$^{76}Ge(^{12}C,4n\gamma),^{81}Br(^{6}Li,3n\gamma)$ 1982De05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, A. Negret, and K. Zuber	NDS 110,2815 (2009)	30-Sep-2009

Includes $^{74}Ge(^{12}C,2n\gamma)$ from 1989Ku11.

1982De05 (also 1980De41): $^{81}Br(^{6}Li,3n\gamma)$ E=19-30 MeV; measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, excitation functions. $^{76}Ge(^{12}C,4n\gamma)$ E=48-60 MeV; measured $\gamma\gamma$, $\gamma(\theta)$, lifetimes measured by recoil- distance Doppler-shift (RDDS) method. Enriched targets, Ge(Li) detectors.

Other measurements:

1989Ku11: $^{74}Ge(^{12}C,2n\gamma)$ E=215 MeV. Measured g factors by transient-field technique. For these measurements, 1989Ku11 used g=+0.419 *47* (1988Ku01) for the first 2^+ state as a reference value.

1982BrZO: $^{76}Ge(^{12}C,4n\gamma)$ E=42-52 MeV. Measured lifetimes of 2808 and 3332 levels by recoil-distance method.

1981Br20: $^{76}Ge(^{12}C,4n\gamma)$ E=62 MeV; measured g factor of first 8^+ state, spin precession in polarized hyperfine fields, tilted geometry.

1972InZU: $^{76}Ge(^{12}C,4n\gamma)$ E=55-68 MeV; measured Eγ, Iγ, $\gamma\gamma$. Proposed yrast states up to 8^+ (794, 1769, 2811 and 3927) and non-yrast states at 1457,2^+ and 2057,3^+.

Additional information 1.

^{84}Sr Levels

All g factors are from 1989Ku11 in $^{74}Ge(^{12}C,2n\gamma)$ E=215 MeV reaction, unless otherwise noted.

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	Comments
0[@]	0^+		
793.30[@] *9*	2^+	3.19 ps *35*	$T_{1/2}$: 1994Ch28 obtain 6.2 ps 21 by reanalyzing data of 1982De05.
1454.21[&] *11*	2^+		
1767.90[@] *13*	4^+	1.73 ps *21*	$T_{1/2}$: 1994Ch28 obtain 4.16 ps 14 by reanalyzing data of 1982De05.
2056.71[&] *14*	3^+		
2298.22[&] *15*			
2448.28[c] *16*	3^-		Configuration: $(g_{9/2},f^{-1}_{5/2})$ or $(g_{9/2},p^{-1}_{3/2})$.
2598.72[&] *23*	(4^+)		J^{π}: 2^+,4^+ from 1145$\gamma(\theta)$ indicating ΔJ=0 or 2; 4 favored by excitation function.
2735.81[&] *15*	(5^+)		J^{π}: ΔJ=1 from 968$\gamma(\theta)$; J=5 from excitation function.
2769.30[c] *15*	5^-	9.5 ps *6*	g=+1.6 *2* (1989Ku11) g-factor is an average for the feeding states, except for the 3488, 7^- state. J^{π}: spin from $\gamma(\theta)$ and excitation function.
2808.11[@] *15*	6^+	1.04 ps *21*	$T_{1/2}$: other: 2.6 ps *4* (1982BrZO).
3041.52[d] *16*	5^-		
3098.91 *16*	6^+		
3157.61[&] *18*	(7^+)		J^{π}: 422$\gamma(\theta)$ indicates ΔJ=0 or 2; 7 favored by excitation function.
3270.81 *22*			
3279.42[d] *17*	6^-		
3332.21[b] *17*	8^+	157 ps *5*	g=−0.15 *7* (1981Br20) g: from spin precession in polarized hyperfine fields of a tilted multi-foil target (1981Br20). Other: −0.1 *2* (1989Ku11). $T_{1/2}$: other: 170 ps *7* (1982BrZO), 162.9 ps 35 (1982De05 value reanalyzed by 1994Ch28). Configuration: $\nu(g^{-2}_{9/2})_{8+}\otimes$ (g.s. of ^{86}Sr core).
3488.21[c] *16*	7^-	4.4 ps *5*	g=+0.6 *2* (1989Ku11)
3650.42[d] *16*	7^-		
3680.22[a] *16*	8^+	3.33 ps *14*	g=+0.9 *1* (1989Ku11) Configuration: $\pi g^{2}_{9/2\ 8+}\otimes$ ^{82}Kr core.

