^{139}La(n,γ) E=th

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 154,1 (2018)	20-Nov-2018

J^π(capturing state)=3^+,4^+ for s-wave capture by ^{139}La(7/2$^+$)

This dataset is based on 2007ChZX (updating 2003ChZS) which describe the Database of Prompt Gamma Rays from Slow Neutron Capture for Elemental Analysis (PGAA) completed by Nuclear Data Services of IAEA Vienna. Literature and measured data were combined for elements from H to U for which 2007ChZX give global description and list adopted γ's with Iγ>1% (Table 7.3). The complete data are given following the links on the page http://www-nds.iaea.org/pgaa

For ^{140}La PGAA used the 1994Pe19 and 1981Lo16 literature datasets, and data measured by the Institute of Isotope and Surface Chemistry, Budapest, for this purpose. Budapest elemental data measured by prompt k0 factor method were matched with 1994Pe19 isotopic data for assignment to ^{140}La. Budapest Iγ's were reported in partial elemental cross sections ($\sigma^Z_\gamma(E_\gamma)$) corresponding to neutrons at 2200 m/s, and were used to renormalize the Iγ's of literature datasets (reported in per 100 n captures). 194 γ's from Budapest measurement matched one of the 279 placed γ's from 1994Pe19 and were used for normalization. The renormalization was done by a factor chosen to minimize the weighted average difference between the literature and experimental intensity data.

PGAA did the weighted averages of Eγ and Iγ values from these datasets. A weighted least-square fit of the γ's was done to get the levels, and the adopted γ-ray energies were calculated from level energy differences after correction for recoil, which ensures good precision to weak transitions. A χ^2 analysis was performed to handle outliers and discrepant data for Eγ and Iγ data. See 2007ChZX, p. 67, for details on analysis.

PGAA-adopted data (ENSDF-formatted file 140la_adop.ens in site) give Iγ column head in per 100 n captures, while the Iγ values listed in table for placed γ's are $\sigma^Z_\gamma(E_\gamma)$ values (as seen in the data comparison file La_report.htm, where Iγ's in both units are listed). The Iγ values for unplaced γ's listed in the same table are instead in per 100 n captures, but not renormalized to Budapest measurement.

Because Budapest measurement is the Iγ reference, the values in cross section unit were kept here by evaluator, while the Iγ column head was modified accordingly. The Iγ values of unplaced γ's were renormalized by evaluator to Budapest measurement, then transformed in cross section unit. The normalization factor 1.2400 was calculated by evaluator as the average of all Iγ ratios of placed γ's, between renormalized and non-renormalized data from file La_report.htm, when the only existent non-renormalized data were those from 1994Pe19, which contains the unplaced γ's too. The ΔIγ values were affected by the extra factor 1.1377, which resulted as the average of ΔIγ(%) ratios of the same renormalized – non-renormalized data used to calculate the normalization factor.

2007ChZX and related data constitute one of the most extensive and comprehensive works ever done on the subject of prompt gamma rays from slow neutron capture, which practically cover the periodic table. Not surprisingly, though, some of the peculiarities in analyzing each particular nuclide were not disclosed, or might have escaped the evaluator's ability to find them in long data files, while comprehensive explanations were given to the common part of the method. For this reason some of the comments and footnotes that follow, like the ones on the precision of E(level), are signaling the fact but do not contain its explanation

Comments to data prior to, and included into 2007ChZX through 1994Pe19 dataset:

1970Ju04,1972Fu10,1990Is09: primary γ's.

1970Ju04,1988BoZH,1989BoZL,1990Me03: secondary γ's.

1970Ju04,1972Fu10,1988BoZH,1989BoZL: measured γ, $\gamma\gamma$.

1990Is09,1990Me03: measured γ.

1989BoZL,1988BoZH: measured ce.

1989Be45,1989Ma51,2004Mi14: (pol n,γ) data on 0.734 eV resonance neutrons.

1977Ke21: γ-spectra from ^{139}La(n,γ) E=10-70 keV.

For other measurements see 1994Pe19

^{140}La Levels

E(level)†	J^π‡
0.0	3^-
29.9641 *6*	2^-
34.6465 *10*	5^-
43.85# *4*	1^-

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^{139}La(n,γ) E=th (continued)

^{140}La Levels (continued)

E(level)[†]	J^{π}[‡]	E(level)[†]	E(level)[†]	E(level)[†]
48.8850 *25*	6^-	1433.251 *24*	1866.43 *6*	2257.33 *5*
63.1791 *8*	4^-	1442.631 *24*	1871.57 *9*	2264.34 *6*
103.8293 *25*	6^-	1469.60 *3*	1875.32 *8*	2273.50 *13*
162.659[@] *3*	2^-	1477.06 *3*	1879.715 *24*	2277.43 *11*
272.307[@] *4*	4^-	1481.312 *24*	1895.700 *24*	2280.38 *6*
284.656 *8*	7^-	1495.322 *24*	1902.088 *24*	2291.83 *13*
318.219 *5*	3^-	1527.5 *3*	1941.16 *3*	2297.91 *3*
322.055 *22*	5^-	1532.29 *10*	1947.62 *4*	2308.42 *4*
467.69[@] *8*	1^-	1547.66 *6*	1954.75 *19*	2311.72 *11*
575.9[@] *5*	$2^-,3^-$	1550.929 *24*	1963.44 *6*	2321.65 *9*
581.25 *16*	0^-	1554.487 *24*	1971.87 *3*	2323.48 *4*
591.52[@] *11*	2^-	1564.51 *4*	1986.19 *4*	2332.39 *7*
602.034[#] *12*	4^-	1577.5 *5*	1989.28 *7*	2340.29 *6*
658.280[#] *12*	3^-	1580.06 *4*	1997.174 *24*	2346.09 *15*
672.98[#] *3*	4^-	1596.09 *4*	2005.90 *6*	2351.15 *9*
711.67[@] *3*	3^-	1617.97 *6*	2018.22 *3*	2356.15 *4*
744.71[#] *3*	4^-	1621.69 *8*	2023.76 *4*	2361.32 *6*
755.07[#] *20*	$1^-,2^-$	1635.99 *4*	2040.13 *11*	2369.10 *10*
771.425[#] *14*	$^-$	1651.79 *4*	2041.92 *4*	2393.40 *4*
796.27[#] *5*	2^-	1655.37 *20*	2045.02 *3*	2396.46 *4*
831.2[#] *4*	$2^-,3^-$	1660.88 *8*	2048.59 *3*	2403.249 *24*
905.754 *15*	2^-	1663.00 *4*	2065.47 *4*	2413.32 *4*
912.17[#] *3*	$3^-,4^-$	1672.19 *3*	2069.67 *6*	2421.97 *4*
914.11 *18*	$3^-,4^-,5^-$	1676.68 *16*	2077.989 *24*	2425.84 *4*
917.67[#] *11*	$2,3,4^-$	1683.82 *3*	2082.17 *6*	2434.67 *20*
941.80[#] *17*	$2^-,3^-,4^-$	1688.01 *16*	2092.01 *20*	2436.71 *4*
968.66 *8*	$3^-,4^-$	1701.05 *3*	2094.23 *15*	2446.35 *3*
986.700 *19*	$4^-,5^-$	1709.4 *3*	2103.31 *6*	2450.36 *4*
1035.63[#] *3*	4^-	1718.76 *3*	2109.48 *5*	2458.60 *6*
1055.042[#] *20*	$4^-,5^-$	1723.12 *4*	2116.72 *10*	2462.78 *4*
1093.58 *8*	$2^-,3^-,4^-$	1735.560 *24*	2120.03 *4*	2468.68 *6*
1097.27 *15*		1736.67 *3*	2125.41 *3*	2472.89 *3*
1100.934 *19*	$3^-,4^-$	1743.72 *4*	2129.69 *4*	2483.35 *12*
1109.77 *3*	$3^-,4^-$	1748.02 *6*	2143.900 *24*	2484.85 *7*
1116.760 *20*		1756.15 *4*	2148.94 *11*	2492.97 *4*
1147.43 *20*		1765.52 *4*	2159.80 *13*	2499.43 *4*
1161.02 *12*		1774.59 *16*	2162.61 *5*	2520.98 *3*
1187.38 *4*		1777.57 *3*	2172.44 *3*	2523.01 *6*
1190.50 *12*		1789.10 *10*	2175.95 *6*	2539.67 *20*
1207.36 *9*		1792.67 *13*	2183.62 *5*	2543.22 *4*
1209.80 *3*		1801.08 *3*	2191.70 *4*	2549.4 *3*
1254.78 *13*		1804.95 *6*	2197.0 *4*	2553.81 *3*
1259.967 *24*		1813.95 *10*	2199.63 *4*	2562.81 *4*
1284.12 *7*		1819.48 *4*	2218.13 *5*	2566.53 *15*
1295.47 *11*		1823.13 *6*	2219.73 *6*	2596.19 *3*
1339.55 *4*		1838.90 *13*	2231.53 *9*	2599.13 *3*
1340.72 *9*		1841.97 *4*	2235.97 *3*	2605.22 *4*
1416.08 *4*		1848.62 *10*	2241.24 *6*	2622.16 *7*
1422.39 *4*		1854.09 *12*	2244.08 *4*	2628.59 *4*
1425.65 *4*		1859.66 *6*	2247.81 *4*	2643.94 *8*

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^{139}La(n,γ) E=th (continued)

^{140}La Levels (continued)

E(level)[†]	J$^\pi$[‡]
2648.43 *17*	
2815.77 *6*	
(5161.004[&] *6*)	3$^+$,4$^+$[a]

[†] From 2007ChZX, based on 1994Pe19 (see the above general comments)

[‡] From 2007ChZX, based on 1994Pe19; see Adopted Levels for updated and evaluated values

[#] E(level) less precise than in 1994Pe19

[@] E(level) less precise than in 1994Pe19, with change of several standard deviations

[&] From 2007ChZX, by least-squares fit of γ energies to the level energies, including S(n). 2007ChZX compared this with S(n)=5160.97 *5* from 1995Au04 (see also S(n)=5160.98 *4*, 2017Wa10)

[a] From s-wave capture on J^π=7/2$^+$ target

γ(^{140}La)

Iγ normalization: 100 divided by thermal n cross section from 2007ChZX, σ_γ=5.76 b 5 (Table 5.1, from primary γ′s) and divided by ^{139}La isotopic abundance θ=0.99910 *1* (Table 5.1) Other value: σ_γ=6.13 b 24 (2007ChZX, from secondary γ′s to g.s.). Compared to the capture cross section of 9.04 b 4 (2006MuZX) or more recent values of 9.16 b 36 (2014Do07) and 9.24 b 25 (2017Pa08) it results that both primary and secondary σ_γ′s are incomplete (2007ChZX, p. 57).

