^{64}Ni(α,2nγ), ^{55}Mn(^{14}N,2pnγ) 1977Ne04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 111, 1093 (2010)	3-Mar-2009

1977Ne04: Eα=19-25 MeV; Eγ, Iγ, $\gamma\gamma$ coincidences, γ-yield functions and $\gamma(\theta)$.
1975Br25: Eα=22-40 MeV; Eγ, Iγ, $\gamma\gamma$ coincidences, γ-yield functions and $\gamma(\theta)$, and (^{14}N,γ(t)).
1977Mo20: Eα=30 MeV; Ge(Li)'s; $T_{1/2}$ by DSA γ line-shape analysis.
1982Cl02: E(^{14}N)=47 MeV; $T_{1/2}$ by recoil-distance Doppler shift.
1983Ba69: E(^{14}N)=54 MeV; g-factors from recoil-into-helium perturbed angular correlation technique.
Data are mainly from ^{64}Ni(α,2nγ) by 1977Ne04, 1975Br25, and 1977Mo20. $\gamma\gamma$ coincidences are taken from the spectra of 1975Br25 and 1977Ne04.

^{66}Zn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0.0	0^+		
1038.5 *4*	2^+	1.7 ps *+35−14*	
1871.5 *5*	2^+	0.83 ps *+35−21*	
2448.5 *6*	4^+	0.83 ps *+42−28*	J^π: J=4 confirmed by $\gamma(\theta)$ in 1975Br25 and 1977Ne04. π=+ from E2 to 2^+.
2702.2 *10*	(3)		J^π: J<4 suggested by yield of 831γ (1977Ne04).
2763.8 *5*	4^+	>7 ps	J^π: J=2, 4 from $\gamma(\theta)$ (1977Ne04). J=2 ruled out by feeding from $J^\pi=5^-$ level at 3745. π=− unlikely because deexciting γ's would require large M2 components.
2825.2 *6*	3^-	1.04 ps *+55−28*	J^π: J=3 confirmed by $\gamma(\theta)$ in 1975Br25 and 1977Ne04; also yield function in 1977Ne04.
3075.8 *6*	4^+	1.7 ps *+10−3*	J^π: J=4 from $\gamma(\theta)$ (1977Ne04,1975Br25); π=+ from E2 to 2^+.
3521.8 *10*			
3707.6 *6*	(5)		J^π: J=(5) favored from $\gamma(\theta)$ (1977Ne04).
3745.1 *6*	5^-	45.7[@] ps *28*	J^π: J=5 from $\gamma(\theta)$ (1977Ne04,1975Br25); π=− from E2 to 3^- level. $T_{1/2}$: 6 ps *+14−3* by DSA γ line-shape analysis (1977Mo20) but does not take fully into account strong feeding from the 4250 and 4074 levels which have $T_{1/2}$=133 ps *10* and 29.8 ps *14* (1982Cl02), respectively.
3896.6 *8*	5^-		J^π: J=(5) favored by 1977Ne04 from $\gamma(\theta)$.
4073.8 *6*	(6^-)	29.8[@] ps *14*	g: g(4635, ^{64}Zn):g(4074)=1.00 *18*:0.64 *14* (1983Ba69); ratio of the absolute values determined. J^π: $J^\pi=(6^-)$ favored from $\gamma(\theta)$ and γ yields (1977Ne04,1975Br25) and $T_{1/2}$ (1982Cl02).
4180.4 *7*	(6^+)	0.21 ps *+10−3*	J^π: J=(6) favored by 1975Br25 from $\gamma(\theta)$, γ yields, and γ- decay systematics. π from (E2) to 4^+ level.
4249.9 *6*	(7^-)	133[@] ps *10*	g: g(4635, ^{64}Zn):g(4250)=1.00 *18*:0.60 *12* (1983Ba69); ratio of the absolute values determined. J^π: $J^\pi=(7^-)$ favored from $\gamma(\theta)$ and γ yields (1977Ne04,1975Br25) and $T_{1/2}$ (1982Cl02).
4812.2 *7*	(7^-)		J^π: $J^\pi=(7^-)$ favored from $\gamma(\theta)$ and γ yields (1977Ne04).
5110.0 *7*	(8^-)		J^π: $J^\pi=(8^-)$ favored by 1977Ne04 from $\gamma(\theta)$ and γ-decay systematics.
5205.2 *7*	(8^+)	>6 ps	J^π: $J^\pi=(8^+)$ favored by 1977Ne04 and 1975Br25 from $\gamma(\theta)$, γ yields, and γ-decay systematics.
5462.4 *7*	(9^-)	1.9[@] ps *8*	J^π: $J^\pi=(9^-)$ favored by 1977Ne04 and 1975Br25 from $\gamma(\theta)$, $T_{1/2}$, and γ-decay systematics. $T_{1/2}$: 2.8 ps *+21−14* by DSA γ line-shape analysis (1977Mo20).
6290.5 *8*	(10^+)	1.6 ps *+7−3*	J^π: $J^\pi=(10^+)$ favored by 1977Ne04 and 1975Br25 from $\gamma(\theta)$, $T_{1/2}$, and γ-decay systematics.
6417.1 *10*			J^π: J=(10) favored by 1977Ne04 from yield of 1307γ.
7515.2 *11*		1.5 ps *+6−3*	J^π: yield of 1225γ favors J>10 (1977Ne04). $T_{1/2}$: uncertainty has been increased by the evaluators to include an uncertainty of 15% in the stopping powers.

