	25[#] *6*	0.0	$5/2^-$			
1072.9	−	991.9[&]	100[&] *6*	83.19	$5/2^-$,$7/2^-$			
		1075.1[&]	6[&] *6*	0.0	$5/2^-$			
1227.5	−	152.35[a] *16*	9[a] *1*	1072.9	−			
		1144.29[a] *17*	100[a] *1*	83.19	$5/2^-$,$7/2^-$			
1375.0	−	525.9	39[&] *14*	850.07	$3/2^-$			
		1292.2 *5*	100[&] *14*	83.19	$5/2^-$,$7/2^-$			
1492.67	−	1409.3 *3*	96 *12*	83.19	$5/2^-$,$7/2^-$			
		1492.7 *3*	100 *12*	0.0	$5/2^-$			
1534.83	−	479.1 *5*	3.8 *15*	1055.83	$1/2^-$,$3/2^-$,$5/2^-$			
		684.1 *5*	11.2 *41*	850.07	$3/2^-$			
		1535.0 *3*	100 *4*	0.0	$5/2^-$			
≥1618?		390.26[ac] *10*		1227.5	−			
1725.4	−	1642.2 *5*	100	83.19	$5/2^-$,$7/2^-$			
1835.4	−	342.9 *5*	9.7 *29*	1492.67	−			
		1752.1 *5*	100.0 *26*	83.19	$5/2^-$,$7/2^-$			
		1835.2 *6*	26.8 *21*	0.0	$5/2^-$			
2146.7		2063.5 *8*	100	83.19	$5/2^-$,$7/2^-$			
2185.8		1129.9 *3*	100 *21*	1055.83	$1/2^-$,$3/2^-$,$5/2^-$			
		1335.7 *5*	85 *21*	850.07	$3/2^-$			
2340.6	$5/2^+$,$3/2^+$	2257.2 *9*	100	83.19	$5/2^-$,$7/2^-$			
2493.2		2410.0 *7*	100 *8*	83.19	$5/2^-$,$7/2^-$			
		2493.1 *7*	92 *8*	0.0	$5/2^-$			
2702.1	$1/2^-$ to $7/2^-$	1209.2 *3*	49 *11*	1492.67	−			
		1327.3 *3*	28 *13*	1375.0	−			
		1852.0 *4*	100 *13*	850.07	$3/2^-$			
		2618.3 *8*	38 *11*	83.19	$5/2^-$,$7/2^-$			
2758.4		1530.9[a] *3*	100[a]	1227.5	−			M: d or E2 from RUL.
3287.3		528.85[a] *20*	100[a]	2758.4		D		
≥3959?		671.9[ac] *20*		3287.3				
≥4073?		785.8[ac] *20*		3287.3				
4710.3		1423.0[a] *9*	100[a]	3287.3		D		

Adopted Levels, Gammas (continued)

$\gamma(^{57}Mn)$ (continued)

† Relative-photon branching ratio from each level.
‡ From comparison to RUL, except as noted.
# Weighted average from β^- decay and $(\alpha,p\gamma)$.
@ Q(+D) from $p\gamma(\theta)$ in $(\alpha,p\gamma)$; $\Delta\pi$=+ from level scheme.
& From $(\alpha,p\gamma)$.
a From (^{13}C,3npγ) and (^{15}n,2n$\alpha\gamma$).
b 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.
c Placement of transition in the level scheme is uncertain.

$^{57}_{25}Mn_{32}$-5

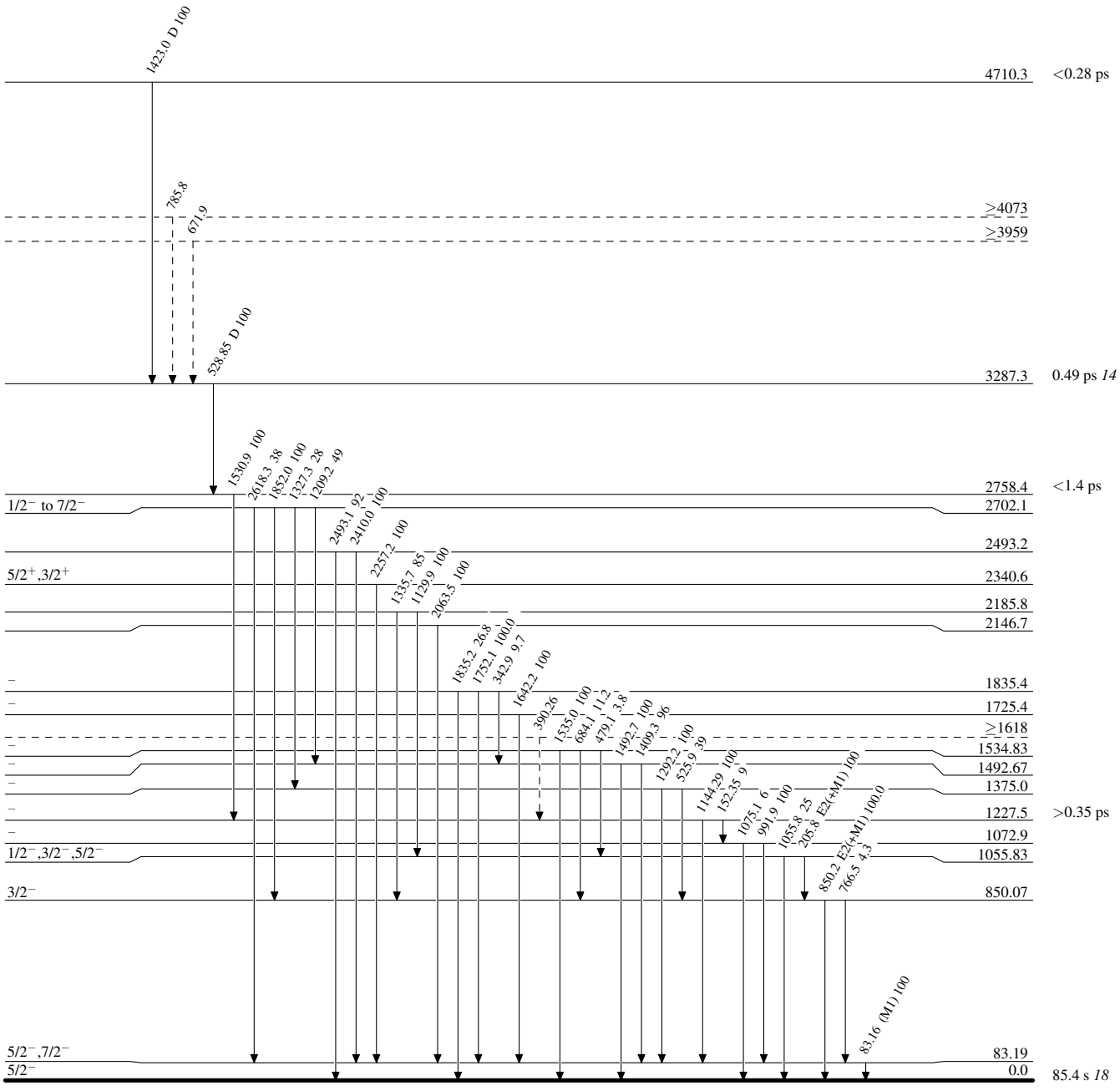
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{57}_{25}Mn_{32}$