E_γ[†]	I_γ[‡b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[c]	Comments
13.89 *4*	0.0016 *2*	43.85	1⁻	29.9641	2⁻	M1+E2	6.×10³ *6*	α(L)=4.E3 5; α(M)=1.0×10³ *10*; α(N+..)=2.3×10² *23* α(N)=2.0×10² *20*; α(O)=3.E1 3; α(P)=0.018 *6*
14.2385 *25*	0.028 *6*	48.8850	6⁻	34.6465	5⁻			
26.6[@]		602.034	4⁻	575.9	2⁻,3⁻			
28.5326 *13*	0.0103 *11*	63.1791	4⁻	34.6465	5⁻			
29.9641 *6*	0.169 *8*	29.9641	2⁻	0.0	3⁻	M1	5.36	α(L)=4.25 *6*; α(M)=0.884 *13*; α(N+..)=0.228 *4* α(N)=0.194 *3*; α(O)=0.0315 *5*; α(P)=0.00242 *4*
34.61[@d] *4*		831.2	2⁻,3⁻	796.27	2⁻			
34.6465 *10*	0.022 *2*	34.6465	5⁻	0.0	3⁻	E2	116.3	α(L)=91.1 *13*; α(M)=20.3 *3*; α(N+..)=4.86 *7* α(N)=4.27 *6*; α(O)=0.588 *9*; α(P)=0.000664 *10* I_γ: From intensity balance.
38.6948 *15*		711.67	3⁻	672.98	4⁻			
45.913 *6*	0.0120 *7*	318.219	3⁻	272.307	4⁻	M1	10.27	α(K)=8.75 *13*; α(L)=1.205 *17*; α(M)=0.251 *4*; α(N+..)=0.0647 *9* α(N)=0.0550 *8*; α(O)=0.00893 *13*; α(P)=0.000687 *10*
49.748 *22*	0.0050 *6*	322.055	5⁻	272.307	4⁻			
54.9443 *11*	0.143 *7*	103.8293	6⁻	48.8850	6⁻	M1	6.10	α(K)=5.20 *8*; α(L)=0.711 *10*; α(M)=0.1479 *21*; α(N+..)=0.0382 *6* α(N)=0.0325 *5*; α(O)=0.00527 *8*; α(P)=0.000406 *6*
56.246 *7*	0.0046 *5*	658.280	3⁻	602.034	4⁻	M1	5.69	α(K)=4.86 *7*; α(L)=0.664 *10*; α(M)=0.1381 *20*; α(N+..)=0.0356 *5* α(N)=0.0303 *5*; α(O)=0.00492 *7*; α(P)=0.000380 *6*
63.1791 *8*	0.208 *8*	63.1791	4⁻	0.0	3⁻	M1	4.06	α(K)=3.46 *5*; α(L)=0.473 *7*; α(M)=0.0983 *14*; α(N+..)=0.0254 *4* α(N)=0.0216 *3*; α(O)=0.00351 *5*; α(P)=0.000270 *4*
69.1828 *24*	0.0137 *5*	103.8293	6⁻	34.6465	5⁻			
86.43 *3*		744.71	4⁻	658.280	3⁻			
[x]89.12 *3*	0.002 *1*							
97.1 *5*		672.98	4⁻	575.9	2⁻,3⁻			
115.90 *6*	0.00360 *14*	912.17	3⁻,4⁻	796.27	2⁻			
118.81 *4*	0.0075 *3*	162.659	2⁻	43.85	1⁻			
123.82 *13*	0.00180 *7*	591.52	2⁻	467.69	1⁻			
132.695 *3*	0.0146 *6*	162.659	2⁻	29.9641	2⁻	M1	0.485	α(K)=0.415 *6*; α(L)=0.0560 *8*; α(M)=0.01163 *17*; α(N+..)=0.00301 *5* α(N)=0.00256 *4*; α(O)=0.000416 *6*; α(P)=3.23×10⁻⁵ *5*
[x]137.501 *17*	0.010 *3*							E_γ: corrected value from 1970Ju04.
150.93[@]		905.754	2⁻	755.07	1⁻,2⁻			
155.560 *5*	0.192 *7*	318.219	3⁻	162.659	2⁻	M1	0.312	α(K)=0.266 *4*; α(L)=0.0358 *5*; α(M)=0.00744 *11*; α(N+..)=0.00192 *3* α(N)=0.001636 *23*; α(O)=0.000266 *4*; α(P)=2.07×10⁻⁵ *3*

From ENSDF

γ(^{140}La) (continued)

$E_γ$[†]	$I_γ$[‡b]	E_i(level)	$J_i^π$	E_f	$J_f^π$	Mult.[#]	α[c]	Comments
[x]158.73 *5*	0.0036 *16*							
[x]159.34 *3*	0.012 *6*							
162.659 *3*	0.489 *18*	162.659	2^-	0.0	3^-	M1	0.275	α(K)=0.235 *4*; α(L)=0.0316 *5*; α(M)=0.00657 *10*; α(N+..)=0.001698 *24* α(N)=0.001445 *21*; α(O)=0.000235 *4*; α(P)=1.83×10^{-5} *3*
[x]163.75[d] *8*	0.0064 *24*							
[x]165.853 *19*	0.011 *4*							
[x]167.28 *10*	0.0050 *24*							
167.46 *4*	0.00467 *18*	912.17	$3^-,4^-$	744.71	4^-			
169.39 *19*		914.11	$3^-,4^-,5^-$	744.71	4^-			
169.392 *10*	0.0382 *14*	771.425	$^-$	602.034	4^-	M1,E2	0.28 *4*	α(K)=0.222 *12*; α(L)=0.046 *18*; α(M)=0.010 *4*; α(N+..)=0.0025 *10* α(N)=0.0021 *9*; α(O)=0.00032 *12*; α(P)=1.52×10^{-5} *12*
172.9 *4*		831.2	$2^-,3^-$	658.280	3^-			
179.2 *5*		755.07	$1^-,2^-$	575.9	$2^-,3^-$			
180.827 *8*	0.0064 *21*	284.656	7^-	103.8293	6^-			
[x]185.85[d] *15*	0.0064 *24*							
190.59 *8*		658.280	3^-	467.69	1^-			
194.04[@]		905.754	2^-	711.67	3^-			
202.44 *19*		914.11	$3^-,4^-,5^-$	711.67	3^-			
[x]203.09[d] *15*	0.0064 *24*							
209.127 *4*	0.0431 *16*	272.307	4^-	63.1791	4^-	M1	0.1384	α(K)=0.1184 *17*; α(L)=0.01581 *23*; α(M)=0.00328 *5*; α(N+..)=0.000849 *12* α(N)=0.000722 *11*; α(O)=0.0001175 *17*; α(P)=9.19×10^{-6} *13*
215.02[d] *16*	0.025 *6*	796.27	2^-	581.25	0^-			
218.225 *22*	0.78 *3*	322.055	5^-	103.8293	6^-	M1	0.1233	α(K)=0.1056 *15*; α(L)=0.01408 *20*; α(M)=0.00292 *4*; α(N+..)=0.000755 *11* α(N)=0.000643 *9*; α(O)=0.0001046 *15*; α(P)=8.19×10^{-6} *12*
235.771 *8*	0.111 *4*	284.656	7^-	48.8850	6^-	M1	0.1002	α(K)=0.0858 *12*; α(L)=0.01141 *16*; α(M)=0.00237 *4*; α(N+..)=0.000612 *9* α(N)=0.000521 *8*; α(O)=8.48×10^{-5} *12*; α(P)=6.64×10^{-6} *10*
237.660 *4*	0.320 *12*	272.307	4^-	34.6465	5^-	M1	0.0980	α(K)=0.0840 *12*; α(L)=0.01117 *16*; α(M)=0.00232 *4*; α(N+..)=0.000599 *9* α(N)=0.000510 *8*; α(O)=8.30×10^{-5} *12*; α(P)=6.50×10^{-6} *10*
242.342 *4*	0.00590 *22*	272.307	4^-	29.9641	2^-			
255.040 *5*	0.017 *4*	318.219	3^-	63.1791	4^-			
258.875 *22*	0.0233 *9*	322.055	5^-	63.1791	4^-	M1,E2	0.0767 *17*	α(K)=0.063 *4*; α(L)=0.0105 *17*; α(M)=0.0022 *4*; α(N+..)=0.00056 *9* α(N)=0.00048 *8*; α(O)=7.5×10^{-5} *10*; α(P)=4.5×10^{-6} *7*
272.306 *4*	0.502 *19*	272.307	4^-	0.0	3^-	M1	0.0682	α(K)=0.0585 *9*; α(L)=0.00774 *11*; α(M)=0.001607 *23*; α(N+..)=0.000415 *6* α(N)=0.000353 *5*; α(O)=5.76×10^{-5} *8*; α(P)=4.52×10^{-6} *7*

γ(^{140}La) (continued)