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^{76}Ge(^{12}C,4nγ),^{81}Br(^{6}Li,3nγ) 1982De05 (continued)

^{84}Sr Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$[#]	Comments
3749.3 *3*			
4029.02[@] *25*	(8$^+$)		J$^{\pi}$: 1221$\gamma(\theta)$ indicate 6$^+$,8$^+$ from ΔJ=0 or 2; 8 favored by excitation function.
4268.32[d] *19*	8$^-$		
4370.9[&] *3*	(9$^+$)		J$^{\pi}$: 1213$\gamma(\theta)$ indicate ΔJ=(2); 9 favored by excitation function.
4447.92[b] *18*	10$^+$	2.22 ps *35*	g=+0.2 *1* (1989Ku11) Configuration: $\nu g^{-2}_{9/2}\ _{8+}\otimes$(2$^+$ of ^{86}Sr core).
4534.42[a] *19*	10$^+$	1.66 ps *14*	g=+0.8 *2* (1989Ku11)
4636.42[c] *18*	9$^-$	2.5 ps *4*	g=0.00 *4* (1989Ku11) Configuration: $\nu g^{-2}_{9/2} \otimes$ (3$^-$).
4746.0 *3*			
5444.82[c] *20*	11$^-$	7.5 ps *10*	
5653.53[a] *20*	12$^+$	0.83 ps *28*	
6069.9[c] *3*	12$^-$		
6739.94[a] *22*	14$^+$		

† From least-squares fit to Eγ′s.
‡ As proposed by 1982De05 based on their $\gamma(\theta)$ and excitation function data and band associations.
# From recoil-distance Doppler shift technique in the reaction ^{76}Ge(^{12}C,4nγ)^{84}Sr at 60 MeV. See 1994Ch28 for a reanalysis of some of the lifetimes from 1982De05.
@ Band(A): g.s. band.
& Band(B): quasi γ band.
a Band(C): $\pi(g^2_{9/2})_{8+}\otimes$(^{82}Kr core).
b Band(D): $\nu(g^{-2}_{9/2})_{8+}\otimes$(^{86}Sr core).
c Band(E): Octupole band based on 3$^-$.
d Band(F): Band based on 5$^-$.

γ(^{84}Sr)

All γ-ray placements from 1982De05 are based on $\gamma\gamma$ data using reactions: ^{81}Br(^{6}Li,3nγ) at 28 MeV and ^{76}Ge(^{12}C,4nγ) at 58.3,60 MeV. See table II of 1982De05 for extensive details of $\gamma\gamma$ coincidence gates and observed γ rays.
A_2 and A_4 coefficients are from ^{81}Br(^{6}Li,3nγ) at 28 MeV, unless otherwise noted.

