^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 116, 1 (2014)	31-Dec-2013

1988ZhZW, 1988ZhZV, 1988ZhZU: E=40, 46 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, lifetimes by DSA. 1988ZhZW provide Eγ, Iγ data at 40 and 46 MeV; 1988ZhZU $\gamma(\theta)$ data coefficients; and 1988ZhZV lifetime measurements.
Additional information 1.
1983Lu05: E=42-52 MeV, measured γ and lifetimes by recoil distance Doppler shift.
1981Bu02: E=40 MeV, measured Eγ, Iγ, $\gamma(\theta)$, and lifetimes by recoil-distance Doppler-shift method. The authors adopt level scheme from (α,nγ) and (α,3nγ) study of 1977Ar04.
1978Iv02: E=35-45 MeV, measured excitation functions. This paper is from the same group as 1981Bu02. The following γ rays were assigned to high-spin levels based on excitation functions: 232, 265, 369, 661, 681, 739, 991, 1111, 1289 and 1659. Weaker lines from 1977Ar04 are verified at 128, 312, 444, 454, 494, 527, 629 and 861.

^{85}Sr Levels

E(level)	J$^\pi$[#]	T$_{1/2}$[@]	Comments
0.0	9/2$^+$		
231.8 *6*	7/2$^+$		
238.79 *5*	1/2$^-$	67.63 min *4*	E(level),J$^\pi$,T$_{1/2}$: from Adopted Levels.
742.7 *10*	(3/2$^-$)		
767.4 *8*	(5/2$^+$)		
785.7 *12*	(5/2$^-$)		
936.7 *10*	5/2$^-$		
1111.5 *7*	13/2$^+$	2.56 ps *21*	T$_{1/2}$: from 1981Bu02. Other: 1.18 ps *35* (1988ZhZV). Additional information 2.
1220.9 *7*	11/2$^+$	0.62 ps *14*	
1261.9 *7*	9/2$^+$		
1626.8 *12*	9/2$^+$		
1657.8 *7*	(11/2)$^+$		
1850.7 *8*	13/2$^+$	1.7 ps *4*	
2102.6 *8*	13/2$^-$		
2367.6 *10*	17/2$^-$	2.4 ns *12*	T$_{1/2}$: from 1981Bu02. Other: >0.76 ns (1983Lu05, seems incorrectly assigned to 2102, 17/2$^-$ level and 991γ).
2400.4 *9*	17/2$^+$	2.25 ps *21*	T$_{1/2}$: weighted average of 2.15 ps *21* (1981Bu02) and 2.56 ps *28* (1983Lu05). Other: 0.62 ps *21* (1988ZhZV).
2525.9 *9*	15/2$^+$	0.139 ps *35*	
2534.5[‡] *12*	17/2$^{(-)}$		E(level),J$^\pi$: level from 1981Bu02.
2661.7[†] *9*	15/2$^-$	0.42 ps *14*	
2854.4[†] *14*	19/2$^{(+)}$		E(level): level from 1981Bu02.
2861.6[†] *10*	17/2$^-$	0.83 ps *35*	
3028.5 *10*	19/2$^-$	1.9 ps *4*	T$_{1/2}$: weighted average of 2.1 ps *4* (1981Bu02), 3.5 ps *8* (1983Lu05), and 1.46 ps *35* (1988ZhZV).
3073.2[†] *10*	(17/2$^+$,19/2$^+$)		J$^\pi$: 17/2$^+$ in 1988ZhZU but 19/2$^+$ in 1988ZhZW; (17/2)$^+$ In Adopted Levels.
3081.4 *14*	(21/2$^+$)	51 ps *7*	T$_{1/2}$: weighted average of 46 ps *4* (1983Lu05) and 61 ps *6* (1981Bu02). Other:>5.5 ps (1988ZhZV).
3228.6[†] *14*	(21/2$^-$)	>2.8 ps	
3380.4[‡] *17*	21/2$^{(+)}$		E(level): level from 1981Bu02.
3385.3[†] *11*	19/2$^+$		
3397.5 *14*	21/2$^-$	2.27 ps *21*	T$_{1/2}$: from weighted average of 2.22 ps *28* (1981Bu02) and 2.36 ps *21* (1983Lu05), 1.7 ps *6* (1988ZhZV. Lifetime not corrected for possible side feedings.
3513.3[†] *11*	21/2$^+$		J$^\pi$: from 1988ZhZW, (23/2) In 1981Bu02.
3825.3[‡] *15*		6.2 ps *14*	J$^\pi$: proposed J=25/2 (1988ZhZW) is inconsistent with mult=M1+E2 for 312γ to