E_γ[†]	I_γ[‡b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[c]	Comments
x278.36 *15*	0.011 *4*							
279.979 *22*	0.0640 *24*	602.034	4^-	322.055	5^-	M1,E2	0.061 *3*	α(K)=0.051 *4*; α(L)=0.0081 *10*; α(M)=0.00172 *23*; α(N+..)=0.00044 *5* α(N)=0.00037 *5*; α(O)=5.9×10^{-5} *6*; α(P)=3.7×10^{-6} *6*
283.52 *17*		941.80	$2^-,3^-,4^-$	658.280	3^-			
283.617 *16*	0.0409 *15*	1055.042	$4^-,5^-$	771.425	$^-$			
287.408 *22*	0.013 *4*	322.055	5^-	34.6465	5^-			
288.255 *5*	0.73 *3*	318.219	3^-	29.9641	2^-	M1	0.0587	α(K)=0.0503 *7*; α(L)=0.00665 *10*; α(M)=0.001380 *20*; α(N+..)=0.000357 *5* α(N)=0.000304 *5*; α(O)=4.95×10^{-5} *7*; α(P)=3.89×10^{-6} *6*
290.92 *3*	0.0167 *6*	1035.63	4^-	744.71	4^-			
305.04 *8*	0.0147 *6*	467.69	1^-	162.659	2^-	M1,E2	0.048 *4*	α(K)=0.040 *4*; α(L)=0.0062 *5*; α(M)=0.00131 *12*; α(N+..)=0.00033 *3* α(N)=0.000285 *24*; α(O)=4.49×10^{-5} *25*; α(P)=2.9×10^{-6} *5*
310.14 *3*	0.0184 *7*	912.17	$3^-,4^-$	602.034	4^-			
323.96 *4*	0.00461 *17*	1035.63	4^-	711.67	3^-			
329.727 *12*	0.0140 *5*	602.034	4^-	272.307	4^-			
341.8 *5*	0.00300 *11*	917.67	$2,3,4^-$	575.9	$2^-,3^-$			
x389.18 *5*	0.027 *7*							
x396.94 *6*	0.033 *7*							
413.2 *5*	0.00430 *16*	575.9	$2^-,3^-$	162.659	2^-			
422.66 *4*	0.370 *14*	744.71	4^-	322.055	5^-	M1,E2	0.019 *3*	α(K)=0.016 *3*; α(L)=0.00234 *12*; α(M)=0.000489 *20*; α(N+..)=0.000125 *7* α(N)=0.000107 *5*; α(O)=1.71×10^{-5} *12*; α(P)=1.20×10^{-6} *24*
423.84 *8*		467.69	1^-	43.85	1^-			
426.49 *3*	0.0435 *16*	744.71	4^-	318.219	3^-			
437.73 *8*	0.0028 *7*	467.69	1^-	29.9641	2^-			
x443.2[d] *3*	0.016 *4*							
478.05 *5*	0.0407 *15*	796.27	2^-	318.219	3^-	M1	0.01600	α(K)=0.01375 *20*; α(L)=0.00179 *3*; α(M)=0.000370 *6*; α(N+..)=9.57×10^{-5} *14* α(N)=8.14×10^{-5} *12*; α(O)=1.328×10^{-5} *19*; α(P)=1.053×10^{-6} *15*
495.620 *13*	0.081 *3*	658.280	3^-	162.659	2^-	M1	0.01462	α(K)=0.01256 *18*; α(L)=0.001631 *23*; α(M)=0.000338 *5*; α(N+..)=8.74×10^{-5} *13* α(N)=7.43×10^{-5} *11*; α(O)=1.212×10^{-5} *17*; α(P)=9.62×10^{-7} *14*
528.34 *11*	0.0197 *7*	591.52	2^-	63.1791	4^-			
x528.6[d] *3*	0.014 *3*							
537.64[@]		581.25	0^-	43.85	1^-			
538.854 *12*	0.0455 *17*	602.034	4^-	63.1791	4^-	M1,E2	0.0101 *18*	α(K)=0.0086 *16*; α(L)=0.00119 *13*; α(M)=0.00025 *3*; α(N+..)=6.4×10^{-5} *7* α(N)=5.4×10^{-5} *6*; α(O)=8.8×10^{-6} *11*; α(P)=6.4×10^{-7} *14*
x543.2 *6*	0.029 *14*							
547.67 *12*		591.52	2^-	43.85	1^-			

$^{140}_{57}La_{83}$-6

$^{139}La(n,\gamma)$ E=th (continued)

$\gamma(^{140}La)$ (continued)

E_γ[†]	I_γ[‡b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[c]	Comments
549.01 *3*	0.098 *4*	711.67	3^-	162.659	2^-	M1	0.01134	α(K)=0.00975 *14*; α(L)=0.001261 *18*; α(M)=0.000261 *4*; α(N+..)=6.75×10^{-5} *10* α(N)=5.74×10^{-5} *8*; α(O)=9.38×10^{-6} *14*; α(P)=7.45×10^{-7} *11*
553.148 *12*	0.0602 *23*	602.034	4^-	48.8850	6^-	E2	0.00786	α(K)=0.00661 *10*; α(L)=0.000987 *14*; α(M)=0.000207 *3*; α(N+..)=5.27×10^{-5} *8* α(N)=4.51×10^{-5} *7*; α(O)=7.14×10^{-6} *10*; α(P)=4.72×10^{-7} *7*
558.9 *4*		831.2	$2^-,3^-$	272.307	4^-			
567.386 *12*	0.335 *13*	602.034	4^-	34.6465	5^-	M1	0.01045	α(K)=0.00899 *13*; α(L)=0.001162 *17*; α(M)=0.000240 *4*; α(N+..)=6.22×10^{-5} *9* α(N)=5.29×10^{-5} *8*; α(O)=8.64×10^{-6} *12*; α(P)=6.87×10^{-7} *10*
[x]574.3 *3*	0.025 *6*							
582.05 *3*	0.00260 *10*	744.71	4^-	162.659	2^-			
[x]583.7 *11*	0.0057 *24*							
592.05 *18*	0.0128 *5*	914.11	$3^-,4^-,5^-$	322.055	5^-			
595.099 *12*	0.103 *4*	658.280	3^-	63.1791	4^-	M1,E2	0.0079 *14*	α(K)=0.0067 *13*; α(L)=0.00092 *12*; α(M)=0.000191 *23*; α(N+..)=4.9×10^{-5} *7* α(N)=4.2×10^{-5} *6*; α(O)=6.7×10^{-6} *10*; α(P)=5.0×10^{-7} *11*
602.032 *12*	0.0522 *20*	602.034	4^-	0.0	3^-			
[x]616.7 *20*	0.011 *5*							
623.632 *12*	0.0517 *20*	658.280	3^-	34.6465	5^-	E2	0.00576	α(K)=0.00487 *7*; α(L)=0.000705 *10*; α(M)=0.0001473 *21*; α(N+..)=3.76×10^{-5} *6* α(N)=3.22×10^{-5} *5*; α(O)=5.12×10^{-6} *8*; α(P)=3.51×10^{-7} *5*
628.314 *12*	0.0284 *11*	658.280	3^-	29.9641	2^-	M1	0.00814	α(K)=0.00700 *10*; α(L)=0.000902 *13*; α(M)=0.000187 *3*; α(N+..)=4.83×10^{-5} *7* α(N)=4.11×10^{-5} *6*; α(O)=6.71×10^{-6} *10*; α(P)=5.34×10^{-7} *8*
638.33 *3*	0.00600 *23*	672.98	4^-	34.6465	5^-			
640.88 *3*	0.0534 *20*	744.71	4^-	103.8293	6^-			
658.278 *12*	0.103 *4*	658.280	3^-	0.0	3^-	M1	0.00727	α(K)=0.00626 *9*; α(L)=0.000805 *12*; α(M)=0.0001664 *24*; α(N+..)=4.31×10^{-5} *6* α(N)=3.66×10^{-5} *6*; α(O)=5.98×10^{-6} *9*; α(P)=4.77×10^{-7} *7*
667.594 *14*	0.0580 *22*	771.425	$^-$	103.8293	6^-	M1,E2	0.0059 *11*	α(K)=0.0051 *10*; α(L)=0.00068 *10*; α(M)=0.000142 *20*; α(N+..)=3.6×10^{-5} *6* α(N)=3.1×10^{-5} *5*; α(O)=5.0×10^{-6} *8*; α(P)=3.8×10^{-7} *9*
681.53 *3*		744.71	4^-	63.1791	4^-			
681.71 *3*	0.007 *4*	711.67	3^-	29.9641	2^-			
[x]689.7 *18*	0.004 *4*							
[x]697.9 *4*	0.023 *5*							
708.244 *14*	0.134 *5*	771.425	$^-$	63.1791	4^-	M1,E2	0.0051 *10*	α(K)=0.0044 *9*; α(L)=0.00059 *9*; α(M)=0.000122 *18*; α(N+..)=3.1×10^{-5} *5* α(N)=2.7×10^{-5} *4*; α(O)=4.3×10^{-6} *7*; α(P)=3.3×10^{-7} *7*
710.07 *3*	0.0668 *25*	744.71	4^-	34.6465	5^-			
711.22 *20*	0.0164 *6*	755.07	$1^-,2^-$	43.85	1^-			

γ(^{140}La) (continued)