E_γ[†]	I_γ[†]	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.[‡]	Comments
162.2 *2*	2.1 *1*	3650.42	7$^-$	3488.21	7$^-$		A_2=+0.41 *1*, A_4=0.00 *1*.
237.9 *1*	1.1 *1*	3279.42	6$^-$	3041.52	5$^-$	D	A_2=−0.25 *4*, A_4=+0.09 *8*.
272.2 *1*	3.0 *1*	3041.52	5$^-$	2769.30	5$^-$	(D)	A_2=+0.25 *6*, A_4=0.00 *1*. Mult.: $\gamma(\theta)$ consistent with ΔJ=0, dipole.
290.8 *1*	1.3 *1*	3098.91	6$^+$	2808.11	6$^+$		A_2=+0.23 *27*, A_4=0.00 *1*.
321.0 *1*	0.6 *1*	2769.30	5$^-$	2448.28	3$^-$		
348.0[@] *1*	3.3 *1*	3680.22	8$^+$	3332.21	8$^+$	D+Q	A_2=−0.36 *6*, A_4=−0.06 *3*. Mult.: $\gamma(\theta)$ consistent with ΔJ=0, D+Q.
371.0 *1*	0.5 *1*	3650.42	7$^-$	3279.42	6$^-$	D	A_2=−0.53 *24*, A_4=+0.01 *2*.
421.8 *1*	2.8 *1*	3157.61	(7$^+$)	2735.81	(5$^+$)	Q	A_2=+0.27 *5*, A_4=−0.08 *4*.
462.7[#] *2*	≈1.0[#]	3270.81		2808.11	6$^+$		I_γ: 1.0 1 (1982De05).
510.1[#] *5*	≈6.4[#]	3279.42	6$^-$	2769.30	5$^-$		I_γ: 6.4 1 (1982De05).
524.1 *1*	13.6 *3*	3332.21	8$^+$	2808.11	6$^+$	E2	A_2=+0.32 *2*, A_4=−0.07 *1*.

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^{76}Ge(^{12}C,4nγ),^{81}Br(^{6}Li,3nγ) 1982De05 (continued)