Continued on next page (footnotes at end of table)

^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05 (continued)

^{85}Sr Levels (continued)

E(level)	J$^\pi$[#]	T$_{1/2}$[@]	Comments
			21/2$^+$. T$_{1/2}$: from 1983Lu05, not corrected for possible side feedings.
3967.3[†] *15*	23/2$^+$	0.55 ps *21*	
3971.5[†‡] *14*	(21/2$^-$)		
4105.5[†] *18*	23/2$^-$	0.21 ps *7*	
4362.5[†] *18*	(25/2$^-$)	1.6 ps *7*	J$^\pi$: (23/2)$^-$ in Adopted Levels.
4493.3[†] *18*	25/2$^+$	0.45 ps *17*	
5072.5[†] *20*	(25/2$^-$)	0.9 ps *4*	
5093.3[†] *21*	27/2$^+$	0.17 ps *6*	

[†] Level from 1988ZhZW and 1988ZhZU, some levels are based on revised placement of γ rays or γ cascades in earlier studies.
[‡] Level not listed in Adopted dataset, the associated γ transition is either relocated or non-existent in more recent ^{76}Ge(^{13}C,4nγ) study by 2012KuZX.
[#] As proposed in 1988ZhZW and 1988ZhZU.
[@] From DSAM (1988ZhZV) unless otherwise stated.

γ(^{85}Sr)

A$_2$ and A$_4$ coefficients are from 1988ZhZU unless otherwise stated. Corresponding values for several transitions are also available from 1981Bu02.

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[&]	δ[&]	Comments
128	7.2 *2*	3513.3	21/2$^+$	3380.4	21/2$^{(+)}$	D[@]		Additional information 26. A$_2$=−0.32 *6*, A$_4$=−0.06 *6* (1981Bu02). I$_\gamma$: 7 at E(^{12}C)=40 MeV, 10 at 46 MeV (1988ZhZW).
167[a]		2534.5	17/2$^{(-)}$	2367.6	17/2$^-$			ordering of 494-167 cascade reversed In 1988ZhZW.
167		3028.5	19/2$^-$	2861.6	17/2$^-$			A$_2$=0.00 *5*; A$_4$=−0.03 *7*
194	1[#]	936.7	5/2$^-$	742.7	(3/2$^-$)			A$_2$=+0.25 *4*; A$_4$=+0.10 *7*
200	4[#]	2861.6	17/2$^-$	2661.7	15/2$^-$			A$_2$=+0.10 *5*; A$_4$=−0.02 *8*
232	23[#]	231.8	7/2$^+$	0.0	9/2$^+$			A$_2$=+0.14 *5*; A$_4$=−0.07 *4* Additional information 3.
265	29.9 *3*	2367.6	17/2$^-$	2102.6	13/2$^-$	E2		Additional information 15. A$_2$=+0.23 *3*, A$_4$=−0.12 *3* (1981Bu02). I$_\gamma$: 29 at E(^{12}C)=40 MeV, 32 at 46 MeV (1988ZhZW).
312	4[#]	3385.3	19/2$^+$	3073.2	(17/2$^+$,19/2$^+$)	D[@]		A$_2$=−0.38 *8*; A$_4$=+0.03 *8* Additional information 23.
312[a]	3.9 *1*	3825.3		3513.3	21/2$^+$	(M1+E2)	−0.12 *7*	312γ (Iγ=5,4) placed from a 3385 level In 1988ZhZU. A$_2$=−0.43 *4*, A$_4$=−0.03 *4* (1981Bu02).
369	15.1 *3*	3397.5	21/2$^-$	3028.5	19/2$^-$	(M1+E2)	−0.09 *3*	Additional information 25. A$_2$=−0.43 *4*, A$_4$=0 (1981Bu02). I$_\gamma$: 12 at E(^{12}C)=40 MeV, 17 at 46 MeV (1988ZhZW).
396	1[#]	1657.8	(11/2)$^+$	1261.9	9/2$^+$	D[@]		A$_2$=−0.40 *15*; A$_4$=+0.01 *10*

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^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05 (continued)