E_γ[†]	I_γ[‡b]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[c]	Comments
722.538 14	0.212 8	771.425	$^-$	48.8850	6^-	M1,E2	0.0049 9	α(K)=0.0042 8; α(L)=0.00056 9; α(M)=0.000116 17; α(N+..)=3.0×10^{-5} 5 α(N)=2.5×10^{-5} 4; α(O)=4.1×10^{-6} 7; α(P)=3.1×10^{-7} 7
725.11 20	0.0125 5	755.07	$1^-,2^-$	29.9641	2^-			
736.777 14	0.0388 15	771.425	$^-$	34.6465	5^-			
744.71 3	0.010 4	744.71	4^-	0.0	3^-			
766.30 5	0.0127 5	796.27	2^-	29.9641	2^-			
782.733 20	0.0396 15	1055.042	$4^-,5^-$	272.307	4^-			
787.3[d] 4	0.008 4	831.2	$2^-,3^-$	43.85	1^-			
796.27 5	0.0162 6	796.27	2^-	0.0	3^-			
[x]821.7 5	0.020 8							
831.2 4	0.0070 3	831.2	$2^-,3^-$	0.0	3^-			
[x]837.8 11	0.006 6							
848.99 3	0.0290 11	912.17	$3^-,4^-$	63.1791	4^-			
863.28 3	0.0149 6	912.17	$3^-,4^-$	48.8850	6^-			
868.32 5	0.0558 21	912.17	$3^-,4^-$	43.85	1^-			
882.21 3	0.0343 13	912.17	$3^-,4^-$	29.9641	2^-			
887.70 11	0.0222 8	917.67	$2,3,4^-$	29.9641	2^-			
[x]892.3 5	0.033 10							
[x]935.8 20	0.012 8							γ placed at 1101 adopted level from (n,γ) two γ dataset.
941.79 17	0.0236 9	941.80	$2^-,3^-,4^-$	0.0	3^-			
[x]953.8 8	0.014 6							
968.66[&d] 8		968.66	$3^-,4^-$	0.0	3^-			
[x]978.1 4	0.019 6							
986.696[&d] 19		986.700	$4^-,5^-$	0.0	3^-			
986.74 3	0.008 4	1035.63	4^-	48.8850	6^-			
991.859 20	0.0487 18	1055.042	$4^-,5^-$	63.1791	4^-			
1006.153 20	0.0347 13	1055.042	$4^-,5^-$	48.8850	6^-			
1020.392 20	0.0535 20	1055.042	$4^-,5^-$	34.6465	5^-			
[x]1025.2 9	0.007 4							
[x]1032.6 6	0.014 5							
[x]1037.0 6	0.021 6							γ placed at 1037 adopted level from (n,γ) two γ dataset.
[x]1041.5 6	0.017 6							
1055.038 20	0.015 5	1055.042	$4^-,5^-$	0.0	3^-			
[x]1083.7 7	0.012 5							
[x]1088.0 9	0.009 5							
1093.58[&d] 8		1093.58	$2^-,3^-,4^-$	0.0	3^-			
[x]1097.8 6	0.027 8							γ placed at 1161 adopted level from (n,γ) two γ dataset.
[x]1101.8 8	0.033 11							γ placed at 1101 adopted level from (n,γ) two γ dataset.
[x]1104.9 7	0.024 11							

^{139}La(n,γ) E=th (continued)

γ(^{140}La) (continued)

E_γ[†]	I_γ[‡b]	E_i(level)	J_i^π	E_f	J_f^π	Comments
[x]1117.5 *4*	0.041 *13*					γ placed at 1161 adopted level from (n,γ) two γ dataset.
[x]1125.5 *6*	0.030 *10*					γ placed at 1188 adopted level from (n,γ) two γ dataset.
[x]1133.7 *13*	0.024 *8*					
[x]1142.7 *13*	0.007 *5*					
[x]1149.8 *20*	0.011 *7*					
[x]1153.6 *10*	0.010 *7*					γ placed at 1425 adopted level from (n,γ) two γ dataset.
[x]1157.5 *8*	0.016 *8*					
[x]1163.1 *9*	0.014 *6*					γ placed at 1434 and/or 1482 Adopted Levels from (n,γ) two γ dataset.
[x]1176.9 *11*	0.018 *6*					
[x]1181.6 *8*	0.013 *6*					
[x]1188.9 *11*	0.015 *6*					γ placed at 1188 adopted level from (n,γ) two γ dataset.
[x]1198.6 *4*	0.014 *6*					
[x]1225.2 *4*	0.051 *16*					γ placed at 1260 adopted level from (n,γ) two γ dataset.
[x]1233.1 *4*	0.036 *12*					γ placed at 1551 adopted level from (n,γ) two γ dataset.
[x]1253.9 *6*	0.019 *6*					
[x]1284.0 *4*	0.031 *8*					γ placed at 1555 adopted level from (n,γ) two γ dataset.
[x]1291.9 *4*	0.035 *10*					γ placed at 1340 and/or 1563 Adopted Levels from (n,γ) two γ dataset.
[x]1296.9 *4*	0.029 *10*					
[x]1330.5 *3*	0.049 *15*					γ placed at 1425 adopted level from (n,γ) two γ dataset.
1340.71[a] *9*	0.017 *7*	1340.72		0.0	3^-	
[x]1363.7 *4*	0.012 *4*					
[x]1385.1 *5*	0.016 *6*					γ placed at 1433 and/or 1659 adopted level from (n,γ) two γ dataset.
[x]1392.6 *9*	0.011 *6*					γ placed at 1427 adopted level from (n,γ) two γ dataset.
[x]1406.4 *4*	0.021 *8*					γ placed at 1720 adopted level from (n,γ) two γ dataset.
[x]1414.2 *6*	0.018 *8*					γ placed at 1478 and/or 1683 Adopted Levels from (n,γ) two γ dataset.
[x]1418.6 *4*	0.045 *16*					γ placed at 1482 and/or 1735 Adopted Levels from (n,γ) two γ dataset.
[x]1426.3 *4*	0.014 *6*					
[x]1432.8 *4*	0.026 *10*					γ placed at 1495 adopted level from (n,γ) two γ dataset.
[x]1447.5 *3*	0.0785 *23*					γ placed at 1482 adopted level from (n,γ) two γ dataset.
[x]1452.1 *4*	0.035 *10*					γ placed at 1486 and/or 1555 and/or 1720 Adopted Levels from (n,γ) two γ dataset.
[x]1470.7 *5*	0.019 *6*					γ placed at 1743 adopted level from (n,γ) two γ dataset.
[x]1476.9 *5*	0.016 *6*					
[x]1489.2 *5*	0.032 *10*					γ placed at 1551 adopted level from (n,γ) two γ dataset.
[x]1495.7 *4*	0.061 *16*					γ placed at 1495 and/or 1659 and/or 1817 Adopted Levels from (n,γ) two γ dataset.
[x]1500.0 *8*	0.024 *8*					γ placed at 1551 and/or 1823 adopted level from (n,γ) two γ dataset.
1848.61[a] *10*		1848.62		0.0	3^-	γ placed at 1849 adopted level from (n,γ) two γ dataset.
2345.21 *6*	0.0164 *6*	(5161.004)	$3^+,4^+$	2815.77		
2512.55 *17*	0.0194 *7*	(5161.004)	$3^+,4^+$	2648.43		
2517.04 *8*	0.0353 *13*	(5161.004)	$3^+,4^+$	2643.94		
2532.39 *4*	0.0188 *7*	(5161.004)	$3^+,4^+$	2628.59		
2538.82 *7*	0.0119 *5*	(5161.004)	$3^+,4^+$	2622.16		

From ENSDF

$^{140}_{57}La_{83}$-9

^{139}La(n,γ) E=th (continued)

γ(^{140}La) (continued)

E_γ[†]	I_γ[‡b]	E_i(level)	J^π_i	E_f	Comments
2555.76 *4*	0.0231 *9*	(5161.004)	$3^+,4^+$	2605.22	
2561.85 *3*	0.0259 *10*	(5161.004)	$3^+,4^+$	2599.13	
2564.79 *3*	0.0373 *14*	(5161.004)	$3^+,4^+$	2596.19	
2594.45 *15*	0.0055 *5*	(5161.004)	$3^+,4^+$	2566.53	
2598.16 *4*	0.0231 *9*	(5161.004)	$3^+,4^+$	2562.81	
2607.17 *3*	0.0344 *13*	(5161.004)	$3^+,4^+$	2553.81	
2611.6 *3*	0.0086 *3*	(5161.004)	$3^+,4^+$	2549.4	
2617.76 *4*	0.0149 *6*	(5161.004)	$3^+,4^+$	2543.22	
2621.31 *20*	0.0015 *3*	(5161.004)	$3^+,4^+$	2539.67	
2637.97 *6*	0.0084 *5*	(5161.004)	$3^+,4^+$	2523.01	
2640.00 *3*	0.0160 *6*	(5161.004)	$3^+,4^+$	2520.98	
2661.55 *4*	0.0263 *10*	(5161.004)	$3^+,4^+$	2499.43	
2668.00 *4*	0.0247 *9*	(5161.004)	$3^+,4^+$	2492.97	
2676.13 *7*		(5161.004)	$3^+,4^+$	2484.85	I_γ: 0.140 *8* (in per 100 captures) is considered by 2007ChZX as from 1994Pe19 (which give 0.141 *8*), but not adopted, while other γ′s in this category were adopted (no explanation found).
2677.63 *12*	0.0100 *4*	(5161.004)	$3^+,4^+$	2483.35	
2688.09 *3*	0.0254 *10*	(5161.004)	$3^+,4^+$	2472.89	
2692.30 *6*	0.0115 *7*	(5161.004)	$3^+,4^+$	2468.68	
2698.19 *4*	0.0185 *7*	(5161.004)	$3^+,4^+$	2462.78	
2702.38 *6*	0.0109 *4*	(5161.004)	$3^+,4^+$	2458.60	
2710.62 *4*	0.0117 *4*	(5161.004)	$3^+,4^+$	2450.36	
2714.63 *3*	0.0141 *5*	(5161.004)	$3^+,4^+$	2446.35	
2724.26 *4*	0.0151 *6*	(5161.004)	$3^+,4^+$	2436.71	
2726.30 *20*	0.00296 *11*	(5161.004)	$3^+,4^+$	2434.67	
2735.13 *4*	0.0188 *7*	(5161.004)	$3^+,4^+$	2425.84	
2739.00 *4*	0.0200 *8*	(5161.004)	$3^+,4^+$	2421.97	
2747.65 *4*	0.0198 *8*	(5161.004)	$3^+,4^+$	2413.32	
2757.726 *24*	0.0515 *19*	(5161.004)	$3^+,4^+$	2403.249	
2764.51 *4*	0.0289 *11*	(5161.004)	$3^+,4^+$	2396.46	
2767.58 *4*	0.0287 *11*	(5161.004)	$3^+,4^+$	2393.40	
2791.87 *10*	0.00475 *18*	(5161.004)	$3^+,4^+$	2369.10	
2799.65 *6*	0.0109 *4*	(5161.004)	$3^+,4^+$	2361.32	
2804.82 *4*	0.0203 *8*	(5161.004)	$3^+,4^+$	2356.15	
2809.82 *9*	0.00662 *25*	(5161.004)	$3^+,4^+$	2351.15	
2814.88 *15*	0.0032 *4*	(5161.004)	$3^+,4^+$	2346.09	
2820.68 *6*	0.0063 *4*	(5161.004)	$3^+,4^+$	2340.29	
2828.58 *7*	0.0051 *4*	(5161.004)	$3^+,4^+$	2332.39	
2837.50 *4*	0.0195 *7*	(5161.004)	$3^+,4^+$	2323.48	
2839.32 *9*	0.0064 *6*	(5161.004)	$3^+,4^+$	2321.65	
2849.25 *11*	0.0040 *4*	(5161.004)	$3^+,4^+$	2311.72	
2852.55 *4*	0.0139 *5*	(5161.004)	$3^+,4^+$	2308.42	
2863.06 *3*	0.073 *3*	(5161.004)	$3^+,4^+$	2297.91	

