^{144}Sm(^{7}Li,2nγ) 1991La17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

1991La17: E=32 MeV ^{7}Li beam was produced from the Tandem accelerator at Cologne University. γ rays were detected with the Osiris multidetector array consisting of 12 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$(DCO). Deduced levels, J^{π}, multipolarities. Comparisons with theoretical calculations. 1991La17 also report data on ^{151}Eu(α,6nγ).

^{149}Tb Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
35.75[#] *8*	11/2$^-$	4.17 min *5*	%ε+%β^+=99.978 *4*; %α=0.022 *4* Energy, J^{π}, $T_{1/2}$ and decay modes from the Adopted Levels. Additional information 1.
822.3[#] *2*	15/2$^-$		
840.7[#] *2*	13/2$^-$		
1129.1[&] *2*	15/2$^+$		
1382.0[#] *2*	19/2$^-$		
1454.7[#] *3*	(17/2$^-$)		
1568.9[#] *3*	(15/2$^-$)		
1591.0[&] *3*	(17/2$^+$)		
1672.7[#] *2*	23/2$^-$		
1813.21[#] *21*	21/2$^-$		
1867.8[&] *2*	19/2$^+$		
1879.1[&] *4*	(17/2$^+$)		
2302.9[@] *3*	27/2$^-$		
2350.0[&] *2*	23/2$^+$		
2368.7[&] *4*	(21/2$^+$)		
2492.2[&] *4*	(21/2$^+$)		
2518.5[&] *3*	27/2$^+$		
2664.3[@] *4*	25/2$^-$		
2667.0[&] *3*	25/2$^{(+)}$		
2762.8[@] *3*	25/2$^{(-)}$		
2812.8[&] *3*	29/2$^+$		
3142.0 *3*	31/2$^+$		Configuration=$\pi h_{11/2}\otimes\nu f_{7/2}\otimes\nu i_{13/2}$ (1991La17).
3527.3 *3*	33/2$^+$		Configuration=$\pi h_{11/2}\otimes\nu f_{7/2}\otimes\nu h_{9/2}\otimes$(3$^-$ in ^{146}Gd) (1991La17).
3603.4 *3*	31/2$^-$		Possible configuration= $\pi h_{11/2}\otimes\nu f^2_{7/2}\otimes$(3$^-$ in ^{146}Gd)$\otimes$(3$^-$ in ^{146}Gd) (1991La17). This configuration involves coupling of two octupole phonons.
3990.6 *5*			
4061.5 *5*			
4208.4[a] *3*	33/2$^+$		
4463.4[a] *3*	35/2$^+$		
4674.0[a] *3*	37/2$^+$		
4923.4[a] *4*	39/2$^+$		
5148.3[a] *5*	41/2$^{(+)}$		

[†] From least-squares fit to γ-ray energies.
[‡] As given in 1991La17, based on their $\gamma(\theta)$ data in (α,6nγ), $\gamma\gamma(\theta)$(DCO) data in (^{7}Li,2nγ) and pol data for selected transitions. Some of the assignments in 1991La17 are from theoretical predictions. The assignments are the same in the Adopted Levels, except that several are placed in parentheses there as strong arguments seem lacking.

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^{144}Sm(^{7}Li,2nγ) 1991La17 (continued)

^{149}Tb Levels (continued)

Seq.(B): $\pi h_{11/2}\otimes\nu f^2_{7/2}$ multiplet.
@ Seq.(C): $\pi h_{11/2}\otimes\nu f_{7/2}\otimes\nu h_{9/2}$ multiplet.
& Seq.(D): $\pi h_{11/2}\otimes\nu f^2_{7/2}\otimes(3^-$ in ^{146}Gd) multiplet.
a Band(A): $\pi h^2_{11/2}\otimes\pi d^{-1}_{5/2}\otimes\nu f^2_{7/2}$ multiplet.

$\gamma(^{149}Tb)$

DCO values given under comments are from 1991La17. The gating transition is generally ΔJ=2, E2, in which case DCO≈1 suggests ΔJ=2, quadrupole; DCO≈2.0 suggests ΔJ=1, dipole; DCO>1 suggests ΔJ=1, dipole+quadrupole.

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
140.6 *2*	3.0 *3*	1813.21	21/2$^-$	1672.7	23/2$^-$	(D+Q)	DCO=1.40 *15*
148.3 *4*	0.8 *3*	2667.0	25/2$^{(+)}$	2518.5	27/2$^+$		
168.5 *2*	5.7 *3*	2518.5	27/2$^+$	2350.0	23/2$^+$	Q	DCO=0.86 *9*
210.6 *2*	0.8 *3*	4674.0	37/2$^+$	4463.4	35/2$^+$		
215.6 *1*	16.6 *4*	2518.5	27/2$^+$	2302.9	27/2$^-$	D	DCO=0.89 *5* Mult.: DCO is also consistent with D, ΔJ=0; polarization data from (α,6nγ) also in 1991La17 indicates E1.
224.9 *3*	0.5 *2*	5148.3	41/2$^{(+)}$	4923.4	39/2$^+$		
249.4 *2*	0.8 *3*	4923.4	39/2$^+$	4674.0	37/2$^+$		
254.9 *2*	1.1 *3*	4463.4	35/2$^+$	4208.4	33/2$^+$		
276.7 *3*	0.4 *2*	1867.8	19/2$^+$	1591.0	(17/2$^+$)		
288.4 *2*	2.1 *2*	1129.1	15/2$^+$	840.7	13/2$^-$		A 288.0γ was placed from a 3816 level by 1979Si19 in (^{10}B,3nγ). 288.0γ reported by 1994Me12 in (^{31}P,4nγ) deexcites 6400.4 level.
290.8 *1*		1672.7	23/2$^-$	1382.0	19/2$^-$	Q	DCO=0.92 *5*
294.3 *1*	14.7 *3*	2812.8	29/2$^+$	2518.5	27/2$^+$	(D+Q)	DCO=1.68 *15*
306.8 *1*	15.6 *4*	1129.1	15/2$^+$	822.3	15/2$^-$		
316.7 *5*	0.5 *3*	2667.0	25/2$^{(+)}$	2350.0	23/2$^+$		
325.7 *3*	0.3 *2*	1454.7	(17/2$^-$)	1129.1	15/2$^+$		
329.2 *1*	10.5 *2*	3142.0	31/2$^+$	2812.8	29/2$^+$		
361.4 *2*	2.3 *2*	2664.3	25/2$^-$	2302.9	27/2$^-$	(D+Q)	DCO=1.32 *25*
385.2 *2*	4.8 *2*	3527.3	33/2$^+$	3142.0	31/2$^+$		
387.2 *3*	2.0 *2*	3990.6		3603.4	31/2$^-$		
412.5 *5*	0.3 *2*	2762.8	25/2$^{(-)}$	2350.0	23/2$^+$		
431.2 *1*	5.4 *3*	1813.21	21/2$^-$	1382.0	19/2$^-$	D	DCO=2.1 *3*
439.3 *4*	0.2 *2*	1568.9	(15/2$^-$)	1129.1	15/2$^+$		
460.0 *3*		4923.4	39/2$^+$	4463.4	35/2$^+$		
460.3 *5*	0.6 *2*	2762.8	25/2$^{(-)}$	2302.9	27/2$^-$		DCO=1.0 *4*
461.3 *4*	0.5 *2*	3603.4	31/2$^-$	3142.0	31/2$^+$		
461.9 *3*	2.1 *2*	1591.0	(17/2$^+$)	1129.1	15/2$^+$		
465.7 *3*		4674.0	37/2$^+$	4208.4	33/2$^+$		
482.3 *2*	8.0 *5*	2350.0	23/2$^+$	1867.8	19/2$^+$	Q	DCO=0.89 *11*
485.5 *5*	1.0 *3*	1867.8	19/2$^+$	1382.0	19/2$^-$		
500.8 *5*	0.2 *1*	2368.7	(21/2$^+$)	1867.8	19/2$^+$		
509.9 *3*	5.4 *9*	2812.8	29/2$^+$	2302.9	27/2$^-$	(D+Q)	DCO=1.95 *24*
534.2 *3*	0.9 *2*	4061.5		3527.3	33/2$^+$		
536.7 *3*	1.8 *2*	2350.0	23/2$^+$	1813.21	21/2$^-$	(D+Q)	DCO=1.8 *3*
559.6 *1*	76.3 *9*	1382.0	19/2$^-$	822.3	15/2$^-$	Q	DCO=1.07 *3*
613.7 *4*	0.4 *2*	1454.7	(17/2$^-$)	840.7	13/2$^-$		
623.5 *3*	0.9 *3*	3142.0	31/2$^+$	2518.5	27/2$^+$		
624.4 *5*	0.8 *3*	2492.2	(21/2$^+$)	1867.8	19/2$^+$		
630.2 *2*	33.1 *7*	2302.9	27/2$^-$	1672.7	23/2$^-$	Q	DCO=1.05 *5*