γ(^{85}Sr) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	Comments
440[a]	2[#]	3513.3	21/2$^+$	3073.2	(17/2$^+$,19/2$^+$)			Additional information 27.
445	13.8 *2*	2102.6	13/2$^-$	1657.8	(11/2)$^+$	D[@]		Additional information 13. A_2=−0.23 *2*, A_4=−0.05 *3* (1981Bu02). I_γ: 14 at E(^{12}C)=40, 46 MeV (1988ZhZW).
454[a]		2854.4	19/2$^{(+)}$	2400.4	17/2$^+$	(M1+E2)	−0.12 *4*	454γ (Iγ=11, 17) placed from a 3967 level In 1988ZhZV. A_2=−0.58 *4*, A_4=+0.10 *4* (1981Bu02).
454	11[#]	3967.3	23/2$^+$	3513.3	21/2$^+$			A_2=−0.13 *7*; A_4=−0.04 *9* Additional information 29.
494	3[#]	2861.6	17/2$^-$	2367.6	17/2$^-$			A_2=−0.70 *20*; A_4=0
494	3.3 *1*	3028.5	19/2$^-$	2534.5	17/2$^{(-)}$	(M1+E2)	+0.30 *15*	494γ (Iγ=3) placed from a 2862 level In 1988ZhZU. Note that ordering of 454-167 cascade is reversed In other studies. A_2=+0.26 *2*, A_4=0 (1981Bu02).
504	2[#]	742.7	(3/2$^-$)	238.79	1/2$^-$			Additional information 4.
526[a]		3380.4	21/2$^{(+)}$	2854.4	19/2$^{(+)}$	(M1+E2)	−1.8 *3*	526γ (Iγ=6, 12) placed from a 4493 level In 1988ZhZU. A_2=−0.77 *12*, A_4=+0.14 *13* (1981Bu02).
526	6[#]	4493.3	25/2$^+$	3967.3	23/2$^+$	D[@]		A_2=−0.35 *5*; A_4=+0.01 *9* Additional information 33.
536	1[#]	767.4	(5/2$^+$)	231.8	7/2$^+$	D[@]		A_2=−0.29 *6*; A_4=−0.01 *7*
547[b]	6[#]	785.7	(5/2$^-$)	238.79	1/2$^-$	[@]		A_2=−0.70 *20*; A_4=0 A_2 value is inconsistent with ΔJ=2, E2 transition. Additional information 5.
547[b]	4[#]	3073.2	(17/2$^+$,19/2$^+$)	2525.9	15/2$^+$			A_2=+0.30 *10*; A_4=0 Additional information 19.
559	4[#]	2661.7	15/2$^-$	2102.6	13/2$^-$			A_2=+0.54 *8*; A_4=−0.09 *8*
600	2[#]	5093.3	27/2$^+$	4493.3	25/2$^+$	D[@]		A_2=−0.08 *5*; A_4=−0.05 *10* Additional information 35. note that a 600γ is placed from a 3981 level In (α,3nγ) (1977Ar04).
628	9.6 *4*	3028.5	19/2$^-$	2400.4	17/2$^+$	D[@]		Additional information 17. A_2=−0.28 *8*, A_4=+0.09 *7* (1981Bu02). I_γ: 7 at E(^{12}C)=40 MeV, 10 at 46 MeV (1988ZhZW).
661	13.7 *3*	3028.5	19/2$^-$	2367.6	17/2$^-$	(M1+E2)	−0.09 *3*	Additional

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^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05 (continued)