$^{140}_{57}La_{83}$-10

^{139}La(n,γ) E=th (continued)

$\gamma(^{140}$La) (continued)

E_γ†	I_γ‡b	E_i(level)	J_i^π	E_f	E_γ†	I_γ‡b	E_i(level)	J_i^π	E_f
2869.14 *13*	0.0018 *3*	(5161.004)	$3^+,4^+$	2291.83	3163.792 *24*	0.0324 *12*	(5161.004)	$3^+,4^+$	1997.174
2880.60 *6*	0.0101 *4*	(5161.004)	$3^+,4^+$	2280.38	3171.69 *7*	0.0073 *5*	(5161.004)	$3^+,4^+$	1989.28
2883.54 *11*	0.0050 *5*	(5161.004)	$3^+,4^+$	2277.43	3174.77 *4*	0.0135 *5*	(5161.004)	$3^+,4^+$	1986.19
2887.47 *13*	0.00451 *17*	(5161.004)	$3^+,4^+$	2273.50	3189.09 *3*	0.0538 *20*	(5161.004)	$3^+,4^+$	1971.87
2896.63 *6*	0.0081 *5*	(5161.004)	$3^+,4^+$	2264.34	3197.52 *6*	0.0213 *8*	(5161.004)	$3^+,4^+$	1963.44
2903.65 *5*	0.0112 *4*	(5161.004)	$3^+,4^+$	2257.33	3206.21 *19*	0.00437 *16*	(5161.004)	$3^+,4^+$	1954.75
2913.16 *4*	0.0124 *5*	(5161.004)	$3^+,4^+$	2247.81	3213.35 *4*	0.0144 *5*	(5161.004)	$3^+,4^+$	1947.62
2916.89 *4*	0.0130 *8*	(5161.004)	$3^+,4^+$	2244.08	3219.80 *3*	0.0300 *11*	(5161.004)	$3^+,4^+$	1941.16
2919.73 *6*	0.0086 *3*	(5161.004)	$3^+,4^+$	2241.24	3258.876 *24*	0.0068 *4*	(5161.004)	$3^+,4^+$	1902.088
2925.00 *3*	0.0435 *16*	(5161.004)	$3^+,4^+$	2235.97	3265.263 *24*	0.0532 *20*	(5161.004)	$3^+,4^+$	1895.700
2929.44 *9*	0.00598 *23*	(5161.004)	$3^+,4^+$	2231.53	3281.248 *24*	0.0506 *19*	(5161.004)	$3^+,4^+$	1879.715
2941.24 *6*	0.00276 *24*	(5161.004)	$3^+,4^+$	2219.73	3285.64 *8*	0.0042 *3*	(5161.004)	$3^+,4^+$	1875.32
2942.84 *5*	0.00368 *25*	(5161.004)	$3^+,4^+$	2218.13	3289.39 *9*	0.00297 *24*	(5161.004)	$3^+,4^+$	1871.57
2961.34 *4*	0.0262 *10*	(5161.004)	$3^+,4^+$	2199.63	3294.53 *6*	0.0056 *4*	(5161.004)	$3^+,4^+$	1866.43
2963.9 *4*	0.0077 *6*	(5161.004)	$3^+,4^+$	2197.0	3301.30 *6*	0.0038 *3*	(5161.004)	$3^+,4^+$	1859.66
2969.27 *4*	0.0409 *15*	(5161.004)	$3^+,4^+$	2191.70	3306.87 *12*	0.00158 *6*	(5161.004)	$3^+,4^+$	1854.09
2977.35 *5*	0.0164 *6*	(5161.004)	$3^+,4^+$	2183.62	3312.34 *10*	0.0038 *3*	(5161.004)	$3^+,4^+$	1848.62
2985.02 *6*	0.0100 *4*	(5161.004)	$3^+,4^+$	2175.95	3318.99 *4*	0.0319 *12*	(5161.004)	$3^+,4^+$	1841.97
2988.53 *3*	0.0458 *17*	(5161.004)	$3^+,4^+$	2172.44	3322.06 *13*	0.00163 *15*	(5161.004)	$3^+,4^+$	1838.90
2998.36 *5*	0.0136 *5*	(5161.004)	$3^+,4^+$	2162.61	3337.83 *6*	0.00639 *24*	(5161.004)	$3^+,4^+$	1823.13
3001.17 *13*	0.00220 *23*	(5161.004)	$3^+,4^+$	2159.80	3341.48 *4*	0.0090 *5*	(5161.004)	$3^+,4^+$	1819.48
3012.03 *11*	0.0033 *7*	(5161.004)	$3^+,4^+$	2148.94	3347.01 *10*	0.00283 *24*	(5161.004)	$3^+,4^+$	1813.95
3017.070 *24*	0.0671 *25*	(5161.004)	$3^+,4^+$	2143.900	3356.01 *6*	0.00562 *21*	(5161.004)	$3^+,4^+$	1804.95
3031.27 *4*	0.0330 *12*	(5161.004)	$3^+,4^+$	2129.69	3359.88 *3*	0.0120 *7*	(5161.004)	$3^+,4^+$	1801.08
3035.56 *3*	0.0518 *20*	(5161.004)	$3^+,4^+$	2125.41	3368.29 *13*	0.0022 *3*	(5161.004)	$3^+,4^+$	1792.67
3040.94 *4*	0.0294 *11*	(5161.004)	$3^+,4^+$	2120.03	3371.86 *10*	0.0032 *3*	(5161.004)	$3^+,4^+$	1789.10
3044.25 *10*	0.0038 *5*	(5161.004)	$3^+,4^+$	2116.72	3383.39 *3*	0.0242 *9*	(5161.004)	$3^+,4^+$	1777.57
3051.49 *5*	0.0183 *7*	(5161.004)	$3^+,4^+$	2109.48	3386.37 *16*	0.0031 *4*	(5161.004)	$3^+,4^+$	1774.59
3057.66 *6*	0.0194 *7*	(5161.004)	$3^+,4^+$	2103.31	3395.44 *4*	0.0161 *6*	(5161.004)	$3^+,4^+$	1765.52
3066.74 *15*	0.0057 *6*	(5161.004)	$3^+,4^+$	2094.23	3404.81 *4*	0.0171 *6*	(5161.004)	$3^+,4^+$	1756.15
3068.96 *20*	0.00420 *16*	(5161.004)	$3^+,4^+$	2092.01	3412.94 *6*	0.0068 *4*	(5161.004)	$3^+,4^+$	1748.02
3078.80 *6*	0.0130 *5*	(5161.004)	$3^+,4^+$	2082.17	3417.24 *4*	0.0181 *7*	(5161.004)	$3^+,4^+$	1743.72
3082.979 *24*	0.140 *5*	(5161.004)	$3^+,4^+$	2077.989	3424.29 *3*	0.0232 *14*	(5161.004)	$3^+,4^+$	1736.67
3091.30 *6*	0.0114 *4*	(5161.004)	$3^+,4^+$	2069.67	3425.399 *24*	0.058 *3*	(5161.004)	$3^+,4^+$	1735.560
3095.50 *4*	0.0191 *7*	(5161.004)	$3^+,4^+$	2065.47	3437.83 *4*	0.0247 *9*	(5161.004)	$3^+,4^+$	1723.12
3112.38 *3*	0.0320 *12*	(5161.004)	$3^+,4^+$	2048.59	3442.20 *3*	0.0410 *15*	(5161.004)	$3^+,4^+$	1718.76
3115.94 *3*	0.0176 *7*	(5161.004)	$3^+,4^+$	2045.02	3451.6 *3*	0.0014 *3*	(5161.004)	$3^+,4^+$	1709.4
3119.05 *4*	0.0118 *8*	(5161.004)	$3^+,4^+$	2041.92	3459.91 *3*	0.0199 *8*	(5161.004)	$3^+,4^+$	1701.05
3120.84 *11*	0.0033 *4*	(5161.004)	$3^+,4^+$	2040.13	3472.95 *16*	0.0027 *4*	(5161.004)	$3^+,4^+$	1688.01
3137.21 *4*	0.0239 *9*	(5161.004)	$3^+,4^+$	2023.76	3477.14 *3*	0.0444 *17*	(5161.004)	$3^+,4^+$	1683.82
3142.75 *3*	0.0320 *12*	(5161.004)	$3^+,4^+$	2018.22	3484.28 *16*	0.0027 *4*	(5161.004)	$3^+,4^+$	1676.68
3155.06 *6*	0.0090 *3*	(5161.004)	$3^+,4^+$	2005.90	3488.77 *3*	0.0170 *6*	(5161.004)	$3^+,4^+$	1672.19

$^{140}_{57}La_{83}$-11

^{139}La(n,γ) E=th (continued)

γ(^{140}La) (continued)