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^{144}Sm(^{7}Li,2nγ) 1991La17 (continued)

γ(^{149}Tb) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
677.2 *2*	1.0 *3*	2350.0	$23/2^+$	1672.7	$23/2^-$		
715 *1*		3527.3	$33/2^+$	2812.8	$29/2^+$		
728.4 *4*	0.5 *2*	1568.9	$(15/2^-)$	840.7	$13/2^-$		
738.7 *1*	10.1 *4*	1867.8	$19/2^+$	1129.1	$15/2^+$	Q	DCO=1.14 *7*
746.9 *5*	2.4 *5*	1568.9	$(15/2^-)$	822.3	$15/2^-$		
750.0 *3*	1.7 *2*	1879.1	$(17/2^+)$	1129.1	$15/2^+$		
768.7 *4*	1.1 *3*	1591.0	$(17/2^+)$	822.3	$15/2^-$		
786.6 *2*	100 *8*	822.3	$15/2^-$	35.75	$11/2^-$	Q	DCO=1.03 *3*
804.8 *2*	3.0 *4*	840.7	$13/2^-$	35.75	$11/2^-$		
845.6[#] *3*	1.1 *2*	2518.5	$27/2^+$	1672.7	$23/2^-$	[M2]	This γ ray reported only by 1991La17 is suspect since the expected Iγ=3.2 should have been detected by 1994Me12.
986.8 *5*	0.9 *3*	2368.7	$(21/2^+)$	1382.0	$19/2^-$		
994.3 *2*	2.4 *4*	2667.0	$25/2^{(+)}$	1672.7	$23/2^-$		
1090.0 *3*	0.9 *3*	2762.8	$25/2^{(-)}$	1672.7	$23/2^-$	(D)	DCO=2.0 *9*
1110.3 *3*	0.8 *3*	2492.2	$(21/2^+)$	1382.0	$19/2^-$		
1146.7 *2*	1.4 *2*	4674.0	$37/2^+$	3527.3	$33/2^+$		
1300.5 *2*	2.7 *3*	3603.4	$31/2^-$	2302.9	$27/2^-$	(Q)	DCO=1.05 *23*
1321.6 *2*	0.9 *3*	4463.4	$35/2^+$	3142.0	$31/2^+$		
1395.5 *2*	1.5 *3*	4208.4	$33/2^+$	2812.8	$29/2^+$		

[†] From 1991La17. Energies are from results of both this study and ^{151}Eu(α,6nγ) by 1991La17, mostly from this study with the superior detection sensitivity.
[‡] Deduced from DCO data in 1991La17.
[#] Placement of transition in the level scheme is uncertain.