γ(^{85}Sr) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	Comments
								information 18. A_2=−0.42 *4*, A_4=+0.10 *4* (1981Bu02). I_γ: 14 at E(^{12}C)=40 MeV, 21 at 46 MeV (1988ZhZW).
673	2[#]	3073.2	(17/2$^+$,19/2$^+$)	2400.4	17/2$^+$			Additional information 20.
681	11.4 *3*	3081.4	(21/2$^+$)	2400.4	17/2$^+$	E2		Additional information 21. A_2=+0.24 *5*, A_4=−0.08 *6* (1981Bu02). I_γ: 11 at E(^{12}C)=40 MeV, 14 at 46 MeV (1988ZhZW).
698	3[#]	936.7	5/2$^-$	238.79	1/2$^-$			Additional information 6.
708	3[#]	4105.5	23/2$^-$	3397.5	21/2$^-$			Additional information 31.
739	6[#]	1850.7	13/2$^+$	1111.5	13/2$^+$	(M1)		A_2=+0.32 *12*; A_4=−0.14 *10* Additional information 12.
767	1[#]	767.4	(5/2$^+$)	0.0	9/2$^+$			A_2=+0.27 *7*; A_4=0
811	3[#]	2661.7	15/2$^-$	1850.7	13/2$^+$	D[@]		A_2=−0.24 *6*; A_4=−0.09 *9*
861[d]	7[d#]	3228.6	(21/2$^-$)	2367.6	17/2$^-$	(E2)		A_2=+0.21 *4*; A_4=−0.07 *4* Additional information 22.
861[ca]	7.3[c] *1*	3397.5	21/2$^-$	2534.5	17/2$^{(-)}$	E2		A_2=+0.21 *2*, A_4=−0.06 *2* (1981Bu02).
943[a]	3[#]	3971.5	(21/2$^-$)	3028.5	19/2$^-$			Additional information 30.
965	2[#]	4362.5	(25/2$^-$)	3397.5	21/2$^-$			A_2=+0.4 *2*; A_4=0 Additional information 32.
967	2[#]	5072.5	(25/2$^-$)	4105.5	23/2$^-$	D[@]		A_2=−0.6 *2*; A_4=0 Additional information 34.
985	4[#]	3385.3	19/2$^+$	2400.4	17/2$^+$			A_2=+0.3 *1*; A_4=0 Additional information 24.
989	1[#]	1220.9	11/2$^+$	231.8	7/2$^+$			
991	19.6 *4*	2102.6	13/2$^-$	1111.5	13/2$^+$	D+Q	+0.65 *30*	Additional information 14. A_2=+0.28 *4*, A_4=0 (1981Bu02). I_γ: 23 at E(^{12}C)=40 MeV, 24 at 46 MeV (1988ZhZW).
1030	3[#]	1261.9	9/2$^+$	231.8	7/2$^+$	D[@]		A_2=−0.32 *8*; A_4=−0.05 *5*
1111	100.0 *12*	1111.5	13/2$^+$	0.0	9/2$^+$	E2		Additional information 7. A_2=+0.22 *2*, A_4=−0.11 *3* (1981Bu02).
1113	4[#]	3513.3	21/2$^+$	2400.4	17/2$^+$			Additional information 28.
1221	12[#]	1220.9	11/2$^+$	0.0	9/2$^+$	D[@]		A_2=−0.57 *7*; A_4=−0.02 *4* Additional information 8.
1262	2[#]	1261.9	9/2$^+$	0.0	9/2$^+$			A_2=+0.2 *1*; A_4=0
1289	40.4 *4*	2400.4	17/2$^+$	1111.5	13/2$^+$	E2		Additional

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^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05 (continued)

$\gamma(^{85}Sr)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	Comments
								information 16. A_2=+0.25 *2*, A_4=−0.12 *2* (1981Bu02). I_γ: 40 at E(^{12}C)=40 MeV, 47 at 46 MeV (1988ZhZW).
1305	2[#]	2525.9	15/2$^+$	1220.9	11/2$^+$	(E2)		A_2=+0.3 *1*; A_4=0
1395	8[#]	1626.8	9/2$^+$	231.8	7/2$^+$			A_2=+0.20 *5*; A_4=+0.05 *3* Additional information 9.
1414	4[#]	2525.9	15/2$^+$	1111.5	13/2$^+$	(M1)		A_2=−0.50 *15*; A_4=0
1426	6.4 *2*	1657.8	(11/2)$^+$	231.8	7/2$^+$	Q		Additional information 10. A_2=+0.22 *5*, A_4=−0.07 *5* (1981Bu02). I_γ: 7 at E(^{12}C)=40 MeV, 6 at 46 MeV (1988ZhZW).
1658	8.5 *2*	1657.8	(11/2)$^+$	0.0	9/2$^+$	(M1+E2)	−1.1 *+7−5*	Additional information 11. A_2=−0.77 *9*, A_4=+0.10 *6* (1981Bu02). I_γ: 13 at E(^{12}C)=40 MeV, 11 at 46 MeV (1988ZhZW).
1851	4[#]	1850.7	13/2$^+$	0.0	9/2$^+$	(E2)		A_2=+0.45 *20*; A_4=0