E_γ †	I_γ ‡b	E_i(level)	J_i^π	E_f	J_f^π
3497.96 *4*	0.0056 *4*	(5161.004)	$3^+,4^+$	1663.00	
3500.08 *8*	0.0023 *3*	(5161.004)	$3^+,4^+$	1660.88	
3505.59 *20*	0.0013 *3*	(5161.004)	$3^+,4^+$	1655.37	
3509.17 *4*	0.0072 *5*	(5161.004)	$3^+,4^+$	1651.79	
3524.97 *4*	0.0064 *4*	(5161.004)	$3^+,4^+$	1635.99	
3539.27 *8*	0.00333 *25*	(5161.004)	$3^+,4^+$	1621.69	
3542.99 *6*	0.0042 *3*	(5161.004)	$3^+,4^+$	1617.97	
3564.87 *4*	0.0130 *5*	(5161.004)	$3^+,4^+$	1596.09	
3580.90 *4*	0.0129 *5*	(5161.004)	$3^+,4^+$	1580.06	
3583.4 *5*	0.00042 *21*	(5161.004)	$3^+,4^+$	1577.5	
3596.45 *4*	0.0157 *6*	(5161.004)	$3^+,4^+$	1564.51	
3606.467 *24*	0.0556 *21*	(5161.004)	$3^+,4^+$	1554.487	
3610.026 *24*	0.0548 *21*	(5161.004)	$3^+,4^+$	1550.929	
3613.29 *6*	0.0055 *4*	(5161.004)	$3^+,4^+$	1547.66	
3628.66 *10*	0.0037 *3*	(5161.004)	$3^+,4^+$	1532.29	
3633.5 *3*	0.00156 *15*	(5161.004)	$3^+,4^+$	1527.5	
3665.631 *24*	0.135 *5*	(5161.004)	$3^+,4^+$	1495.322	
3679.641 *24*	0.139 *5*	(5161.004)	$3^+,4^+$	1481.312	
3683.89 *3*	0.0322 *21*	(5161.004)	$3^+,4^+$	1477.06	
3691.35 *3*	0.0350 *13*	(5161.004)	$3^+,4^+$	1469.60	
3718.321 *24*	0.0384 *15*	(5161.004)	$3^+,4^+$	1442.631	
3727.700 *24*	0.073 *3*	(5161.004)	$3^+,4^+$	1433.251	
3735.30 *4*	0.0170 *6*	(5161.004)	$3^+,4^+$	1425.65	
3738.56 *4*	0.0352 *13*	(5161.004)	$3^+,4^+$	1422.39	
3744.87 *4*	0.0234 *9*	(5161.004)	$3^+,4^+$	1416.08	
3820.23 *9*	0.0047 *5*	(5161.004)	$3^+,4^+$	1340.72	
3821.40 *4*	0.0131 *9*	(5161.004)	$3^+,4^+$	1339.55	
3865.47 *11*	0.00289 *11*	(5161.004)	$3^+,4^+$	1295.47	
3876.83 *7*	0.0056 *7*	(5161.004)	$3^+,4^+$	1284.12	
3900.979 *24*	0.0531 *20*	(5161.004)	$3^+,4^+$	1259.967	
3906.17 *13*	0.0006 *4*	(5161.004)	$3^+,4^+$	1254.78	
3951.14 *3*	0.0198 *8*	(5161.004)	$3^+,4^+$	1209.80	
3953.59 *9*	0.00255 *23*	(5161.004)	$3^+,4^+$	1207.36	
3970.44 *12*	0.00170 *22*	(5161.004)	$3^+,4^+$	1190.50	
3973.56 *4*	0.0120 *5*	(5161.004)	$3^+,4^+$	1187.38	
3999.92 *12*	0.00220 *23*	(5161.004)	$3^+,4^+$	1161.02	
4013.52 *20*	0.00099 *15*	(5161.004)	$3^+,4^+$	1147.43	
4044.182 *21*	0.0297 *11*	(5161.004)	$3^+,4^+$	1116.760	
4060.007 *20*	0.0297 *11*	(5161.004)	$3^+,4^+$	1100.934	$3^-,4^-$
4063.67 *15*	0.0011 *3*	(5161.004)	$3^+,4^+$	1097.27	
4105.897 *20*	0.0238 *9*	(5161.004)	$3^+,4^+$	1055.042	$4^-,5^-$
4125.31 *3*	0.0183 *7*	(5161.004)	$3^+,4^+$	1035.63	4^-
4192.28 *8*	0.00028 *21*	(5161.004)	$3^+,4^+$	968.66	$3^-,4^-$
4248.76 *3*	0.00106 *22*	(5161.004)	$3^+,4^+$	912.17	$3^-,4^-$
4364.66 *5*	0.00433 *16*	(5161.004)	$3^+,4^+$	796.27	2^-
4389.505 *14*	0.255 *10*	(5161.004)	$3^+,4^+$	771.425	$^-$
4416.22 *3*	0.247 *9*	(5161.004)	$3^+,4^+$	744.71	4^-
4449.26 *3*	0.0075 *6*	(5161.004)	$3^+,4^+$	711.67	3^-
4502.647 *13*	0.164 *6*	(5161.004)	$3^+,4^+$	658.280	3^-
4558.891 *13*	0.0488 *18*	(5161.004)	$3^+,4^+$	602.034	4^-
4842.695 *7*	0.661 *25*	(5161.004)	$3^+,4^+$	318.219	3^-
4888.606 *7*	0.150 *6*	(5161.004)	$3^+,4^+$	272.307	4^-
4998.250 *6*	0.0145 *8*	(5161.004)	$3^+,4^+$	162.659	2^-
5097.726 *6*	0.68 *3*	(5161.004)	$3^+,4^+$	63.1791	4^-
5126.257 *6*	0.114 *4*	(5161.004)	$3^+,4^+$	34.6465	5^-
5130.939 *6*	0.0159 *9*	(5161.004)	$3^+,4^+$	29.9641	2^-
5160.902 *6*	0.089 *5*	(5161.004)	$3^+,4^+$	0.0	3^-

† From 2007ChZX, based on 1994Pe19; 1994Pe19: secondary γ's are mostly from 1970Ju04 or 1988BoZH (without uncertainty), primary γ's from 1990Is09; see also general comments

‡ Partial elemental cross section in barn from 2007ChZX, $\sigma_\gamma^Z(E_\gamma)=\theta p(E_\gamma)\sigma_0$, with θ=99.910% *1* the isotopic abundance (2007ChZX, same in 2005TuZX), p(E_γ) the absolute γ-emission probability (γ's per capture), σ_0 the n capture probability (at 2200 m/s); see also general comments

\# From α(K)exp in 1988BoZH, detailed ce data were not given

@ γ removed by 2007ChZX; since no specific explanation was found, it is adopted here, based on 1994Pe19

& γ added by 2007ChZX (unknown source); all γ's in this category are transitions to g.s.

a γ added by 2007ChZX (from 1981Lo16).

b For intensity per 100 neutron captures, multiply by 17.377 *15*.

$^{140}_{57}La_{83}$-12

γ(^{140}La) (continued)

[c] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[d] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{140}_{57}La_{83}$-13

