^{58}Ni(^{12}C,αpγ) 1980Ka08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

1980Ka08: E=39 MeV ^{12}C beam was produced from the EN tandem accelerator at ORNL. Target was 0.72 mg/cm^2 enriched ^{58}Ni on a Pt backing. γ rays were detected with the two Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO), Doppler-shift attenuation. Deduced levels, J, π, $T_{1/2}$, γ-ray multipolarities, mixing ratios. 1980Ka08 also measured Iγ, $\gamma(\theta)$ with ^{60}Ni(^{7}Li,2nγ) reaction at E=18-21 MeV. See details in that dataset.

Other (HI,Xγ) measurements which don't have much data:

1980ZoZZ: ^{54}Fe(^{14}N,n2pγ) E=40 MeV. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, γ(lin pol). Deduced levels, J, π, band structure.

1991Zh28: ^{45}Ti(^{25}Mg,3p3n), E=68 MeV; measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$.

1976AlYZ: ^{54}Fe(^{14}N,n2pγ) E=36 MeV and ^{58}Ni(^{12}C,αpγ), E=36 MeV. Measured $T_{1/2}$ by recoil-distance method.

1975ChYJ: ^{54}Fe(^{12}C,pγ), ^{56}Fe(^{12}C,2npγ), ^{56}Fe(^{14}N,αnγ). Beam energies not given. Measured Eγ, $\gamma\gamma$ coincidences, γ yields and $\gamma(\theta)$.

1980MuZV: ^{40}Ca(^{28}Si,3pγ).

^{65}Ga Levels

The following levels reported by 1980Ka08 are not reported by 1999Da10 in ^{12}C(^{58}Ni,αpγ) nor 2001We11 in ^{40}Ca(^{32}S,α2pγ), either because of different placements of γ rays or deexcitation γ rays not seen in later studies: 1326.0, 1370.7, 1521.3, 3071.4, 4132.2. Those levels are not adopted in Adopted Levels, except for 1370.7 level which is reported in (α,2nγ).

E(level)[†‡]	J$^\pi$[#]	$T_{1/2}$	Comments
0.0	3/2$^-$		J$^\pi$: from Adopted Levels.
190.6 *2*	5/2		
1075.1 *3*	7/2		
1286.9 *4*	9/2		
1326.0 *7*			
1370.7 *5*			
1521.3 *4*	(3/2,5/2)		
2037.2 *3*	9/2		
2787.9 *5*	13/2	0.55 ps *28*	$T_{1/2}$: from DSAM in 1980Ka08.
2813.0 *6*	(9/2,11/2)		
3064.3 *4*	13/2		
3071.4 *8*			
3732.0 *4*	(13/2,15/2)		
4122.2 *5*	(17/2)		
4132.2 *8*			
4330.4 *6*	(15/2)		J$^\pi$: (17/2$^+$) in Adopted Levels.
4432.7 *5*	(21/2)		J$^\pi$: (17/2$^+$) in Adopted Levels.
4546.5 *5*	(17/2,19/2)		

[†] Additional information 1.
[‡] From a least-squares fit to γ-ray energies.
[#] Deduced based on measured $\gamma(\theta)$, $\gamma\gamma$(DCO), yield curve and γ decay pattern in 1980Ka08, unless otherwise noted.

γ(^{65}Ga)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	δ	Comments
190.6 *2*	100	190.6	5/2	0.0	3/2$^-$	D+Q	−0.7 *3*	Mult.,δ: from 1096γ-190$\gamma(\gamma)$(DCO) (1980Ka08).
310.5 *2*	3.2 *4*	4432.7	(21/2)	4122.2	(17/2)	Q		A_2=+0.348 *38*; A_4=−0.002 *42* 310γ-1058γ: DCO=0.9 *4*.