γ(^{84}Sr) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
551.5 *2*	0.9 *1*	3650.42	7⁻	3098.91	6⁺	D	A_2=−0.36 *7*, A_4=+0.04 *1*.
581.3 *2*	0.5 *1*	3680.22	8⁺	3098.91	6⁺		
593.3 *2*	0.8 *1*	3041.52	5⁻	2448.28	3⁻		
602.5 *1*	7.1 *3*	2056.71	3⁺	1454.21	2⁺	D+Q	A_2=+0.18 *3*, A_4=+0.05 *1*.
608.9 *1*	2.3 *1*	3650.42	7⁻	3041.52	5⁻		
625.1@ *2*	1.1 *1*	6069.9	12⁻	5444.82	11⁻	D	A_2=−0.33 *5*, A_4=+0.01 *6*.
650.4 *2*	1.3 *1*	3749.3		3098.91	6⁺	D+Q	A_2=−0.44 *5*, A_4=+0.16 *4*.
660.9 *1*	10.6 *3*	1454.21	2⁺	793.30	2⁺		A_2=+0.14 *3*, A_4=0.00 *1*.
679.1# *2*	≈2.6#	2735.81	(5⁺)	2056.71	3⁺		I_γ: 2.6 3 (1982De05).
680.1#@ *2*	≈3.9#	3488.21	7⁻	2808.11	6⁺	D	I_γ: 3.9 4 (1982De05). A_2=−0.31 *4*, A_4=+0.16 *5*.
718.9 *1*	9.0 *5*	3488.21	7⁻	2769.30	5⁻	E2	A_2=+0.31 *3*, A_4=−0.05 *1*.
780.1 *2*	1.3 *1*	4268.32	8⁻	3488.21	7⁻		
793.3 *1*	100 *5*	793.30	2⁺	0	0⁺	E2	A_2=+0.23 *1*, A_4=−0.05 *1*.
808.4 *1*	2.3 *2*	5444.82	11⁻	4636.42	9⁻	E2	A_2=+0.38 *8*, A_4=−0.19 *8*.
844.0 *1*	5.1 *2*	2298.22		1454.21	2⁺		
854.2 *1*	7.7 *2*	4534.42	10⁺	3680.22	8⁺	E2	A_2=+0.30 *3*, A_4=−0.05 *1*.
872.1 *1*	11.3 *3*	3680.22	8⁺	2808.11	6⁺	E2	A_2=+0.33 *3*, A_4=−0.05 *1*.
881.1 *2*	1.2 *1*	3650.42	7⁻	2769.30	5⁻	(Q)	A_2=+0.12 *2*, A_4=−0.10 *6*.
967.9 *1*	2.2 *1*	2735.81	(5⁺)	1767.90	4⁺	D+Q	A_2=+0.38 *7*, A_4=+0.07 *2*.
974.6 *1*	77 *4*	1767.90	4⁺	793.30	2⁺	E2	A_2=+0.30 *1*, A_4=−0.07 *1*.
988.9 *1*	2.7 *1*	4268.32	8⁻	3279.42	6⁻	Q	A_2=+0.30 *7*, A_4=−0.13 *5*.
994.0 *3*	1.6 *1*	2448.28	3⁻	1454.21	2⁺	D	A_2=−0.25 *5*, A_4=+0.005 *3*.
996.9 *3*	0.7 *1*	5444.82	11⁻	4447.92	10⁺		
1001.4 *1*	21.7 *19*	2769.30	5⁻	1767.90	4⁺	D	A_2=−0.18 *1*, A_4=+0.012 *1*. δ: 0 from 1001$\gamma(\theta)$ as expected for E1.
1040.2 *1*	42.6 *9*	2808.11	6⁺	1767.90	4⁺	E2	A_2=+0.27 *2*, A_4=−0.06 *1*.
1086.4@ *1*	2.6 *2*	6739.94	14⁺	5653.53	12⁺	Q	A_2=+0.16 *3*, A_4=−0.06 *1*.
1115.7 *1*	6.7 *3*	4447.92	10⁺	3332.21	8⁺	E2	A_2=+0.27 *4*, A_4=−0.09 *2*.
1119.1@ *1*	2.4 *1*	5653.53	12⁺	4534.42	10⁺	E2	A_2=+0.33 *2*, A_4=−0.14 *2*.
1144.5 *2*	1.5 *2*	2598.72	(4⁺)	1454.21	2⁺		A_2=+0.15 *13*, A_4=−0.05 *5*.
1148.2 *1*	4.1 *2*	4636.42	9⁻	3488.21	7⁻	E2	A_2=+0.30 *6*, A_4=−0.08 *4*.
1205.6@ *2*	0.8 *1*	5653.53	12⁺	4447.92	10⁺	E2	A_2=+0.26 *6*, A_4=−0.03 *2*.
1213.3 *2*	1.0 *1*	4370.9	(9⁺)	3157.61	(7⁺)	(Q)	A_2=+0.33 *7*, A_4=+0.09 *10*.
1220.9 *2*	1.6 *8*	4029.02	(8⁺)	2808.11	6⁺	Q	A_2=+0.20 *9*, A_4=−0.16 *6*.
1263.4 *5*	0.8 *1*	2056.71	3⁺	793.30	2⁺	D	A_2=−0.47 *28*, A_4=+0.09 *11*.
1331.0 *2*	3.5 *2*	3098.91	6⁺	1767.90	4⁺	Q	A_2=+0.36 *1* A_4=−0.06 *1*.
1413.8 *2*	1.1 *1*	4746.0		3332.21	8⁺		
1454.2 *2*	1.4 *1*	1454.21	2⁺	0	0⁺		
1502.9 *3*	0.3 *1*	3270.81		1767.90	4⁺		

† From ^{81}Br(^{6}Li,3nγ) at 28 MeV.

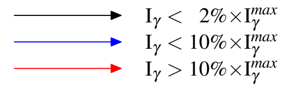
‡ From $\gamma(\theta)$ data in ^{81}Br(^{6}Li,3nγ) at 28 MeV and RUL where level lifetimes are known. The assignments mult=D, Q or D+Q are as implied by $\gamma(\theta)$ coefficients and correspond to ΔJ=1 for for D, D+Q and ΔJ=2 for Q.

\# Unresolved doublet, intensity is an approximate estimate.

@ A_2 and A_4 are from $\gamma(\theta)$ In ^{76}Ge(^{12}C,4nγ)^{84}Sr at 60 MeV.