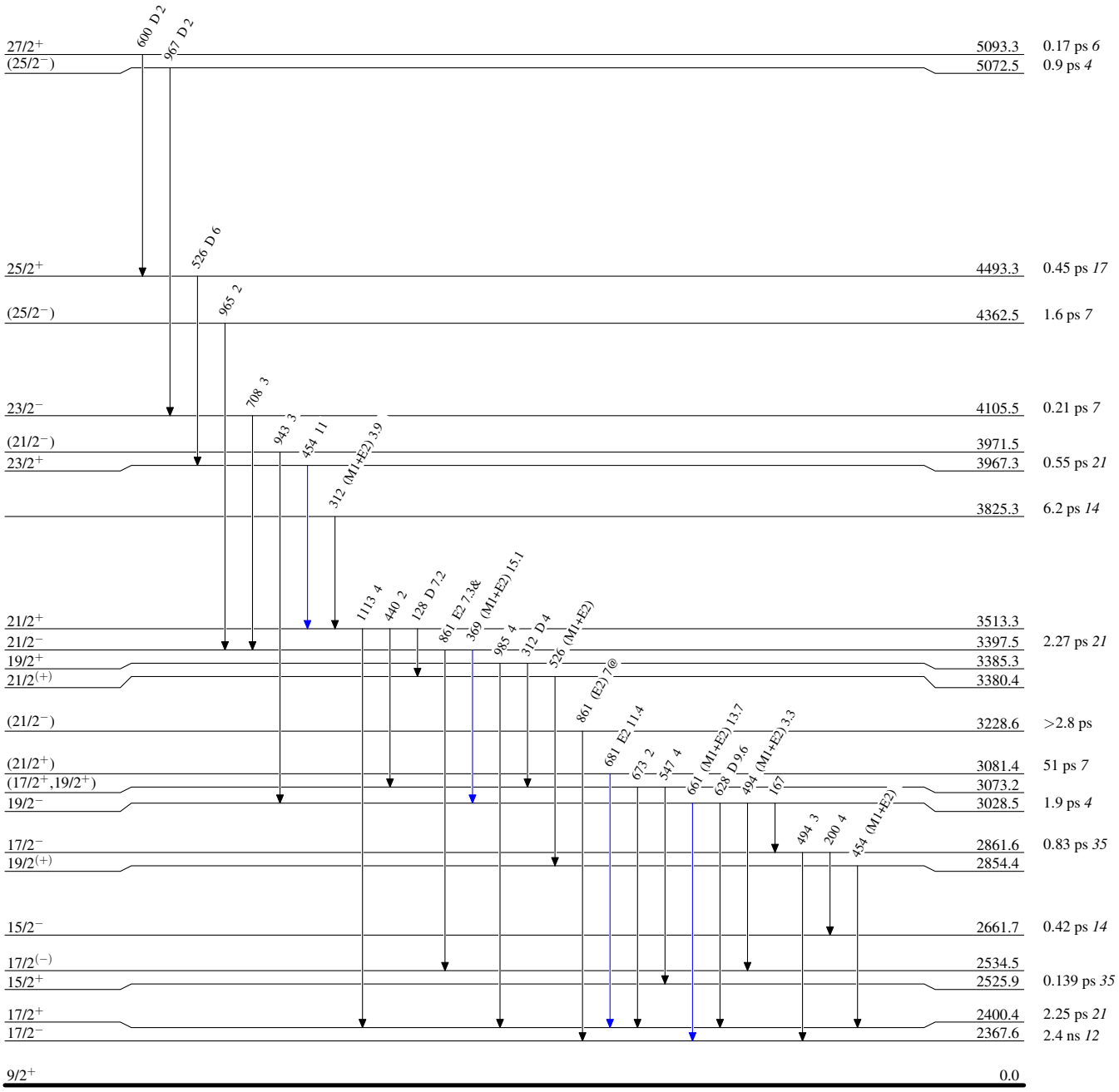
[†] From 1988ZhZW unless otherwise stated.
[‡] From 1981Bu02 at E(^{12}C)=40 MeV, unless otherwise stated. These values are comparable to those from 1988ZhZW at 40 and 46 MeV.
[#] From 1988ZhZW at E(^{12}C)=40 MeV. Values at 46 MeV are given under comments, when different.
[@] Dipole, most likely ΔJ=1, from negative A_2 value in $\gamma(\theta)$ data.
[&] From $\gamma(\theta)$ data in 1981Bu02 and 1988ZhZU; RUL used when level lifetimes are available.
[a] Gamma either relocated or non-existent in Adopted dataset based on more recent ^{76}Ge(^{13}C,4nγ) study by 2012KuZX.
[b] Multiply placed.
[c] Multiply placed with undivided intensity.
[d] Multiply placed with intensity suitably divided.