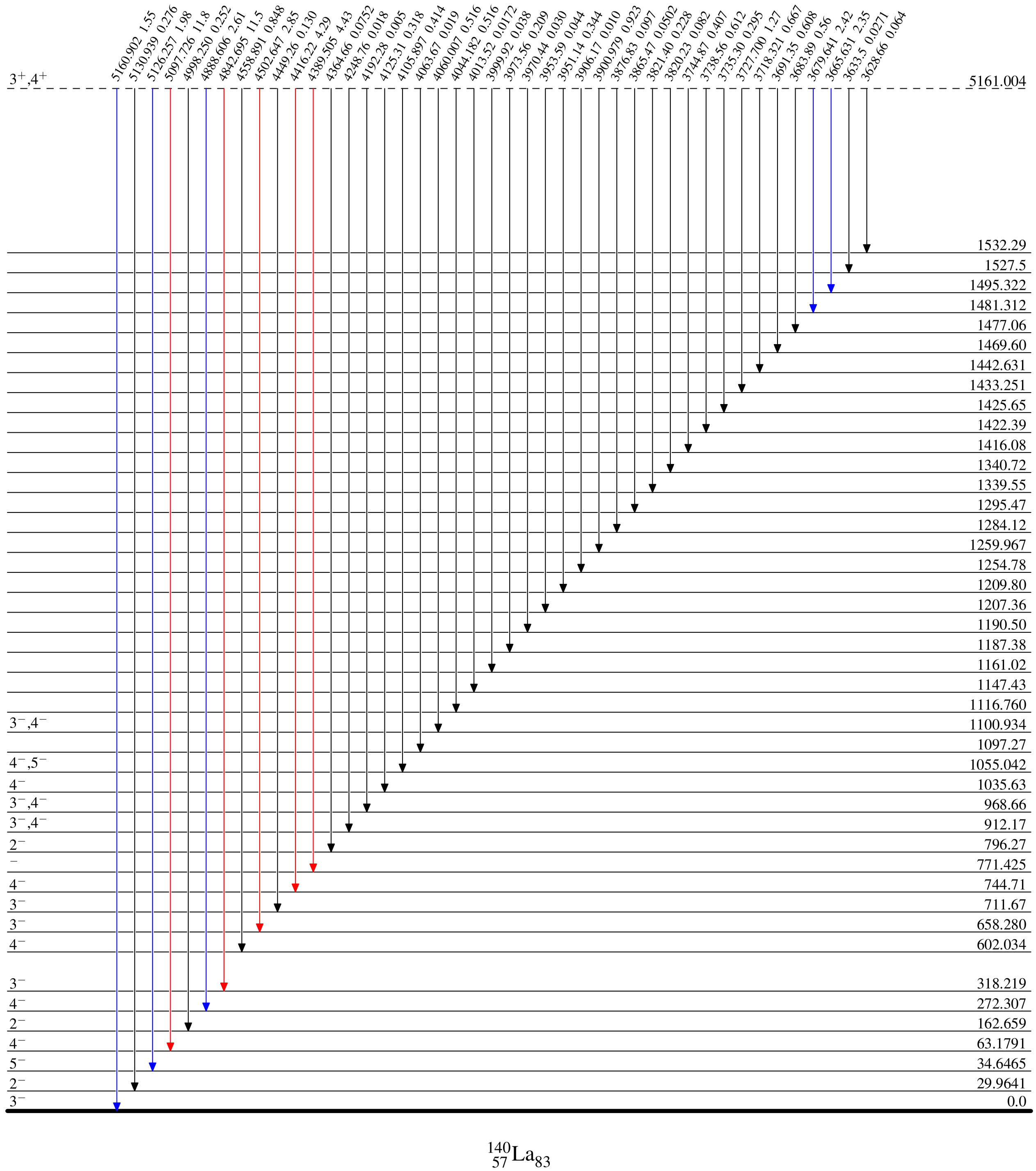
$^{139}La(n,\gamma)$ E=th

Legend

Level Scheme

Intensities: I_γ per 100 neutron captures

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

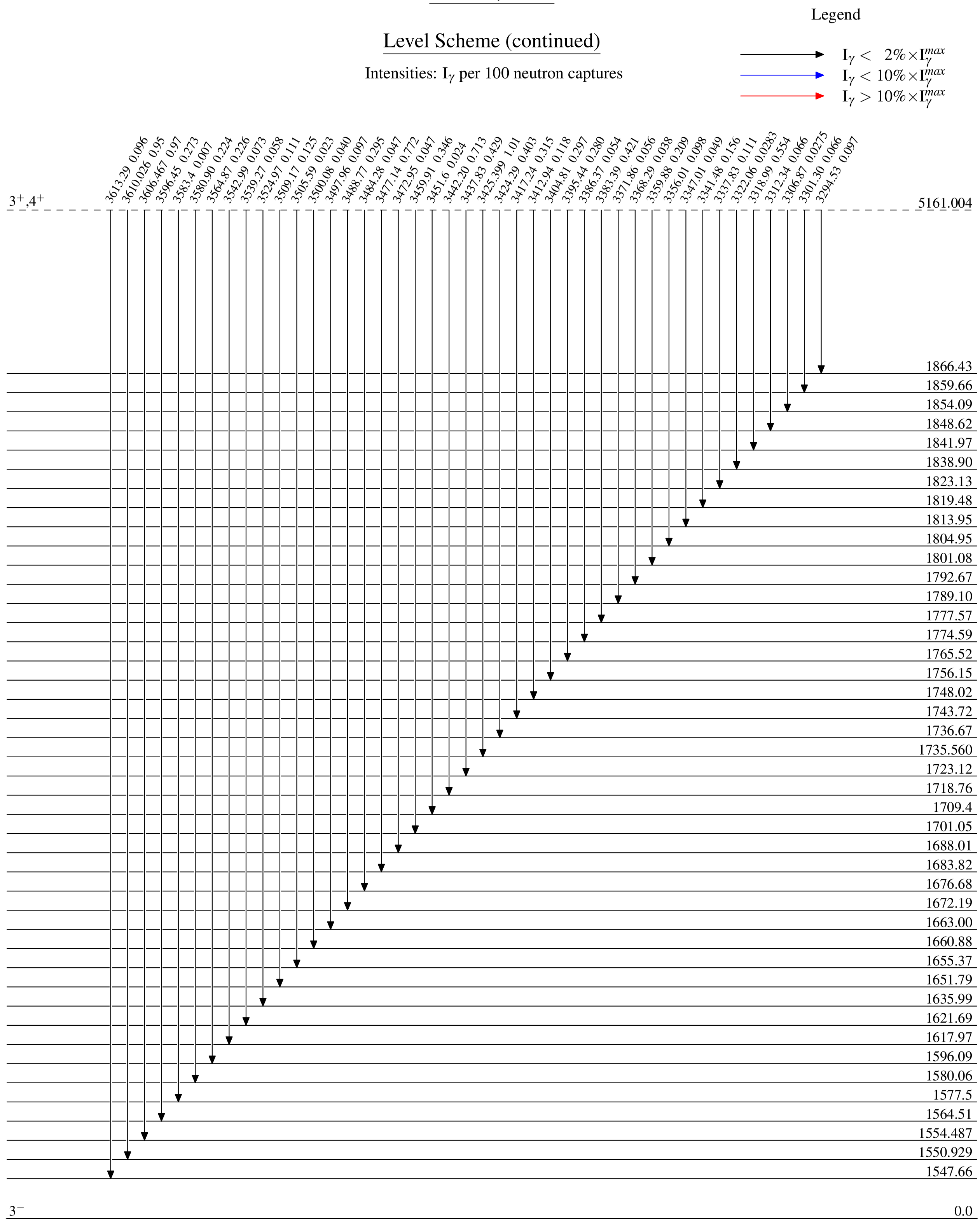


$^{140}_{57}La_{83}$

^{139}La(n,γ) E=th

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures



$^{140}_{57}La_{83}$

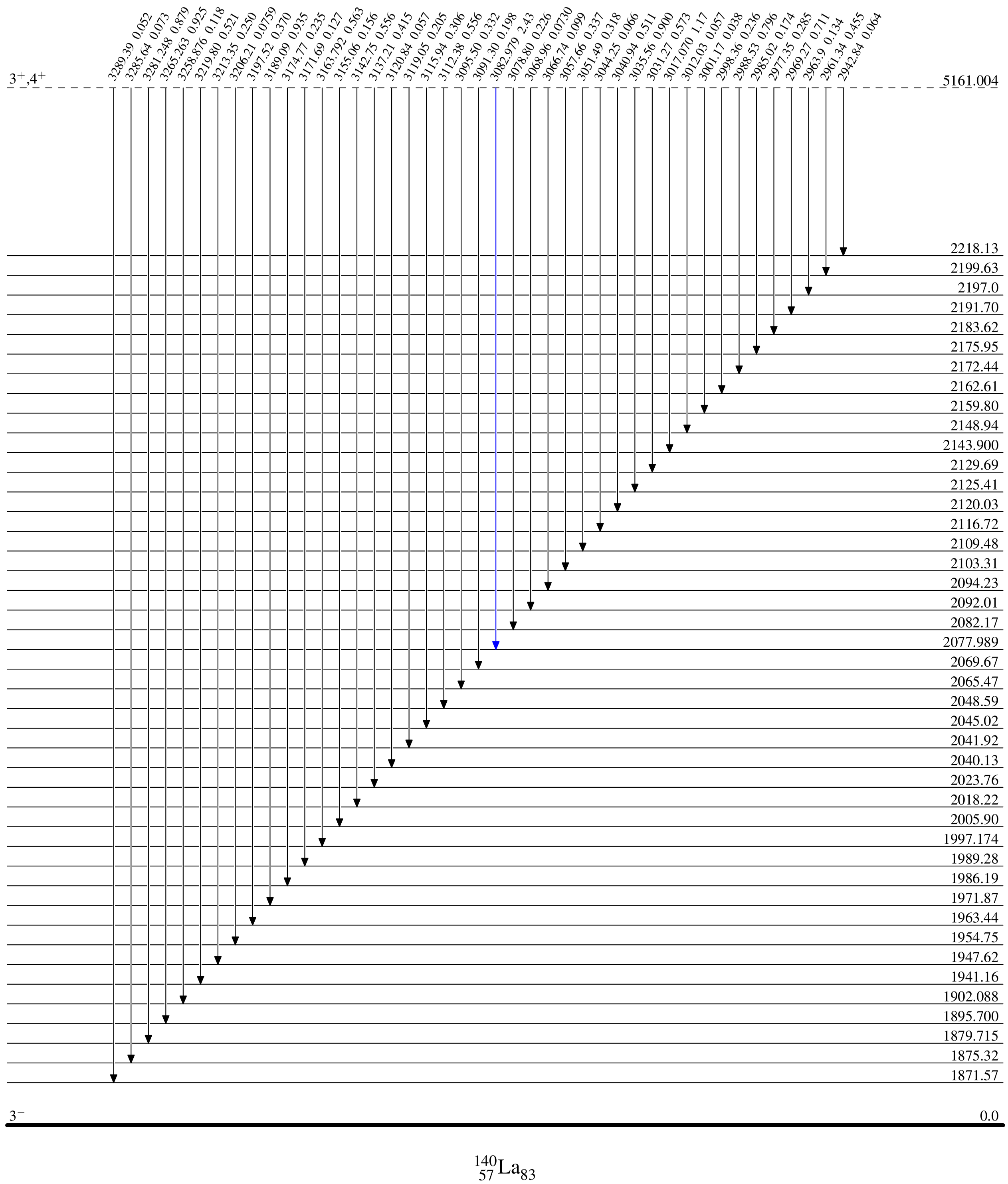
^{139}La(n,γ) E=th

Legend

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures

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



$^{140}_{57}La_{83}$

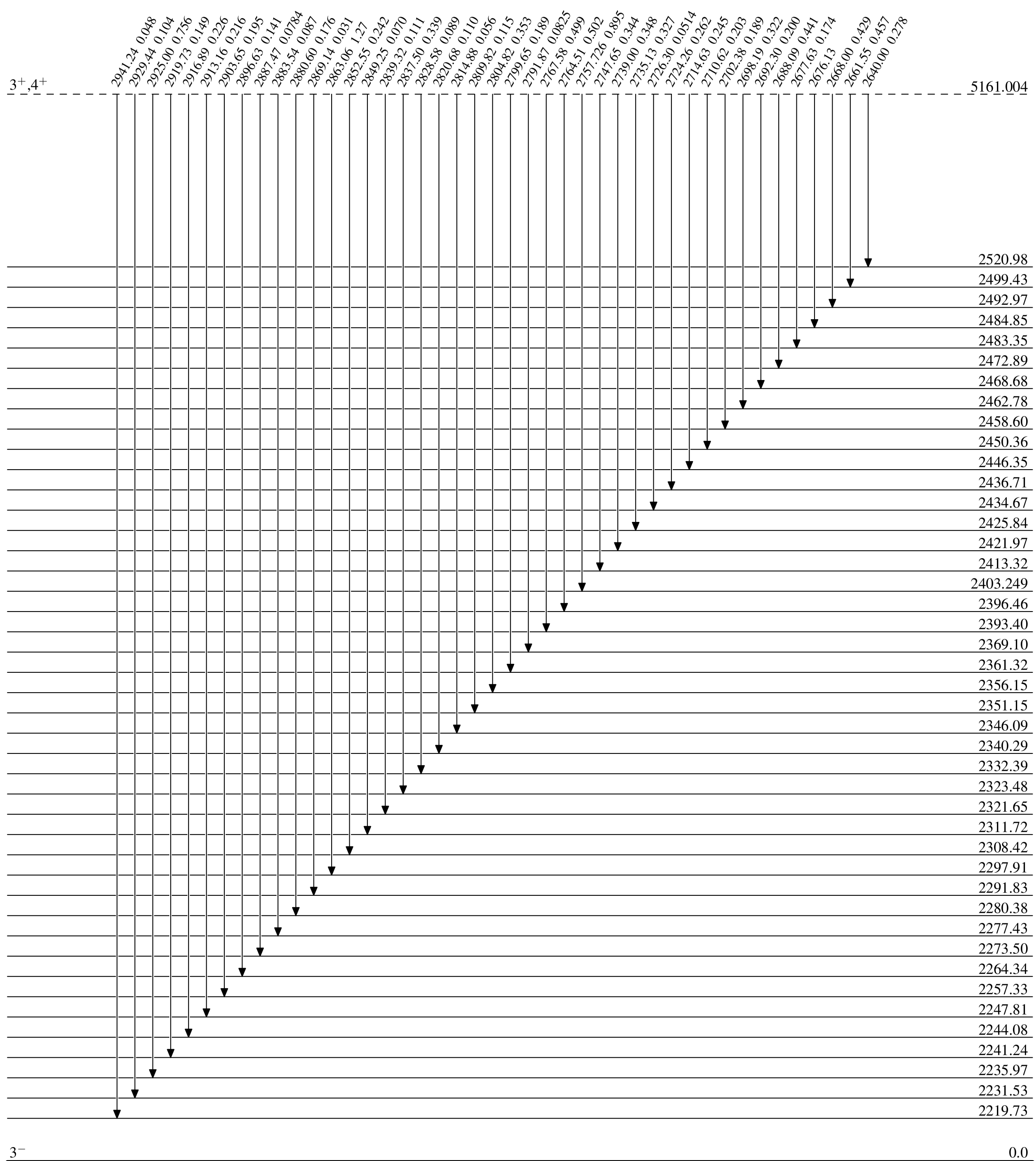