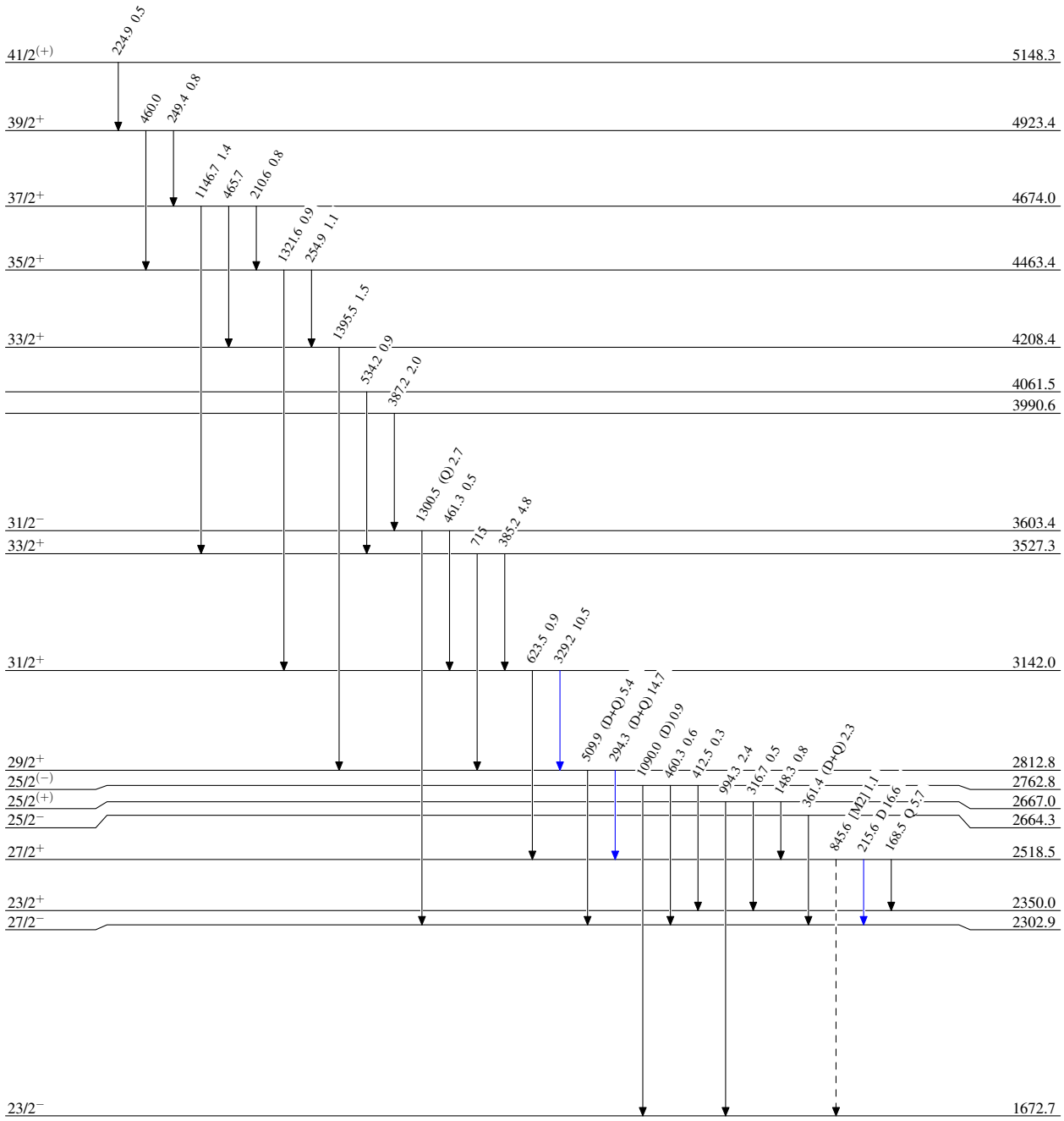
^{144}Sm(^{7}Li,2nγ) 1991La17

Level Scheme

Intensities: Relative I_γ

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)

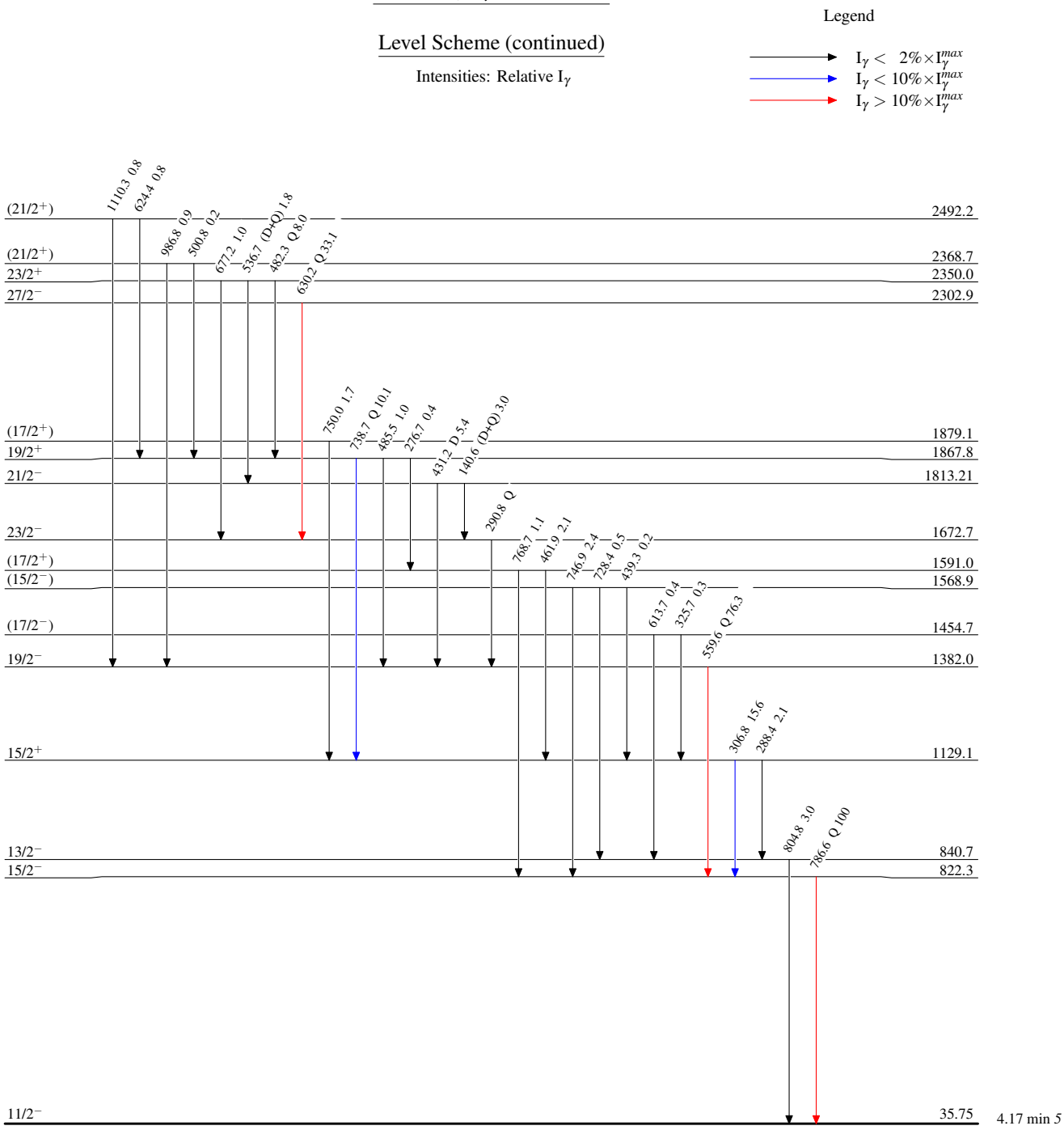


$^{149}_{65}Tb_{84}$

^{144}Sm(^{7}Li,2nγ) 1991La17

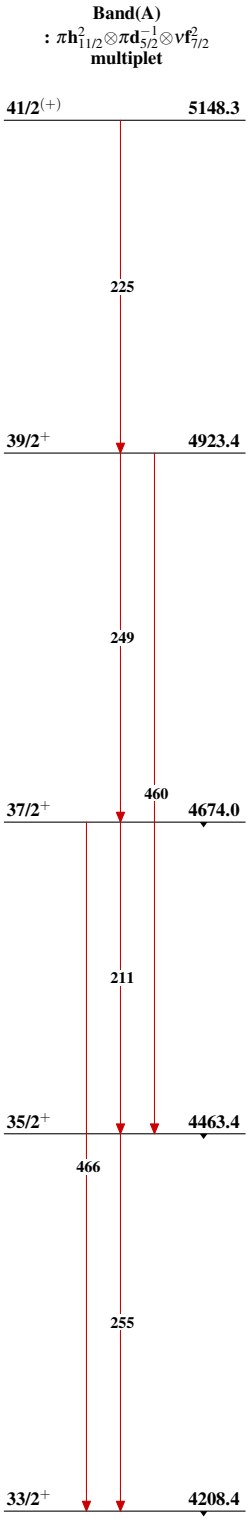
Level Scheme (continued)