^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



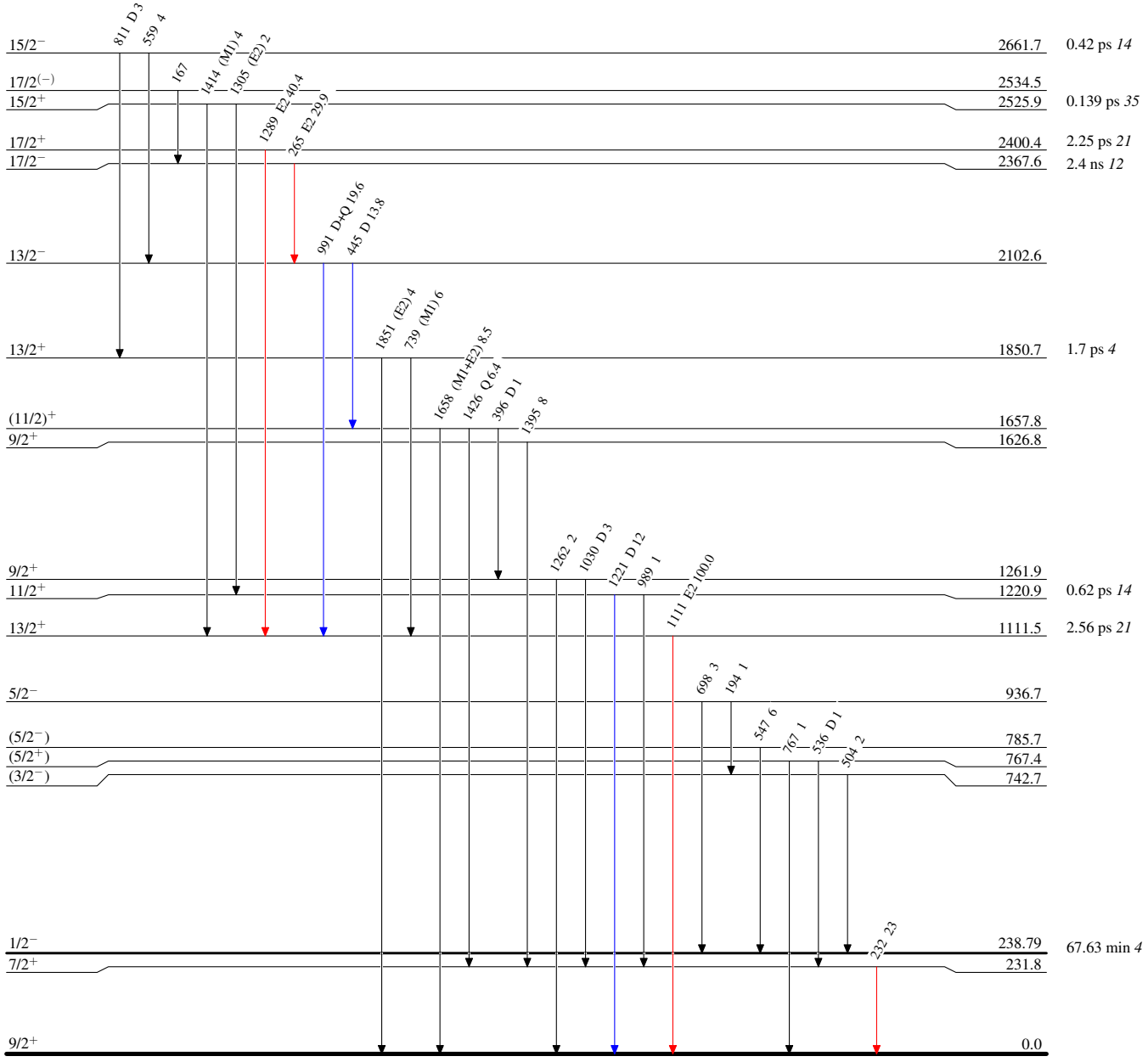
$^{85}_{38}Sr_{47}$

^{76}Ge(^{12}C,3nγ) 1988ZhZW,1981Bu02,1983Lu05

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{85}_{38}Sr_{47}$