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^{64}Ni(α,2nγ), ^{55}Mn(^{14}N,2pnγ) 1977Ne04 (continued)

^{66}Zn Levels (continued)

† From least-squares fit to Eγ data.
‡ From Adopted Levels. Supporting arguments from this data set are given.
# By DSA γ line-shape analysis at Eα=30 MeV (1977Mo20), except as noted. No ^{66}Zn levels with 4 ns≤$T_{1/2}$≤70 ns were found by 1975Br25 in a search for delayed γ's.
@ By recoil-distance Doppler shift in ^{55}Mn(^{14}N,2pnγ) (1982Cl02).

γ(^{66}Zn)

E$_\gamma$ †	I$_\gamma$ ‡	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	δ &	Comments
175.9 *3*	13.0 *13*	4249.9	(7$^-$)	4073.8	(6$^-$)	(M1+E2)#	+0.09 *2*	δ: +0.058 from $\gamma(\theta)$ (1975Br25).
312.0 *8*	0.9 *3*	3075.8	4$^+$	2763.8	4$^+$			E$_\gamma$: from level energy difference; unresolved doublet (1977Ne04). I$_\gamma$: from Iγ(628) and branching ratio from 1977Ne04.
315.3 *8*	1.0 *3*	2763.8	4$^+$	2448.5	4$^+$			E$_\gamma$: from level energy difference; unresolved doublet (1977Ne04). I$_\gamma$: from Iγ(892) and branching ratio from 1977Ne04.
328.6 *2*	27 *3*	4073.8	(6$^-$)	3745.1	5$^-$	(M1+E2)#	+0.10 *2*	δ: +0.075 from $\gamma(\theta)$ (1975Br25).
504.7 *3*	15.0 *15*	4249.9	(7$^-$)	3745.1	5$^-$	(E2)#		δ(M3/E2)=−0.00 *2* (1977Ne04); −0.079 from $\gamma(\theta)$ (1975Br25).
627.6 *4*	9.0 *9*	3075.8	4$^+$	2448.5	4$^+$	(M1+E2)@	−0.25 *12*	δ: −0.25 from $\gamma(\theta)$ (1975Br25).
669.5 *3*	8.5 *9*	3745.1	5$^-$	3075.8	4$^+$	(E1)@		δ(M2/E1)=−0.04 *6* (1977Ne04); −0.132 from $\gamma(\theta)$ (1975Br25).
738.4 *3*		4812.2	(7$^-$)	4073.8	(6$^-$)	(M1+E2)@	+0.11 *2*	Branching ratio: 69% *6* (1977Ne04).
758.0 *8*		3521.8		2763.8	4$^+$			
828[d] *1*	<1	6290.5	(10$^+$)	5462.4	(9$^-$)			E$_\gamma$: from 1975Br25, not reported in 1977Ne04.
830.7 *8*	6.0 *6*	2702.2	(3)	1871.5	2$^+$			
833.2 *4*	20 *2*	1871.5	2$^+$	1038.5	2$^+$			
860.8 *8*		5110.0	(8$^-$)	4249.9	(7$^-$)	(M1+E2)@	+0.21 *15*	Branching ratio: 10% *3* (1977Ne04).
892.3 *3*	4.0 *4*	2763.8	4$^+$	1871.5	2$^+$	(E2)@		δ(M3/E2)=−0.04 *6* (1977Ne04); +0.0 from $\gamma(\theta)$ (1975Br25).
915.5 *8*		4812.2	(7$^-$)	3896.6	5$^-$			Branching ratio: 31% *6* (1977Ne04).
919.9 *3*	2.0 *2*	3745.1	5$^-$	2825.2	3$^-$	E2#		δ(M3/E2)=−0.0 *6* (1977Ne04).
943.8 *3*		3707.6	(5)	2763.8	4$^+$	(D+Q)@	−1.5 *+2−1*	
954.2[c] *5*	4.9[c] *11*	2825.2	3$^-$	1871.5	2$^+$			I$_\gamma$: from Iγ(1785) and branching ratio from 1977Ne04.
954.2[c] *5*	4.5[c] *9*	5205.2	(8$^+$)	4249.9	(7$^-$)	(E1)@		I$_\gamma$: from Iγ(1026) and branching ratio from 1977Ne04. δ(M2/E1)=−0.00 *8* (1977Ne04); −0.045 from $\gamma(\theta)$ (1975Br25).
[x]965.9[a] *4*								
981.5 *5*	<2.5	3745.1	5$^-$	2763.8	4$^+$			
[x]1004.5[a] *4*								
1025.8 *5*	5.5 *6*	5205.2	(8$^+$)	4180.4	(6$^+$)	(E2)@		δ(M3/E2)=−0.04 *6* (1977Ne04); −0.035 from $\gamma(\theta)$ (1975Br25).
1036.0 *3*		5110.0	(8$^-$)	4073.8	(6$^-$)			Branching ratio: 90% *3* (1977Ne04).
1038.5 *4*	100 *10*	1038.5	2$^+$	0.0	0$^+$	(E2)@	*b*	
1071.3 *7*		3896.6	5$^-$	2825.2	3$^-$	(E2)@		δ(M3/E2)=−0.04 *20* (1977Ne04).

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^{64}Ni(α,2nγ), ^{55}Mn(^{14}N,2pnγ) 1977Ne04 (continued)

$\gamma(^{66}Zn)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ [&]	Comments
1085.3 *4*	4.5 *4*	6290.5	(10^+)	5205.2	(8^+)	(E2) [#]		δ(M3/E2)=+0.04 *6* (1977Ne04); +0.101 from $\gamma(\theta)$ (1975Br25).
1204.2 *5*	3.0 *5*	3075.8	4^+	1871.5	2^+	E2 [#]		δ(M3/E2)=−0.15 *15* (1977Ne04). I_γ: from Iγ(628) and branching ratio from 1977Ne04.
1212.5 *4*	9.0 *9*	5462.4	(9^-)	4249.9	(7^-)	(E2) [#]		δ(M3/E2)=−0.04 *4* (1977Ne04); −0.087 from $\gamma(\theta)$ (1975Br25).
1224.7 *7*		7515.2		6290.5	(10^+)			
1295.6 *4*	41 *4*	3745.1	5^-	2448.5	4^+	(E1+M2) [@]	−0.04 *2*	δ: −0.087 from $\gamma(\theta)$ (1975Br25).
1307.1 *7*		6417.1		5110.0	(8^-)			
1410.3 *8*	62 *6*	2448.5	4^+	1038.5	2^+	E2 [#]		δ(M3/E2)=+0.04 *4* (1977Ne04); −0.017 from $\gamma(\theta)$ (1975Br25).
1725.4 *4*	3.5 *4*	2763.8	4^+	1038.5	2^+	(E2) [@]		δ(M3/E2)=+0.0 *3* (1977Ne04).
1732.9 *5*	14.0 *14*	4180.4	(6^+)	2448.5	4^+	(E2+M3) [#]	−0.105 [b]	E_γ: given as 1729 *1*, 1975Br25.
1785.3 *7*	6.0 *6*	2825.2	3^-	1038.5	2^+	(E1) [@]		δ(M2/E1)=−0.04 *5* (1977Ne04).

[†] From 1977Ne04, except as noted.
[‡] Relative intensity measured at 90° to the beam direction for Eα=27 MeV (1975Br25).
[#] From $\gamma(\theta)$ (1977Ne04) and RUL.
[@] From $\gamma(\theta)$ (1977Ne04) and assigned J^π values of initial and final levels.
[&] From $\gamma(\theta)$ (1977Ne04), except as noted.
[a] γ seen in weak coincidence with 833γ but not placed in level scheme (1977Ne04).
[b] From $\gamma(\theta)$ (1975Br25); uncertainty not given.
[c] Multiply placed with intensity suitably divided.
[d] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

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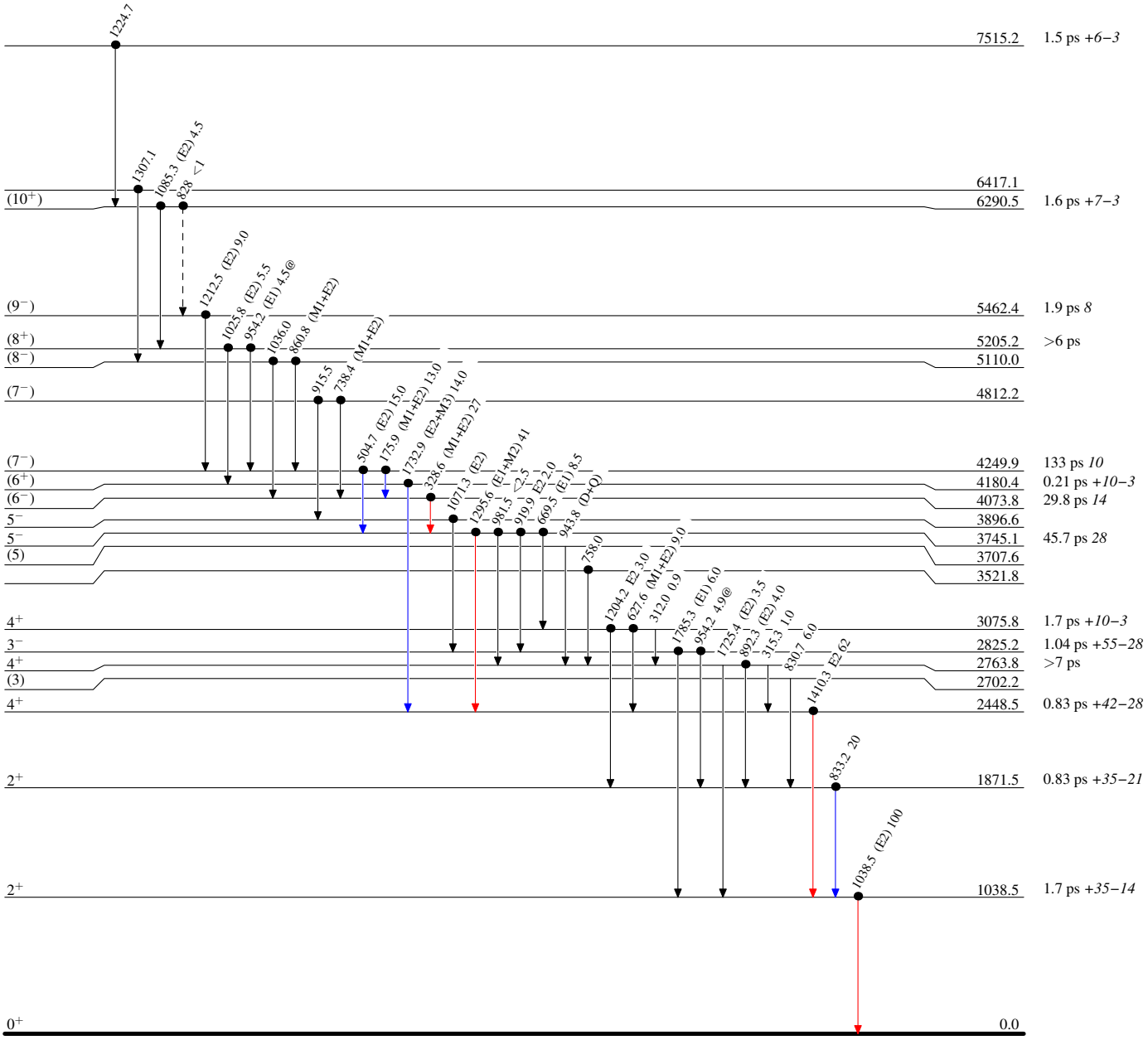
Level Scheme

Intensities: Relative intensity measured At 90° to the beam direction At Eα=27 MeV (1975Br25)MeV (1975Br25)
@ 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



$^{66}_{30}Zn_{36}$