Continued on next page (footnotes at end of table)

^{58}Ni(^{12}C,αpγ) 1980Ka08 (continued)

γ(^{65}Ga) (continued)

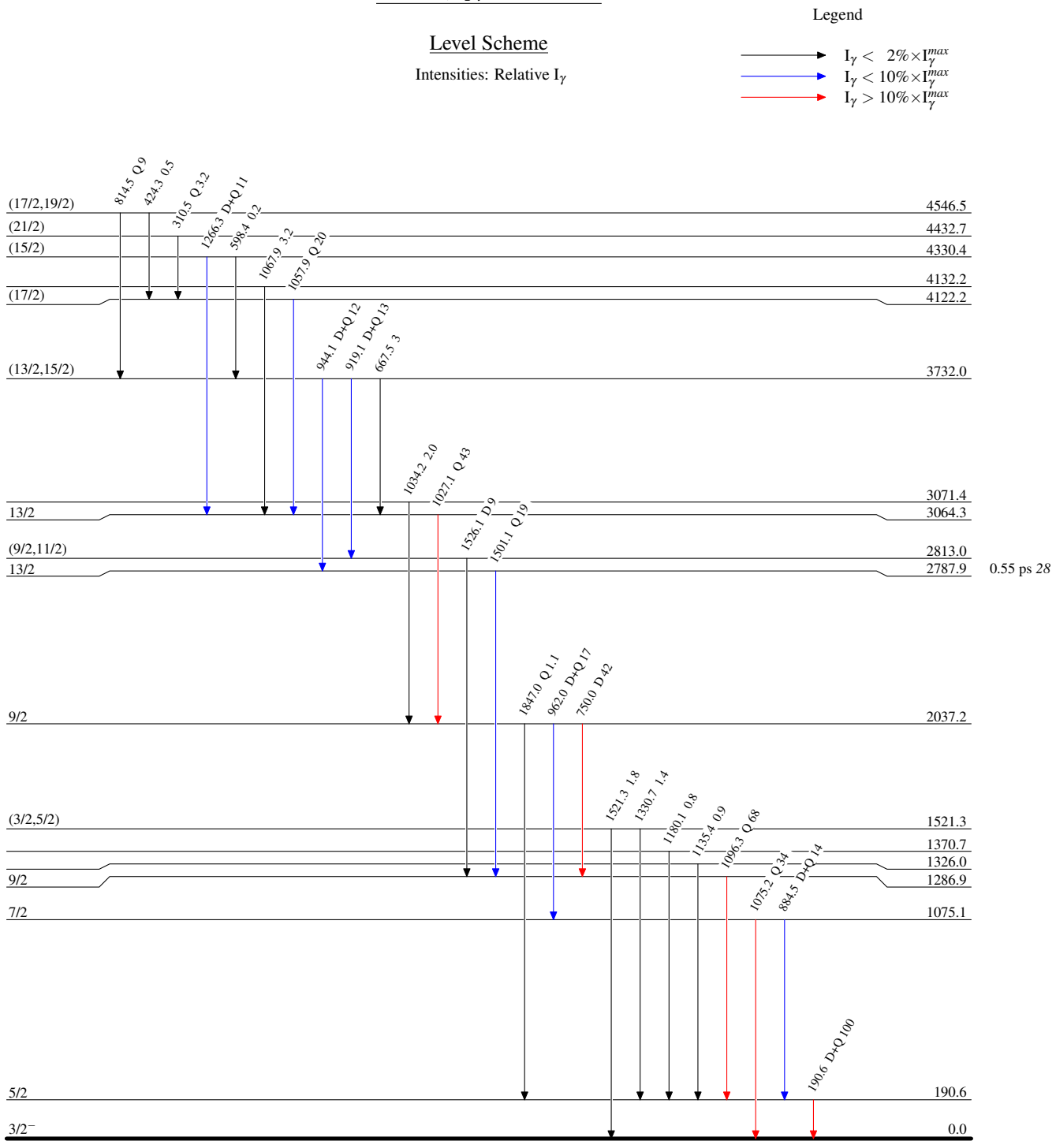
E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ	Comments
424.3 *4*	0.5 *2*	4546.5	(17/2,19/2)	4122.2	(17/2)			
598.4 *5*	0.2 *1*	4330.4	(15/2)	3732.0	(13/2,15/2)			A_2=+0.357 *38*; A_4=+0.148 *37*
667.5 *3*	3 *1*	3732.0	(13/2,15/2)	3064.3	13/2			
750.0[#] *5*	42 *4*	2037.2	9/2	1286.9	9/2	D		A_2=+0.21 *5*; A_4=+0.02 *6* 750γ-1096γ: DCO=0.97 *13*.
814.5 *2*	9 *1*	4546.5	(17/2,19/2)	3732.0	(13/2,15/2)	Q		A_2=+0.304 *37*; A_4=−0.109 *41* 814γ-944γ: DCO=0.50 *14*.
884.5 *2*	14 *2*	1075.1	7/2	190.6	5/2	D+Q	−0.23 *4*	A_2=−0.355 *25*; A_4=+0.082 *29* 884γ-190γ: DCO=0.87 *15*, 962γ-1075γ: DCO=2.0 *6*.
919.1[#] *7*	13 *4*	3732.0	(13/2,15/2)	2813.0	(9/2,11/2)	D+Q	0.3	919γ-1526γ: DCO=0.5 *3*.
944.1 *3*	12 *2*	3732.0	(13/2,15/2)	2787.9	13/2	D+Q	−1.4	A_2=−0.181 *30*; A_4=−0.038 *33*
962.0 *3*	17 *2*	2037.2	9/2	1075.1	7/2	D+Q	−0.10 *5*	A_2=−0.39 *6*; A_4=+0.05 *6* 962γ-884γ: DCO=1.6 *11*.
1027.1[#] *2*	43 *4*	3064.3	13/2	2037.2	9/2	Q		A_2=+0.28 *6*; A_4=−0.06 *6* 1027γ-750γ: DCO=0.93 *13*, 1027γ-962γ: DCO=0.24 *14*.
1034.2 *7*	2.0 *2*	3071.4		2037.2	9/2			E_γ: a 1033.4γ placed from 5467, 19/2$^{(-)}$ level in 2001We11, adopted placement in Adopted Gammas.
1057.9 *3*	20 *2*	4122.2	(17/2)	3064.3	13/2	Q		A_2=+0.28 *6*; A_4=−0.08 *6* 1058γ-1027γ: DCO=0.98 *12*.
1067.9 *7*	3.2 *4*	4132.2		3064.3	13/2			E_γ: a 1067.8γ placed from 7363, 25/2$^{(-)}$ level in 2001We11, adopted placement in Adopted Gammas.
1075.2[#] *5*	34 *2*	1075.1	7/2	0.0	3/2$^-$	Q		
1096.3[#] *4*	68 *7*	1286.9	9/2	190.6	5/2	Q		A_2=+0.295 *28*; A_4=−0.037 *25* 1096γ-190γ: DCO=0.25 *3*.
1135.4 *7*	0.9 *3*	1326.0		190.6	5/2			Additional information 2.
1180.1	0.8 *3*	1370.7		190.6	5/2			E_γ: this γ not seen in 2001We11 and 1999Da10; but seen in (α,2nγ).
1266.3 *8*	11 *2*	4330.4	(15/2)	3064.3	13/2	D+Q		A_2=+0.34 *22*; A_4=+0.20 *28* 1266γ-1027γ: DCO=0.5 *3*. δ: 0.6 *1* or 2.3 *5*.
1330.7 *7*	1.4 *4*	1521.3	(3/2,5/2)	190.6	5/2			E_γ: not seen in 2001We11 and 1999Da10.
1501.1 *5*	19 *2*	2787.9	13/2	1286.9	9/2	Q		A_2=+0.35 *8*; A_4=−0.16 *10* 1501γ-1096γ: DCO=0.92 *21*.
1521.3 *5*	1.8 *5*	1521.3	(3/2,5/2)	0.0	3/2$^-$			E_γ: not seen in 2001We11 and 1999Da10.
1526.1 *6*	9 *2*	2813.0	(9/2,11/2)	1286.9	9/2	D		A_2=−0.184 *44*; A_4=−0.02 *52* 1526γ-1096γ: DCO=2.5 *8*.
1847.0 *9*	1.1 *3*	2037.2	9/2	190.6	5/2	Q		A_2=+0.44 *15*; A_4=+0.14 *16* 944γ-1501γ: DCO=2.4 *4*.

[†] From 1980Ka08.
[‡] From $\gamma(\theta)$ and $\gamma\gamma$(DCO) in 1980Ka08.
[#] Doublet with γ ray in ^{68}Ge (1980Ka08).

^{58}Ni(^{12}C,αpγ) 1980Ka08

Level Scheme

Intensities: Relative I_γ



$^{65}_{31}Ga_{34}$