^{139}La(n,γ) E=th

Legend

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

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures

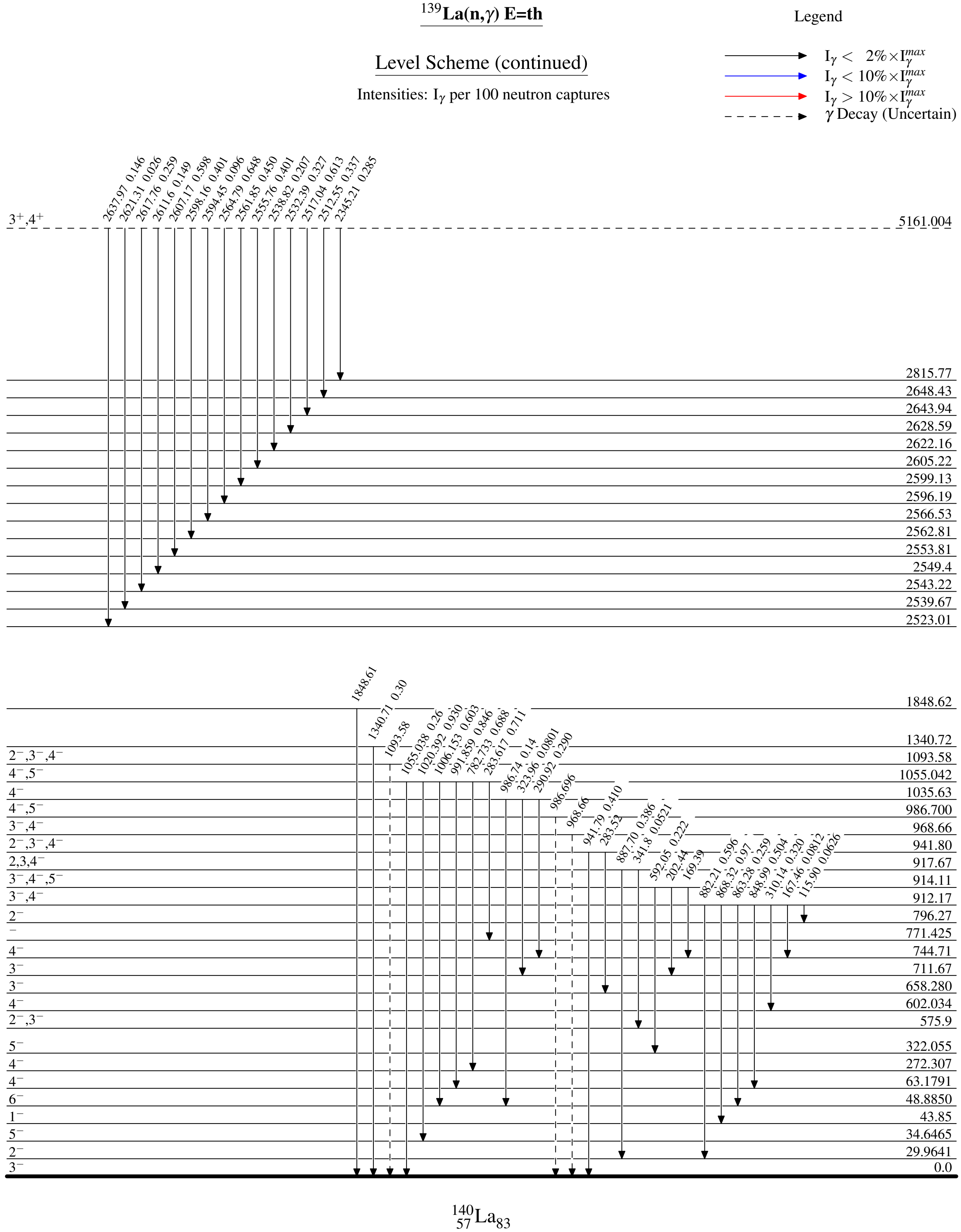


$^{140}_{57}La_{83}$

^{139}La(n,γ) E=th

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures



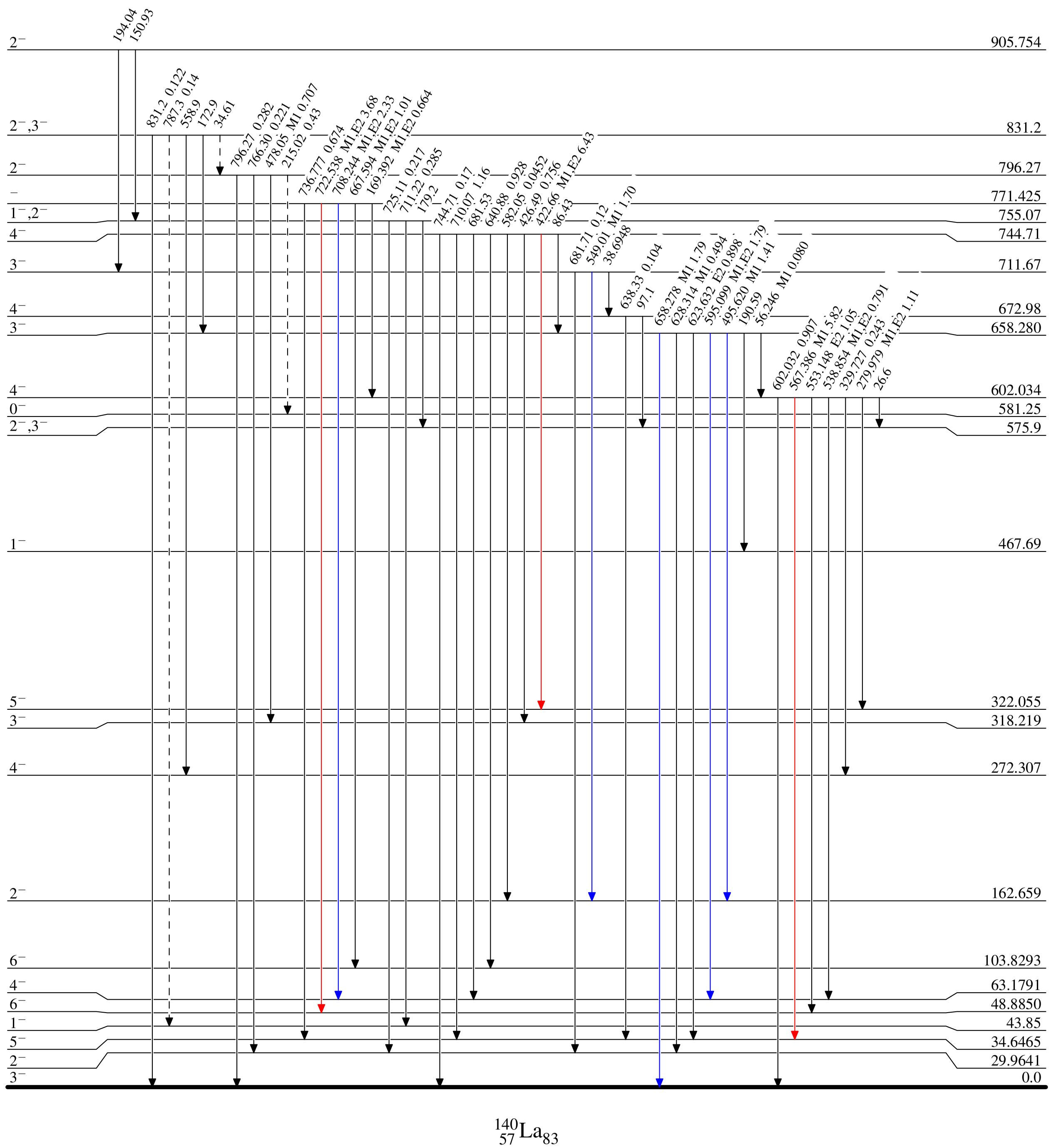
^{139}La(n,γ) E=th

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures

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)



$^{140}_{57}La_{83}$

$^{139}La(n,\gamma)$ E=th

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures