^{151}Eu(α,6nγ) 1991La17

History

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

1991La17: E=78 MeV alpha beam was produced from the Julich Cyclotron. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, γγ-coin, γ(θ), γ(lin pol), γγ(t). Deduced levels, J^π, $T_{1/2}$, γ-ray multipolarities. Comparisons with theoretical calculations. 1991La17 also report data on ^{144}Sm(^{7}Li,2nγ). See 1977KlZP for an earlier report by the same group.

^{149}Tb Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
35.75[#] *8*	11/2⁻	4.17 min	%ε+%β⁺=99.978 *4*; %α=0.022 *4* Additional information 1. Energy, J^π, $T_{1/2}$ and decay modes from the Adopted Levels.
822.4[#] *2*	15/2⁻		
1129.2[@] *3*	15/2⁺		
1382.0[#] *2*	19/2⁻		
1672.8[#] *3*	23/2⁻		
1867.8[@] *3*	19/2⁺		
2303.0 *3*	27/2⁻		Member of $\pi h_{11/2}\otimes\nu h_{9/2}\otimes\nu f_{7/2}$ multiplet (1991La17).
2350.1[@] *3*	23/2⁺		
2518.6[@] *3*	27/2⁺	2.4 ns *2*	$T_{1/2}$: from the Adopted Levels.
2812.9[@] *3*	29/2⁺		
3142.1 *4*	31/2⁺		Configuration=$\pi h_{11/2}\otimes\nu f_{7/2}\otimes\nu\ i_{13/2}$ (1991La17).
3527.4 *4*	33/2⁺		Configuration=$\pi h_{11/2}\otimes\nu f_{7/2}\otimes\nu h_{9/2}\otimes$(3⁻ in ^{146}Gd) (1991La17).
3603.5 *4*	31/2⁻		Possible configuration= $\pi h_{11/2}\otimes\nu f^2_{7/2}\otimes$(3⁻ in ^{146}Gd)⊗ (3⁻ in ^{146}Gd) (1991La17). This configuration involves coupling of two octupole phonons.
4208.5[&] *4*	33/2⁺		
4463.5[&] *4*	35/2⁺		
4674.1[&] *4*	37/2⁺		
4923.5[&] *4*	39/2⁺		
5148.4[&] *5*	(41/2)⁺		

[†] From least-squares fit to γ-ray energies.

[‡] As given in 1991La17, based on γ(θ) and pol data, the latter for selected transitions, combined with association with bands and sequences. Assignments in the Adopted Levels are the same, except that many are placed in parentheses as strong arguments seem lacking.

[#] Seq.(B): $\pi h_{11/2}\otimes\nu f^2_{7/2}$ multiplet. Sequence from 1991La17.

[@] Seq.(C): $\pi h_{11/2}\otimes\nu f^2_{7/2}\otimes$(3⁻ in ^{146}Gd) multiplet. Sequence from 1991La17.

[&] Band(A): $\pi h^2_{11/2}\otimes\pi d^{-1}_{5/2}\otimes\nu f^2_{7/2}$ multiplet. Band from 1991La17.

γ(^{149}Tb)

A_2, A_4 and pol data are from (α,6nγ) in 1991La17, with pol from counting rate asymmetry $2(N_\perp-N_\parallel)/(N_\perp+N_\parallel)$, with respect to the beam direction. The polarization for a pure multipole transition can be determined from the angular distribution coefficients A_2 and A_4 using pol(ad)=$[3A_2+1.25A_4]/[2-A_2+0.75A_4]$ if no parity change (1979Si19). So positive value of pol/pol(ad) indicates no parity change (like M1 or E2) and negative value indicates parity change (like E2). DCO data are also reported by 1991La17 using ^{144}Sm(^{7}Li,2nγ). See that dataset for details.

Continued on next page (footnotes at end of table)

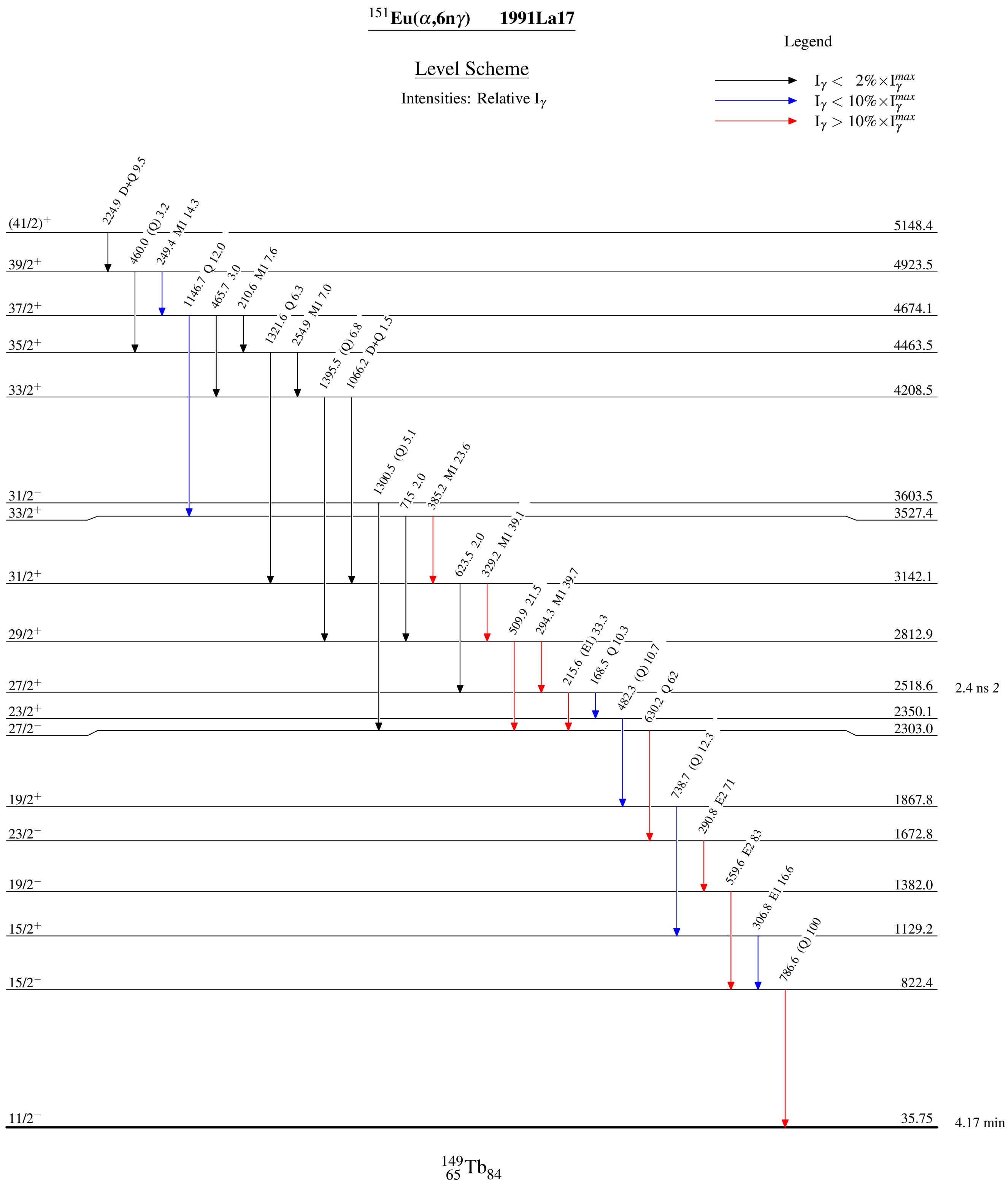
^{151}Eu(α,6nγ) 1991La17 (continued)

γ(^{149}Tb) (continued)

E_γ†	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
168.5 *2*	10.3 *5*	2518.6	27/2+	2350.1	23/2+	Q	A_2=+0.20 *2*; A_4=−0.09 *2*; pol=+0.01 *10*
210.6 *2*	7.6 *8*	4674.1	37/2+	4463.5	35/2+	M1	A_2=−0.17 *2*; A_4=+0.03 *3*; pol=−0.34 *19*
215.6 *1*	33.3 *17*	2518.6	27/2+	2303.0	27/2−	(E1)	A_2=+0.30 *1*; A_4=+0.06 *1*; pol=+0.45 *7* Positive sign in 1991La17 for pol is inconsistent with ΔJ=0, E1; as positive sign either indicates δ(M2/E1)>0.8 or so, which is unlikely from RUL for M2. E1 in 1991La17.
224.9 *3*	9.5 *10*	5148.4	(41/2)+	4923.5	39/2+	D+Q	A_2=+0.09 *2*; A_4=+0.09 *3*
249.4 *2*	14.3 *7*	4923.5	39/2+	4674.1	37/2+	M1	A_2=−0.12 *1*; A_4=−0.01 *2*; pol=−0.11 *10*
254.9 *2*	7.0 *7*	4463.5	35/2+	4208.5	33/2+	M1	A_2=−0.09 *3*; A_4=−0.01 *4*; pol=−0.64 *24*
290.8 *1*	71 *4*	1672.8	23/2−	1382.0	19/2−	E2	A_2=+0.22 *1*; A_4=−0.11 *1*; pol=+0.24 *2*
294.3 *1*	39.7 *20*	2812.9	29/2+	2518.6	27/2+	M1	A_2=−0.25 *1*; A_4=−0.05 *1*; pol=−0.38 *6*
306.8 *1*	16.6 *9*	1129.2	15/2+	822.4	15/2−	E1	A_2=+0.21 *2*; A_4=−0.06 *2*; pol=−0.48 *14*
329.2 *1*	39.1 *20*	3142.1	31/2+	2812.9	29/2+	M1	A_2=−0.17 *1*; A_4=−0.06 *1*; pol=−0.23 *8*
385.2 *2*	23.6 *12*	3527.4	33/2+	3142.1	31/2+	M1	A_2=−0.28 *1*; A_4=−0.06 *2*; pol=−0.30 *12*
460.0 *3*	3.2 *7*	4923.5	39/2+	4463.5	35/2+	(Q)	A_2=+0.23 *8*; A_4=−0.06 *12*
465.7 *3*	3.0 *6*	4674.1	37/2+	4208.5	33/2+		
482.3 *2*	10.7 *6*	2350.1	23/2+	1867.8	19/2+	(Q)	A_2=+0.18 *2*; A_4=−0.03 *3*
509.9 *3*	21.5 *11*	2812.9	29/2+	2303.0	27/2−		
559.6 *1*	83 *4*	1382.0	19/2−	822.4	15/2−	E2	A_2=+0.21 *1*; A_4=−0.10 *1*; pol=+0.23 *8*
623.5 *3*	2.0 *4*	3142.1	31/2+	2518.6	27/2+		
630.2 *2*	62 *3*	2303.0	27/2−	1672.8	23/2−	Q	A_2=+0.23 *1*; A_4=−0.12 *1*
715 *1*	2.0 *4*	3527.4	33/2+	2812.9	29/2+		
738.7 *1*	12.3 *6*	1867.8	19/2+	1129.2	15/2+	(Q)	A_2=+0.18 *3*; A_4=−0.03 *5*
786.6 *2*	100 *5*	822.4	15/2−	35.75	11/2−	(Q)	A_2=+0.22 *1*; A_4=−0.10 *1*
1066.2 *3*	1.5 *3*	4208.5	33/2+	3142.1	31/2+	D+Q	A_2=−0.63 *23*; A_4=+0.21 *34*
1146.7 *2*	12.0 *6*	4674.1	37/2+	3527.4	33/2+	Q	A_2=+0.30 *4*; A_4=−0.14 *6*
1300.5 *2*	5.1 *5*	3603.5	31/2−	2303.0	27/2−	(Q)	A_2=+0.35 *9*; A_4=−0.11 *13*
1321.6 *2*	6.3 *7*	4463.5	35/2+	3142.1	31/2+	Q	A_2=+0.23 *8*; A_4=−0.30 *12*
1395.5 *2*	6.8 *7*	4208.5	33/2+	2812.9	29/2+	(Q)	A_2=+0.31 *8*; A_4=−0.12 *12*

† From 1991La17. Based on a general statement of ≈5% for well-resolved transitions by 1991La17, uncertainties in intensities are assigned by the evaluators as follows: 5% for Iγ≥10, 10% for Iγ≥5, and 20% otherwise. Energies are from results of both this study and ^{144}Sm(^{7}Li,2nγ) by 1991La17 (mostly from the latter with the superior detection sensitivity).

‡ Deduced from γ(θ) and γ(pol) in 1991La17.


151Eu(α,6nγ) 1991La17
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
(41/2)+ 5148.4
39/2+ 4923.5
37/2+ 4674.1
35/2+ 4463.5
33/2+ 4208.5
31/2− 3603.5
33/2+ 3527.4
31/2+ 3142.1
29/2+ 2812.9
27/2+ 2518.6 2.4 ns 2
23/2+ 2350.1
27/2− 2303.0
19/2+ 1867.8
23/2− 1672.8
19/2− 1382.0
15/2+ 1129.2
15/2− 822.4
11/2− 35.75 4.17 min
224.9 D+Q 9.5
460.0 (Q) 3.2
249.4 M1 14.3
1146.7 Q 12.0
465.7 3.0
210.6 M1 7.6
1321.6 Q 6.3
254.9 M1 7.0
1395.5 (Q) 6.8
1066.2 D+Q 1.5
1300.5 (Q) 5.1
715 2.0
385.2 M1 23.6
623.5 2.0
329.2 M1 39.1
509.9 21.5
294.3 M1 39.7
215.6 (E1) 33.3
168.5 Q 10.3
482.3 (Q) 10.7
630.2 Q 62
738.7 (Q) 12.3
290.8 E2 71
559.6 E2 83
306.8 E1 16.6
786.6 (Q) 100
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