Intensities: Relative I_γ



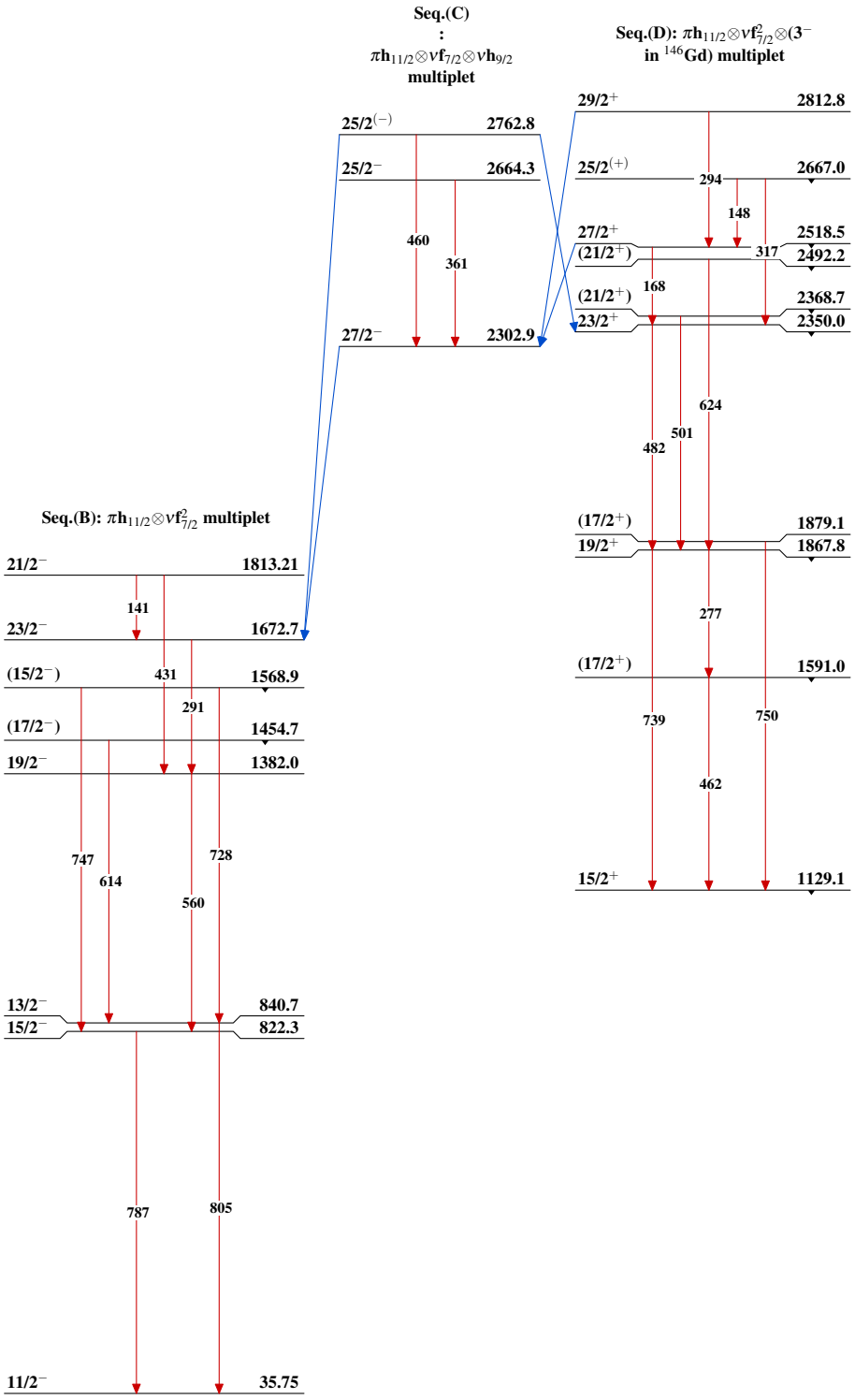
$^{149}_{65}Tb_{84}$

^{144}Sm(^{7}Li,2nγ) 1991La17



$^{149}_{65}Tb_{84}$

^{144}Sm(^{7}Li,2nγ) 1991La17 (continued)



$^{149}_{65}Tb_{84}$