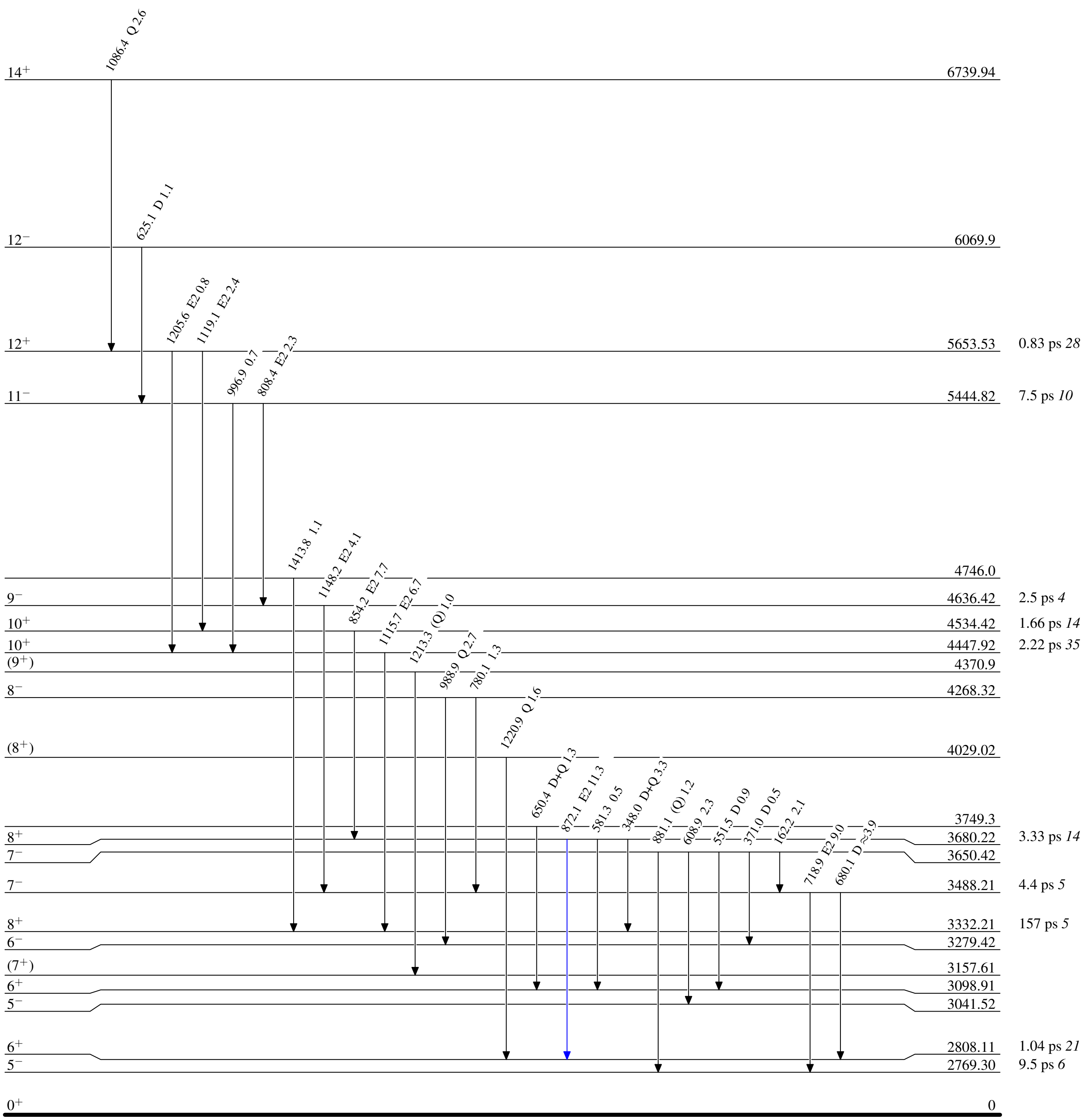
$^{76}Ge(^{12}C,4n\gamma),^{81}Br(^{6}Li,3n\gamma)$ 1982De05

Legend



Level Scheme

Intensities: Relative I_γ

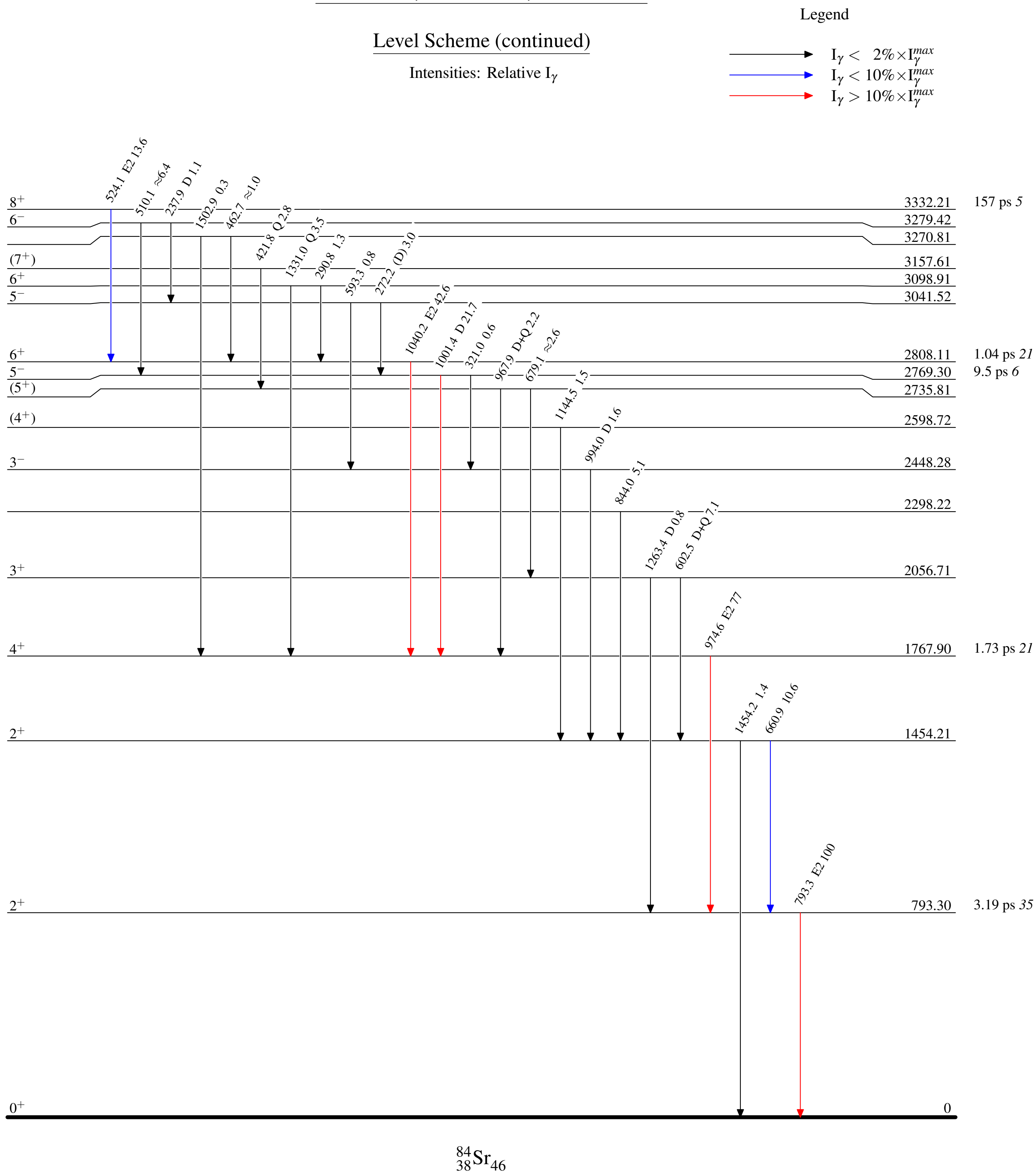


$^{84}_{38}Sr_{46}$

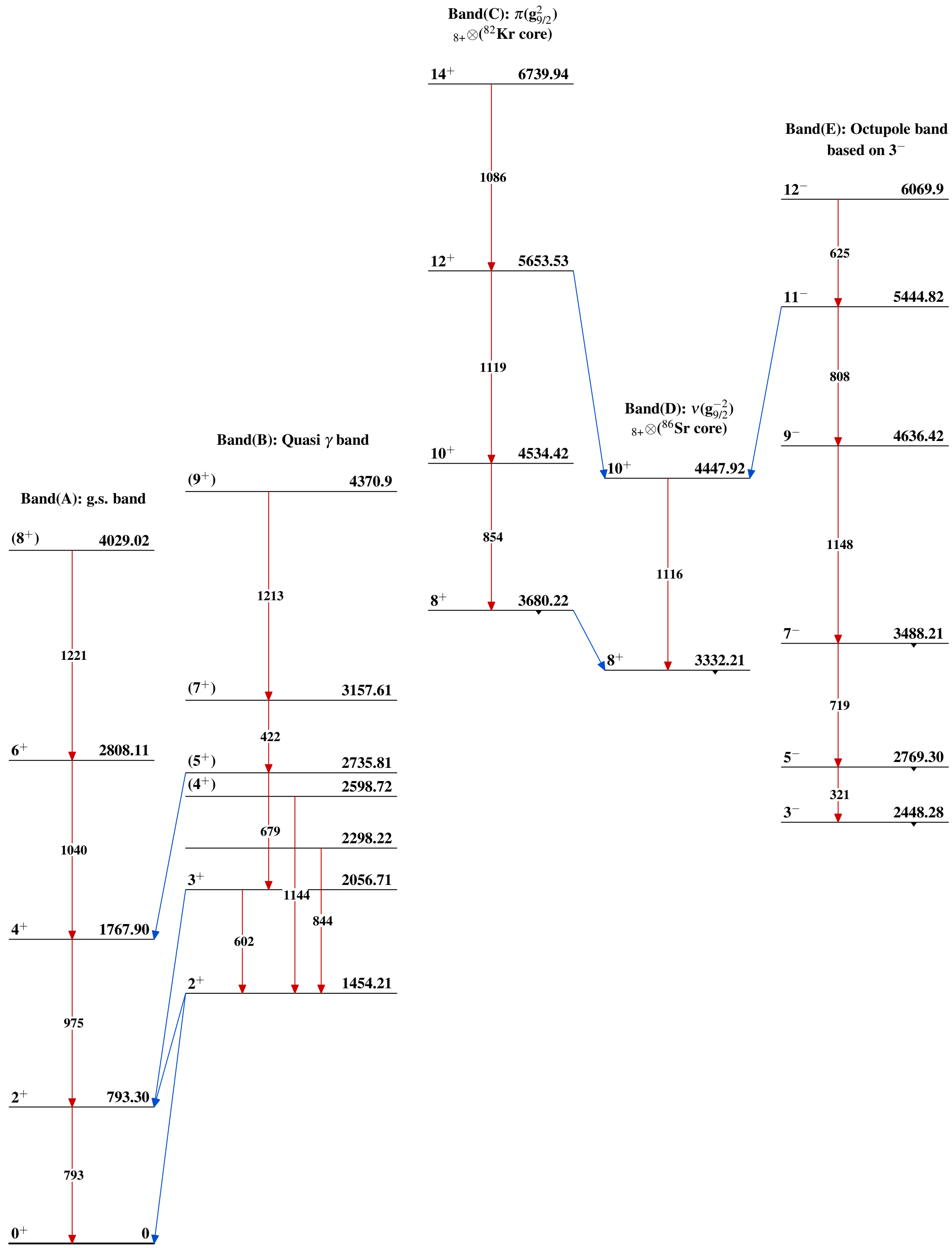
$^{76}Ge(^{12}C,4n\gamma),^{81}Br(^{6}Li,3n\gamma)$ 1982De05

Level Scheme (continued)

Intensities: Relative I_γ



$^{76}Ge(^{12}C,4n\gamma),^{81}Br(^{6}Li,3n\gamma)$ 1982De05



$^{84}_{38}Sr_{46}$

^{76}Ge(^{12}C,4nγ),^{81}Br(^{6}Li,3nγ) 1982De05 (continued)